

**BRIO REFINING SUPERFUND SITE
HOUSTON, TEXAS
AMENDED RECORD OF DECISION
DECLARATION**

SITE NAME AND LOCATION

Brio Refining Site, Houston, Texas

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected amended remedial action for the Brio Refining Site in Houston, Texas, developed in accordance with CERCLA, as amended by SARA, and, to the extent practicable, the National Contingency Plan. This decision is based on the Administrative Record for the site.

The State of Texas concurs on the selected remedy.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this amended Record of Decision (ROD), may present an imminent and substantial endangerment to public health, welfare, or the environment.

DESCRIPTION OF THE REMEDY

This remedy amends the original remedy selected in the 1988 ROD. This containment remedy replaces on-site incineration as selected in the 1988 ROD. The containment remedy will reduce the risks associated with exposure to contaminated materials and inhibit the migration of contaminated groundwater from the site.

The major components of the amended remedy include:

- Installing a sub-grade vertical barrier wall enclosing the site;
- Capping the site with a cover system consisting of compacted clay, liner, and gas collection system;
- Constructing a groundwater flow control system to manage the migration of contaminants within the containment system; and
- Improvement to Mud Gully to ensure flow capabilities within the drainage system.

STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with Federal and state requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. This remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable for this site. The remedy does not employ treatment as a principal element, which does not satisfy the statutory preference for treatment; however, treatment components are incorporated into the remedy to address principal threats. Additional incorporation of treatment was not practicable because of short-term emission concerns from intrusive remedies.

Because this remedy will result in hazardous substances remaining on-site above health-based levels, a review will be conducted within five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.



Jerry Clifford (GRA)
Acting Regional Administrator



Date

**BRIO REFINING SUPERFUND SITE
HOUSTON, TEXAS
AMENDED RECORD OF DECISION
DECISION SUMMARY**

This Amended Record of Decision (ROD) revises and supersedes portions of the original ROD. The portions of the original ROD that remain effective are dismantling and disposition of process equipment and site debris, site control, the recovery of dense non-aqueous phase liquid (DNAPL), and off-site soil contamination. The Amended ROD summarizes the information that can be found in greater detail in documents contained in the Administrative Record for the Brio site, and this Amended ROD will become part of the Administrative Record as required by the NCP. The development and evaluation of remedial alternatives to address the contamination are presented in the Feasibility Study Report, the Memorandum of Technology Screening and Development of Remedial Alternatives, and the Scope of Work as developed by the Community Advisory Group, the Brio Site Task Force and EPA. All of these documents are maintained as part of the Administrative Record.

INTRODUCTION

This Amended ROD summarizes the new selected remedial alternative for the Brio site. The EPA originally selected treatment of contaminated sludges, liquids, and waste material by on-site incineration in 1988. Since the 1988 ROD, additional characterization studies have occurred resulting in a better understanding of the site conditions and geology, contaminants of concern and migration characteristics, and the extent of contaminated media. In addition, the concerns and goals of the public have been better determined through steps taken to involve the community in the decisions and plans that have been made for the site. These developments have resulted in the decision to revise the 1988 ROD remedy through this Amended ROD.

Lead Agency and Administrative Record

The EPA is the lead agency for the Brio Superfund Site. The EPA helped establish a Community Advisory Group (CAG) to provide for public representation and involvement in the remedy development process for the Brio site. As such, meetings are frequently held where the public are invited to attend and participate. This participation is encouraged to allow the public to be involved with the issues concerning the site.

An Administrative Record was established for the 1988 ROD where reports, documents, and correspondence related to the Brio site have been placed. This material shows the history of site activities and serves as an information repository for public use. An Administrative Record has been established for this Amended ROD. The complete Administrative Record is available at the following locations:

Brio Local Community Relations Office
10904 Scarsdale, Suite 295
Houston, Texas 77089
(713) 922-4750

San Jacinto College -
South Campus Library
13735 Beamer Road
Houston, Texas 77089
(713) 992-3416

U.S. Environmental Protection Agency
12th Floor Library
1445 Ross Avenue
Dallas, Texas 75202-2733
(214)665-6444

Texas Natural Resource
Conservation Commission
Park 35 Circle on IH-35 N.
P.O. Box 13087
Austin, Texas 78711-3087
(512) 239-1000

Community Relations

This Amended ROD was prepared with the direct input of the CAG. The CAG held over 20 meetings that were open to the public during the formation of the proposed alternative. EPA provided a \$50,000 Technical Assistance Grant to the CAG for the services of a technical advisor during this process.

A community relations office has been established to facilitate public comment and inquiries as to the status of the site and site activities. As required by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Contingency Plan (NCP), 40 Code of Federal Regulations (CFR), Section 300.435(c)(2)(ii), the EPA solicited public review and comment on this Amended ROD. Public comments on this Amended ROD were solicited in a comment period from April 7 to May 7, 1997. In addition, a public meeting was held on April 15, 1997, to solicit public comment. A Responsiveness Summary addressing public comments received is attached to the Amended ROD.

SITE DESCRIPTION AND BACKGROUND

The Brio Refining Site is located almost 20 miles south of Houston, Texas, and occupies approximately 58 acres. The site is divided by Dixie Farm Road, with Brio North being historically used for storage purposes and Brio South being primarily used for processing activities. A neighboring residential subdivision (Southbend, now abandoned) is located along and north of the northern boundary of Brio North. Mud Gully, a flood control ditch and local tributary of Clear Creek, runs along the western boundary of the Brio site. Figure 1 shows the general location of the Brio site and the site layout.

In general, processing activities consisted of reclamation of petrochemicals from various source materials, most of which were residues, tank bottoms, and tars of other processes performed at off-

site locations. Most of the feedstock materials for processing at Brio were stored in on-site pits, many of which were located on Brio North. However, the disposal areas were on both the Brio North and South Sites. EPA finalized the site on the National Priorities List on March 31, 1989.

Numerous investigations, studies, and site activities have been performed at the Brio Site in efforts to determine the exact location of the former storage pits and the nature and extent of contamination. The investigations found that the majority of the contamination at the site is found within the location of the former storage pit areas. The pits were constructed within the uppermost geologic unit which is called the Upper Clay. This unit occurs across the entire site and ranges in depth from 14 to 32 feet.

The Numerous Sand Channel Zone (NSCZ) and the Fifty-Foot Sand (FFSZ) are the two main water bearing units that have been investigated at the site. The NSCZ lies below the Upper Clay and is comprised of interbedded sands and silty clays. The NSCZ is encountered from 15 to 30 feet below ground surface. The groundwater in the NSCZ is heavily contaminated, low yielding, and typically flows toward and discharges to Mud Gully. The thickness of the NSCZ varies from 10 to over 20 feet.

The Middle Clay Unit (MCU) separates the NSCZ from the underlying Fifty-Foot Sand. The MCU forms a confining layer and ranges from 8 to 20 feet thick. The FFSZ contains low levels of contamination and flows in a south-southeast direction.

Following the site investigations, EPA issued a ROD on March 31, 1988, that selected remedial actions consisting of on-site incineration of pit residuals, removal of surface contamination, channel improvements to Mud Gully, demobilization of remaining process equipment and removal of debris on the site, removal of dense non-aqueous phase liquids (DNAPL) and pump and treat for groundwater in the NSCZ. The ROD addressed all the threats at the site as a single operable unit, including groundwater contamination. A consent decree was entered in April 1991 between EPA and the Brio Site Task Force (BSTF) for implementation of the ROD.

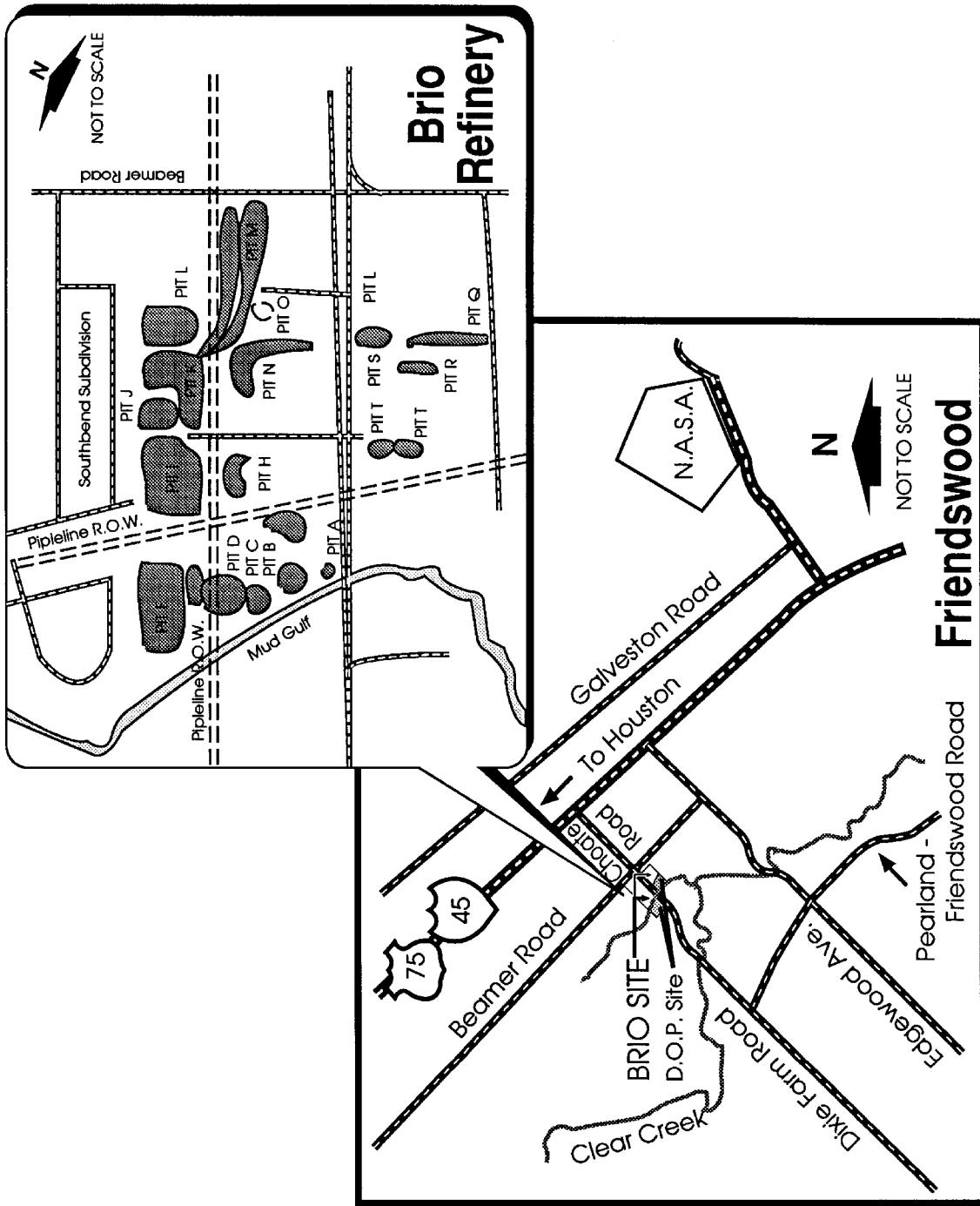


Figure 1 - Brio Refining Site Map

A remedial design was performed by the BSTF and approved by EPA in July 1993. The design covered all aspects of the ROD with the exception of DNAPL recovery. DNAPL recovery is proceeding under a different construction track because the work is not dependant on the type of source control performed.

Demolition of the majority of the remaining process equipment was completed prior to mobilization of the incinerator. In addition, a temporary groundwater treatment system was installed to address the movement of contaminated groundwater into Mud Gully in 1994.

A rotary kiln incinerator and support equipment were mobilized to the site following the demolition work. Temporary enclosures were erected over the pits requiring remediation in order to contain emissions during excavation. The incinerator began clean burn operations with imported material, and excavation began at Pit R on Brio South for shakedown operations and to stockpile material for the trial burn. Emission problems during excavation led to a “stop work” order until appropriate emission control equipment could be installed. Before additional controls could be installed, other events described below led to the submittal of a force majeure claim by the BSTF, which eventually resulted in the decision by EPA to allow the dismantling of the incinerator. The incinerator and support equipment was demobilized by December 1994. Since demobilization, the groundwater treatment system has continued to operate, the DNAPL remediation has proceeded, and drums stockpiled since the inception of investigations at the site were disposed of off-site.

SCOPE OF THIS RESPONSE ACTION

Rationale for Amending the Record of Decision

In response to requests by the public, a review of Brio Site issues, and the remedial action plan was started in early 1993 by the EPA Superfund Revitalization Office (SRO) and the Ombudsman from EPA Headquarters Office in Washington D.C.. The results of this review were published in a document referred to as the SRO Report on April 1, 1994. The report stated that several issues needed resolution before continuing with implementation of the on-site incineration remedy. The issues included additional site characterization, additional air monitoring, and continual stack testing after the trial burn period.

In May 1994, the BSTF submitted a force majeure claim stating that the short-term air standards set by EPA during the remedial design for the implementation of the remedial action would result in a delay of compliance with the milestone schedule in the Consent Decree. On June 2, 1994, the BSTF petitioned the EPA to alter the response action for the Brio site. The BSTF claimed that in addition to the short-term air standards, the SRO report conflicted with the remedy and would substantially delay implementation of the incineration. On June 28, 1994, EPA suspended the milestone schedule and began an evaluation of options including the performance of a focused feasibility study. EPA held a public meeting on July 14, 1994, to solicit input on the options under consideration. The attendees of the meeting overwhelmingly favored discontinuing incinerator operations and studying the use of a containment remedy at the site. On August 2, 1994, EPA notified the BSTF that its petition, along with community input, provided a basis to re-evaluate the incineration remedy. EPA

noted that in addition to information presented in the BSTF's petition the following information was also considered:

- Emissions during excavation of site materials was higher than expected, resulting in the need for rigorous engineering controls;
- Engineering controls to abate the emissions would add significantly to the cost of the remedy;
- Air monitoring showed that fugitive emissions could leave the site even in an undisturbed state; and
- The detection of off-site dense non-aqueous liquids might lead to actions not considered in the current ROD.

The BSTF demobilized the incineration unit, replaced soils excavated in preparation for the trial burn, and began a re-evaluation of the site remedy through a focused feasibility study. The focused feasibility study process stopped following the submittal of the Memorandum on Technology Screening and Development of Remedial Alternatives in August 1995, after the CAG rejected the proposed alternative developed by the BSTF. The containment alternative that is evaluated in this Amended ROD was the result of the focused feasibility study submittals and discussions between EPA, CAG, and the BSTF; and other information contained in the Administrative Record.

Remedial Action Objectives

The remedial action objectives for the response action include:

- Protection of the health and safety of the community, workers, and the environment during implementation of the remedy;
- Minimization, to the extent practicable, of disruption and inconvenience to the community during implementation of the remedy;
- Long-term, effective control of migration of leachable organic liquids from the source area;
- Long-term, effective control of off-site migration of free-phase liquids or site constituents moving through the groundwater, surface water, soil, or air pathways;
- Long-term, effective reduction of potential future risk to the community and the environment resulting from off-site exposure to site constituents by maintaining or achieving:
 - Target levels of public exposure to air emissions
 - Target levels of affected soil dermal contact and ingestion
 - Control of off-site transport of affected soils to acceptable levels

- Protection of existing aquatic life in Mud Gully, and
- Target levels of organic constituents in the Fifty-Foot Sand Zone within a reasonable time;

- Minimization of potential negative impact of natural disasters such as flooding, hurricanes, etc.; and
- Long-term, effective site control and aesthetics.

The Endangerment Assessment developed specific target levels to achieve public health and environmental protection goals. The target levels are based on restricted access and a trespasser scenario and established the goals shown in Table 1. The target levels utilize 1×10^{-6} as the basis for calculating the concentrations. See the Administrative Record for more detailed information about site risks.

This Amended ROD changes the basis for the action levels established for Mud Gully in the 1988 ROD. The standards utilized in 1988 were based on acute toxicity levels for protection of freshwater aquatic life. The standards were updated by the State of Texas in 1990. The revised standards are applicable to Mud Gully and Clear Creek and are presented in Table 2. In addition, a human health criteria is being applied for consumption of fish only. A human health criteria was not utilized in the 1988 ROD, however, fish testing in Mud Gully and Clear Creek by the Texas Natural Resource Conservation Commission (TNRCC) in 1993 and 1994 found detectable levels of volatile organic compounds associated with the Brio site. The utilization of a human health criteria in these segments is applicable for the consumption of fish. When human health criteria exceed the freshwater water quality criteria, the freshwater quality criteria (chronic) will be used. This applies in the case of 1,2 dichloroethane because the calculated human health criteria for the consumption of fish exceeds the chronic water quality criteria.

In addition, an updated analysis of the remediation goals for the NSCZ adds a new criteria for off-site migration of contaminated groundwater. The 1988 ROD did not contain an action level for NSCZ groundwater. A criteria was eventually defined in the Scope of Work for the remedial design and was based on drinking water criteria. This Amended ROD is based on a determination that surface water standards are relevant and appropriate requirements for the NSCZ groundwater and should be applied outside the waste management area (i.e. the vertical barrier wall described below).

**TABLE 1
TARGET LEVELS ESTABLISHED IN THE ENDANGERMENT ASSESSMENT**

Constituent	Exposure Scenario (matrix)				
	Infrequent Trespass Ingestion (Soil)	Inhalation (Soil)	Aquatic Protection (NSCZ Groundwater)	Groundwater Ingestion (Fifty Foot Groundwater)	Off-site Ingestion (Soil)
Non-Carcinogenic PNAs	40,200 mg/kg				40,200 mg/kg
Carcinogenic PNAs					
Benzo(a)anthracene	10,200 mg/kg				26.9 mg/kg
Benzo(b)fluoranthene	1,200 mg/kg				5.1 mg/kg
Benzo(k)fluoranthene	580 mg/kg				5.1 mg/kg
Benzo(a)pyrene	44 mg/kg				.04 mg/kg
Dibenzo(a,h)anthracene	74 mg/kg				.23 mg/kg
Indeno(1,2,3,c,d)pyrene	7,400 mg/kg				10.5 mg/kg
Volatile Organic and Base Neutral Compounds					
1,2 Dichloroethane	2800 mg/kg	3,700 mg/kg	21,300 mg/l	3.8 µg/l	.13 mg/kg
1,1,2 Trichloroethane	4300 mg/kg	2300 mg/kg	1,700 mg/l	6.1 µg/l	1.4 mg/kg
Bis(2-chloroethyl)ether	230 mg/kg		10,400 mg/l		.07 mg/kg
Vinyl Chloride	109 mg/kg	640 mg/kg	4,700 mg/l	1 µg/l	.02 mg/kg
Methylene Chloride	33,000 mg/kg		9,700 mg/l	47 µg/l	12.5 mg/kg

Note: The lowest value for each matrix applies.

**Table 2
Revised Surface Water Criteria**

Compound	Clear Creek Criteria	Mud Gully Criteria
1,1,2 Trichloroethane	41.8 $\mu\text{g/l}$	4180 $\mu\text{g/l}$
1,2 Dichloroethane	1,794 $\mu\text{g/l}$	20,000 $\mu\text{g/l}$
1,1 Dichloroethylene	87.4 $\mu\text{g/l}$	8740 $\mu\text{g/l}$
Vinyl Chloride	94.5 $\mu\text{g/l}$	9450 $\mu\text{g/l}$

SUMMARY OF ALTERNATIVES

The remedial alternatives evaluated in this Amended ROD include the original remedy selected in the 1988 Record of Decision and the new selected remedy. EPA chartered the CAG in September 1994 to assist with the development of a containment alternative for the site. The new containment alternative was based on focused feasibility submittals, discussions between the CAG, the Brio Site Task Force and EPA and other information in the Administrative Record. EPA acted as a facilitator between the CAG and the BSTF in developing the proposed containment alternative. The utilization of this process resulted in a remedial alternative that contains elements essential to address the concerns of the community. The new proposed alternative addresses the environmental threats at the site, provides assurance of long-term protection from site hazards, and addresses other issues (e.g. Mud Gully relocation) that are a priority to the community. EPA is utilizing this process on a pilot project basis evaluating the use of CAGs in the development of remedial alternatives.

It is important to note that this plan does not amend the component in the original ROD addressing DNAPLs. The DNAPL Delineation and Recovery Project that was ongoing as a separate project during the mobilization of the incinerator was not suspended in 1994 and will continue as an element of the Consent Decree with the BSTF.

Alternative 1 - On-site Incineration (1988 ROD)

Affected materials and soils - Shall be treated using either incineration or biological treatment. This media shall be defined as all contaminated sludges and liquids and waste material found to exist above the action levels defined in the Endangerment Assessment (EA). This will include those affected materials and soils existing in pits B, J, H/V, E, Q, and R (as defined in the EA). Additionally, the Remedial Investigation identified sludges and liquids in pits F, G, I, K, L, and M; therefore, these sludges and liquids (and any others found during remedial action) must also be excavated and treated. The definition of the boundary between the sludge/soil interface will be determined prior to remedial action. Excavations shall be conducted in enclosures, material

transported to the treatment unit(s), and the treated material will be backfilled in the pits if it successfully passes the Toxicity Characteristic Leaching Procedure.

Surface contamination - Attachments 8 and 9 of the Remedial Investigation Report shall be examined and the site re-evaluated, prior to remedial action, to identify those areas where surface seeps are visually apparent. These areas will be scraped or excavated to remove the source of contamination and to prevent future migration of this material. This source of contamination will then be consolidated and treated with the affected materials and soils.

Off-site soil contamination - Any off-site soil contamination found during the remedial investigation or during the remedial action shall be removed to background levels. This may require that special detection limits be used for sampling efforts at the site boundaries during the remedial action. This activity will have to be further defined in the remedial design.

Pit G - Further investigation into this pit area to locate sludges or liquids may have to be done at the completion of the remedial action due to the location of this pit beneath the wastewater treatment surface impoundment. This activity will be further defined in the remedial design.

Debris and rubble - There is much inert debris and rubble remaining on the site from past operations. This material may be consolidated and the ultimate disposition of the material determined during the remedial design.

Mud Gully - Contaminants observed in this flood control ditch and the "bottle neck" that exists as it passes the Brio site has been a noted concern of the EPA as well as local residents and the Harris County Flood Control District. It is apparent that these problems will have to be corrected as part of any remedy that is instituted at the site. Initial thoughts would suggest a low-maintenance approach to resolving this problem where some type of performance standard would be set in cooperation with the Harris County Flood Control District. Such actions shall be further defined in the remedial design.

Wastewater treatment system - In-place stabilization of wastes existing in the impoundments, backfill impoundments with dike materials and other uncontaminated materials (if necessary), cap and cover, grade to promote run-off and minimize infiltration, install a package wastewater treatment plant or route wastewater to POTW. Portions of the existing wastewater treatment system may be used during remedial action but will be decommissioned once the remedial action is completed.

Storage tanks and drums - Remove tank contents, decontaminate tanks, dismantle tanks; sell dismantled tanks or transport the tanks to an EPA approved off-site disposal facility; transport the tank contents and drums to an EPA approved off-site disposal facility. If any tanks are used during remedial activities, they will be dismantled upon completion.

Process equipment - The entire process facility will be dismantled. If any portion of the existing facility is used during remedial activities, the structure will be dismantled upon completion of

remedial action.

Monitoring and control of migration pathways - Ambient air sampling on a semi-annual basis, control air emissions from treatment processes, excavate in enclosures and vent the enclosure to an emission control device; eliminate or control rainfall on construction areas; sample and monitor Mud Gully sediments; treat the ground water in the Numerous Sand Channel Zone to a level to be determined in the remedial design (but to achieve treatment of the Dense Non-Aqueous Phase Liquids (DNAPLs) to the satisfaction of EPA) monitor the groundwater for a time frame to be determined in the remedial design; allow natural attenuation (no treatment) of the Fifty-Foot Sand aquifer and monitor the groundwater in the aquifer to ensure that it is naturally cleaning itself. Monitoring activities will be utilized to determine the effectiveness of the actions to be implemented and shall be detailed in the operation and maintenance plan of the remedial design. This same data will be evaluated during the Agency's 5-year review, in accordance with SARA Section 121 (c), to determine if any corrective action is necessary.

Site management plan - Areas outside the boundaries of excavation will be regraded and vegetated to promote drainage and minimize infiltration. A storm water transmission system draining to Mud Gully will be constructed in an east/west direction across the north and south parcels. All regrading will be covered with six inches of top-soil, if necessary, to promote vegetative growth. To the maximum extent practicable, the aesthetics of the site (upon completion of the remedy) shall be enhanced by utilizing creative design and landscaping techniques with input from local residents.

Site control - This remedial action is based on permanent site control, imposition of necessary deed notices and restrictions (if possible), and restriction of access to the site by use of a fence or similar barrier.

Alternative 2 - Cap and Barrier Wall (Containment)

The elements of this alternative include:

Vertical Barrier Wall - A sub-grade barrier wall will be constructed to limit the potential for off-site migration of contaminated groundwater in the NSCZ. The wall will be designed to encompass the site and will be keyed to the Middle Clay Unit. The technique of construction will be established in the remedial design.

Site Cover - A composite cap will be constructed over the site, extending to the limits of the barrier wall (not including Dixie Oil Processors South, see Figure 2). The cap will include a gas collection layer, a flexible membrane liner, compacted clay, and top soil to promote vegetative growth.

Groundwater Flow Control - A groundwater pumping system will be installed within the barrier wall to limit the migration of site contaminants. Recovered groundwater will be treated and discharged to Mud Gully.

Air Monitoring and Long Term Groundwater Monitoring - An air monitoring system will be

maintained during the construction of the remedy to protect public health. The groundwater will be monitored in the FFSZ to ensure groundwater is below established Maximum Contaminant Levels (MCLs). The NSCZ groundwater outside the barrier wall will be monitored to demonstrate compliance with water quality criteria for Mud Gully.

Mud Gully - Similar to the original proposal, this option includes channel improvements to the gully, but also allows the option of relocation of the gully by Harris County.

Common Components - In addition, Alternative 2 retains several components unmodified from the original remedy:

- Off-site soil contamination
- Debris and rubble
- Wastewater treatment system
- Storage tanks and drums
- Process equipment
- Site control

EVALUATION OF THE REMEDIAL ACTION ALTERNATIVES

The following discussion presents the results of the evaluation of the nine criteria for both alternatives currently being considered as required by CERCLA.

1. Overall Protection of Human Health and the Environment. Overall Protection of Human Health and Environment addresses whether or not a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced, or controlled through treatment, engineering controls or institutional controls.

Both the incineration and the containment alternative provide protection of human health and the environment by eliminating, reducing or controlling risk through treatment or capping along with access restrictions. The containment alternative calls for covering the entire site, portions of which contain concentrations of organics above acceptable levels. The cap/cover will act as a barrier that restricts infiltration of storm water, release of volatile organic emissions and direct contact with the contaminated soils.

Migration of the shallow groundwater will be mitigated with the extended barrier wall and the groundwater recovery and treatment system. These two elements will mitigate the potential for migration of affected groundwater to Mud Gully and eventually Clear Creek.

The on-site incineration alternative also satisfies the remedial action objectives of directly eliminating current and future exposure to the contaminated materials at the site. Contaminated soils and material above action levels would be treated by the incineration process, and treated soil/ash would be used as backfill for the site.

Both alternatives would provide effective protection of human health and the environment if implemented and supplemented with appropriate monitoring and maintenance to provide effective long-term protection.

2. Compliance with Applicable or Relevant and Appropriate Requirements (ARARs).

Compliance with ARARs addresses whether or not a remedy will meet all of the applicable or relevant and appropriate requirements of other Federal and State environmental statutes and/or provide grounds for invoking a waiver. In addition to the ARARs for the original remedy listed in the 1988 ROD, this action updates the water quality criteria for Mud Gully and adds the same criteria for the NSCZ groundwater. The containment alternative can be performed in full compliance with all ARARs and other criteria, advisories and guidelines which are applicable or considered relevant and appropriate. As documented in the original ROD, the incineration alternative can be performed in full compliance with ARARs.

3. Long-Term Effectiveness and Permanence. Long-term effectiveness and permanence refers to the magnitude of residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time once cleanup goals have been met.

The original remedy provides for long-term effectiveness and permanence through destruction of the site wastes above the health based level. Exposure to remaining materials would be further isolated through the addition of soils to achieve stormwater control. The affected groundwater would be controlled through the use of extraction wells to prevent off-site migration. The groundwater system would require frequent monitoring to ensure its effectiveness.

The containment alternative involves covering of affected material on the site with soils, a flexible membrane liner and gas collection system. This combination of cover systems will effectively reduce exposure to site contaminants. The gas collection layer will reduce any accumulation of gases that could damage the flexible liner and escape to the atmosphere. A current assessment of barrier systems found that the service life of caps was uncertain, but a cap with an HDPE geomembrane may perform satisfactorily for several hundred years. Long-term monitoring and maintenance will be required to achieve protectiveness of the remedy.

4. Reduction of Toxicity, Mobility, or Volume Through Treatment. Reduction of toxicity, mobility, or volume through treatment is the anticipated performance of the treatment technologies that may be employed in a remedy.

The containment alternative does not provide reduction of toxicity, mobility or volume since treatment of the contaminated media is not conducted as the major component of the remedy. The alternative does provide some reduction of toxicity, mobility and volume for the components of groundwater extraction and treatment, as well as the gas collection and treatment component of the cap, although the volumes would be expected to be insignificant in comparison to the total mass of contaminants at the site.

Incineration would result in a reduction of the toxicity, mobility, and volume of contaminated media

through the destruction of the organic compounds above the health based criteria. The original remedy would also achieve reductions for groundwater extraction and treatment, and would likely address a larger volume of groundwater due to the additional pumping that would be required in absence of a barrier wall.

5. Short-Term Effectiveness. Short-term effectiveness refers to the speed with which the remedy achieves protection, as well as the remedy's potential to create adverse impacts on human health and the environment that may result during the construction and implementation period.

The primary short-term risk for both the containment and incineration alternative is the fact that some increase in air emissions may occur because of excavation and related intrusive activities. Emissions from the site have been documented even in an undisturbed state. The incineration alternative would involve significantly more intrusive activities in areas likely to contain the highest levels of contamination, thus the potential for releases would be the highest.

The implementation time for containment is similar to that estimated for incineration, four years. Both remedies require a significant design stage to develop the plans for implementation. Containment will require a field investigation effort to define the limits for the vertical barrier wall. Incineration requires approximately one year for construction.

Engineering controls and monitoring will reduce the potential for any adverse impacts during implementation of either remedy; however, the likelihood of emission release increases with intrusive activities despite the application of engineering controls. A contingency plan would be developed to address any potential air emissions during remedial activities.

6. Implementability. Implementability is the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement the chosen solution. Both alternatives have been demonstrated at other sites to be implementable. Availability of services to implement the alternatives is not expected to be a problem.

Difficulties with installation of the barrier wall as part of the containment alternative may arise in the area of Mud Gully and may require innovative design. Additionally, extension of the barrier wall across Dixie Farm Road will require extra coordination with the local communities for traffic concerns.

As discussed above, implementability of the incineration alternative at this site is complicated by the likelihood of emissions due to highly intrusive activities. The incineration alternative and the associated intrusive activities would require stringent monitoring and controls to ensure that action levels for air emissions are not exceeded. Incineration is a complex technology that requires a significant amount of testing prior to utilization. An incinerator was previously mobilized to the site, however, wastes were never introduced and testing was not conducted. Excavation of wastes for incineration required the use of stringent engineering controls, although emissions from the excavations were still detected at the fence line of the site.

7. **Cost.** Cost includes an evaluation of capital cost and the cost of operation of the remedy in the present worth calculation.

Alternative 1 - Incineration

The estimated cost of this alternative in the 1988 ROD was \$21.6 million. Bids received for the remedy revised the estimate to over \$40 million. The current estimate of the incineration remedy was derived from the actual bid received on the original remedy with an escalation figure applied. The net present worth of implementing this remedy is \$77.5 million. The capital cost is \$61.4 million.

Components for Alternative 1 Incineration	Capital costs	30 year Present Worth
Design and Testing	\$1,180,000	\$1,180,000
Construction, demobilization	\$9,240,000	\$9,240,000
Operation	\$31,920,000	\$31,920,000
Emission Control	\$3,000,000	\$3,000,000
Construction Oversight	\$1,000,000	\$1,000,000
Operations Oversight	\$2,000,000	\$2,000,000
Construction Contingency	\$7,250,000	\$7,250,000
NSCZ Groundwater Recovery	\$911,000	\$2,970,000
Mud Gully Channel Improvements	\$2,540,000	\$2,540,000
Ground Water Treatment System	\$1,100,000	\$8,400,000
DNAPL Separation and Disposal	\$87,300	\$660,000
Fencing and Site Security	\$377,500	\$460,000
Equipment Dismantling	\$460,000	\$460,000
NSCZ Groundwater Monitoring	\$78,750	\$530,000
FFSZ Groundwater Monitoring	\$34,000	\$280,000
Mud Gully Monitoring	\$0	\$100,000
Site Management	\$230,000	\$5,520,000
Total	\$61,408,550	\$77,510,030

Alternative 2 - Containment

The estimated cost of implementing the Containment remedy is \$42.7 million net present worth. The net present worth assumes 30 years of operations for calculation purposes. The capital cost of the remedy is \$22.7 million.

Components for Alternative 2 Containment	Capital costs	30 year Present Worth
Subgrade Barrier Wall	\$4,305,600	\$4,310,000
NSCZ Groundwater Recovery	\$911,000	\$2,970,000
Surface Tar Delineation	\$280,000	\$280,000
Cap System	\$12,305,000	\$13,100,000
Mud Gully Channel Improvements	\$2,540,000	\$2,540,000
Ground Water Treatment System	\$1,100,000	\$8,400,000
DNAPL Separation and Disposal	\$87,300	\$660,000
Vapor Recovery Operations	\$0	\$500,000
Fencing and Site Security	\$377,500	\$460,000
Equipment Dismantling	\$460,000	\$460,000
Air Monitoring	\$0	\$2,600,000
NSCZ Groundwater Monitoring	\$78,750	\$530,000
FFSZ Groundwater Monitoring	\$34,000	\$280,000
Mud Gully Monitoring	\$0	\$100,000
Site Management	\$230,000	\$5,520,000
Total	\$22,709,150	\$42,710,000

8. State Acceptance. State Acceptance indicates whether, based on its review of the RI/FS and ROD, the State concurs with, opposes, or has no comment on the selected alternative.

The Texas Natural Resource Conservation Commission (TNRCC) has been provided a draft copy

of this ROD and the TNRCC has participated throughout the process in working with the CAG. The TNRCC concurs with the containment remedy.

9. Community Acceptance. Community Acceptance has been assessed in the Record of Decision following a review of the public comments received on the RI/FS report and the Proposed Plan.

The community has strongly opposed implementation of the incineration remedy in the past. The community's opposition was instrumental in this re-evaluation of the remedy. EPA chartered the CAG in September 1994 to assist with the development of a remedy for the site, and the CAG had significant input in the development of the containment remedy. The CAG supports the new proposed remedy.

SUMMARY OF THE SELECTED REMEDIAL ALTERNATIVE

The new selected remedial alternative is the containment alternative with volatile organic chemical (VOC) and groundwater recovery which is composed of several components that together will provide a long-term solution that is reliable and protective of human health and the environment. The individual components of the selected approach are described below. As discussed above, certain elements of the original ROD are not affected by this ROD Amendment.

1. Containment System

This amended Record of Decision (ROD) revises the original remedial action for treatment of affected materials, soils and surface contamination to installation and long-term maintenance of a containment system. The containment system will be designed, constructed and operated to recover VOCs and limit the migration of site contaminants to the air, soil and groundwater to concentrations that are fully protective of human health and the environment. The containment system will consist of the following principal elements:

A. Vertical Barrier Wall

To limit the potential for off-site migration of affected soil and groundwater, a continuous¹ vertical barrier wall, keyed or grouted into the Middle Clay Unit, shall be constructed. The vertical barrier wall will extend into the Southbend Subdivision to the north of the site and east of Pit Q and south to the pipeline corridor. The area to be enclosed by the vertical barrier wall is conceptually shown in Figure 2. As part of the Remedial Design phase, materials of construction and types of commercially available barrier walls (e.g., slurry, composite slurry, sealable joint sheet pile, deep soil mixing, vibrated beam and soil saw technology) will be evaluated. The barrier wall selected

¹ There will be some discontinuity in the areas of roads, buried pipelines or other obstructions.

shall be designed and constructed to achieve long term reliability by maintaining structural integrity, resistance to chemical corrosion and designed to meet a 10^{-7} cm/sec hydraulic conductivity. The selection process will also consider ease of construction, and minimization of community disruption, including potential emissions.

B. Site Cover

To further control potential air emissions from the site, minimize to the extent practicable surface water infiltration and to minimize to the extent practicable the migration of site contaminants into the groundwater, a composite cap shall be constructed to cover the areas shown in Figure 2. The composite cap will be multilayered and consist of a bedding layer of soil to achieve slope for moisture control in the gas collection layer, a gas collection layer, a flexible membrane liner, a minimum of one and one-half feet of compacted clay, top soil and vegetative cover. (This minimum clay thickness may be reduced in the capped portions of Southbend as well as in drainage conveyance areas.) The liner material will be selected during the remedial design. The cap system (clay cover plus liner) shall achieve a hydraulic conductivity of 10^{-7} cm/sec.

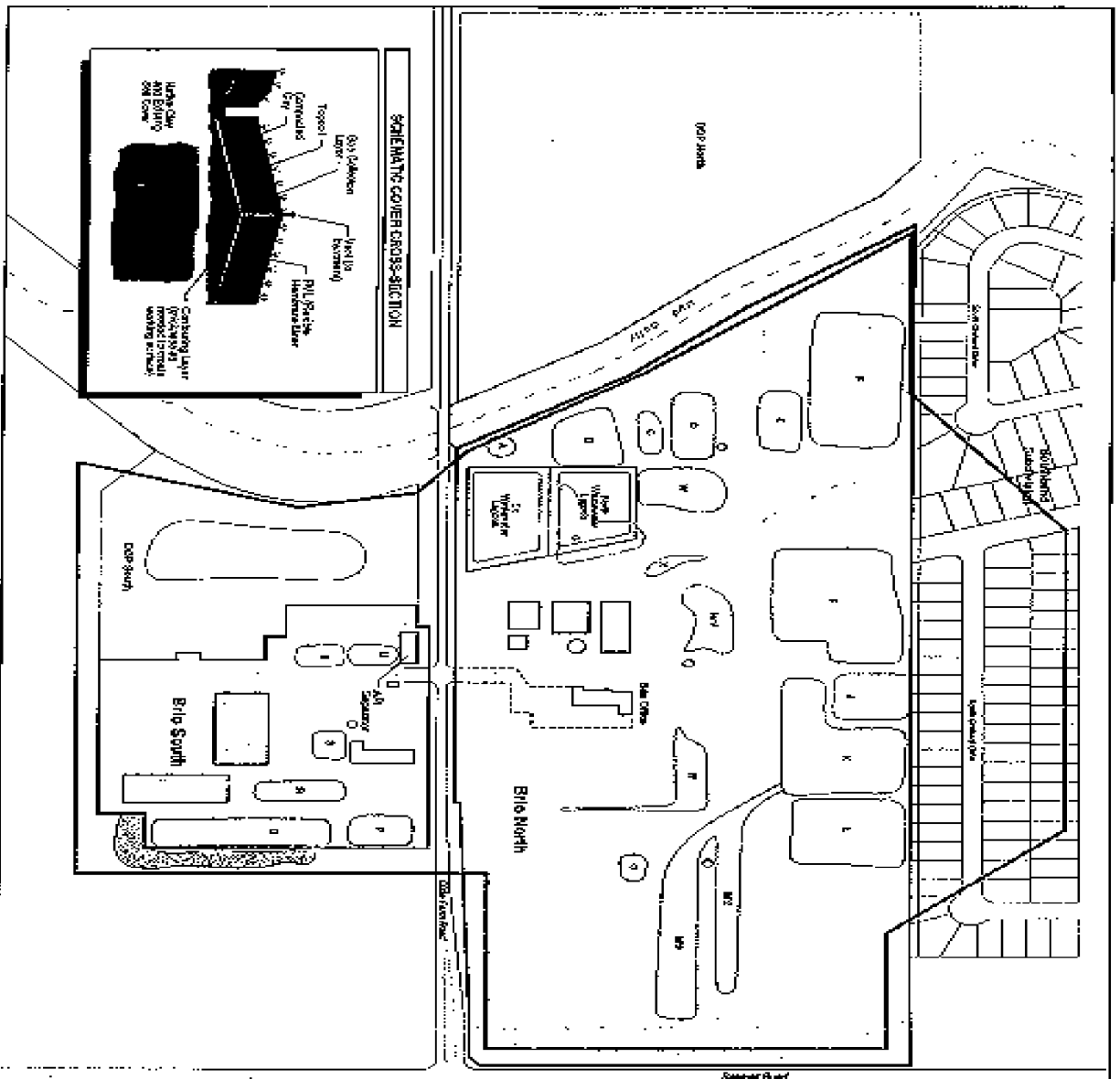
C. Gas Collection

To recover VOCs and provide reliable long term control of VOCs, in addition to the flexible membrane liner, a gas collection layer will be a component of the site-wide cap. The cap will be divided into compartments, based on water runoff considerations and the relationship to former pit areas. The cap installed over each compartment will have a gas collection layer and a vent system leading from the gas collection layer to the surface. The vent system shall be vacuum assisted.

A minimum vacuum requirement shall be determined for the piping system during the operational mode to ensure optimal recovery of VOCs and that collected vapors are effectively routed by vacuum or the blower to the treatment system. The vacuum requirement and the sizing of the treatment system will be established during a pre-operations study of the gas collection layer after construction of the cap is complete. The vent system shall be monitored to ensure against vapor build-up within the gas collection layer.

The vent system shall be manifolded to a treatment system(s). The treatment system(s) shall, at a minimum, consist of two carbon units in series. The air flow between the two carbon units shall be monitored, initially daily. Breakthrough will be defined as a reading of 50 ppm VOCs, in which case the spent carbon unit will be replaced by a fresh unit within 12 hours. After startup, the monitoring frequency between the two carbon units shall be adjusted to a time period no greater than one tenth (1/10) the expected carbon life.

An initial baseline monitoring of total VOC production on a compartment by compartment basis shall be carried out once the system is operational. The baseline monitoring will



LEGEND

- District boundary
- 15502 grid/diagonals are holes and perfor number and location to be drilled
- 50 degree vertical barrier wall (Meyer and Meyer City Grid)
- In-ground system
- Above-grade precast concrete per IT Corp. of Irving, TX 75039, EK 320007
- Other, record for per CAHW County No. D33046.0-06, 11/9/82



Groundwater Services, Inc.
Houston, Texas

CONFIDENTIAL LAYOUT OF BARRIERS WALL, AND SITE COVER
Dist. solely for information, record, Texas

PROJECT	9-10-78	ISSUE #	0-0
DATE	11/12/82	ISSUE #	0-0
BY	WJW	DATE	
APP.	AS Shuman	FIGURE #	FIGURE 2

consist of 1 sample and flow measurement per month of total VOCs, per compartment, for a minimum of 12 consecutive months. The amounts and types of VOCs recovered shall be reported. Prior to any compartment(s) being closed off, 12 months of such data shall be presented supporting the closing. (The initial baseline data may be used for this purpose.) For those compartments which are valved off, a maximum pressure will be defined during design to determine when the closed off compartment must be reopened to the treatment system.

If the amount of VOCs in the air flow to the treatment system results in breakthrough of the carbon units occurring more frequently than once (1) every ten (10) days, then a study evaluating the efficiency of the VOC recovery and treatment system shall be prepared. This study will evaluate: (1) changing the treatment capacity/method, or (2) increasing VOC recovery through installation of vertical wells, whichever better optimizes VOC recovery. This study will consider value engineering concepts, cost effectiveness, safety, VOC recovery rates, and the short term and long term potential for creating emissions in the optimization analysis.

D. Groundwater Flow Control (NSCZ)

To limit the migration of site contaminants from within the containment system, a groundwater pumping system shall be constructed that will collect groundwater from the NSCZ inside the vertical barrier wall to ensure that contaminant concentrations outside the vertical barrier wall are protective of human health and the environment. An inward gradient shall be maintained within the barrier wall in areas of plume contamination. Performance of the groundwater flow control system shall be demonstrated through measurement of groundwater levels within the barrier wall and flow rates into the pumping system, as well as monitoring concentrations of contaminants outside the vertical barrier wall on the down-gradient side. Annual reports shall be provided on the effectiveness of the system and the amounts of groundwater pumped from the site. The groundwater pumping system will be operated continuously or intermittently as long as necessary in order to maintain inward hydraulic gradient.

E. Groundwater Treatment

Groundwater that is recovered through the pumping system shall be treated on-site and discharged off-site into Mud Gully. Recovered groundwater shall be treated to meet relevant standards within the receiving water.

2. Air Monitoring

To protect public health, an air monitoring system shall be maintained during construction of the remedy. The system shall be designed to detect organic site contaminants at levels sufficient to prevent harm to persons living or working in the surrounding community. Action levels for the air monitoring system shall be specified in the Scope of Work. EPA will establish these action levels, after consultation with ATSDR and the Texas Department of Health, taking into account conditions now existing at the site and within the surrounding community.

3. Long Term Groundwater Monitoring

A five-well monitoring system shall be maintained in the FFSZ. The wells shall be screened in the upper portion of the FFSZ. The monitoring program shall require volatile organic compound and semi-volatile organic compound samples to be collected semiannually, using standard EPA laboratory methods for testing drinking water. For each well, if no monitored compounds are detected above MCLs² for a period of five years, subsequent monitoring of that well shall take place annually. If the same monitored compound is detected above MCLs in a well for two consecutive monitoring periods, a report shall be within sixty (60) days prepared evaluating the likely cause for the presence of the compound and proposing relevant responsive actions.

If all wells in the monitoring system achieve annual monitoring status and for a period of five consecutive years the annual monitoring results show no monitored compounds above MCLs, a petition may be submitted for EPA review which shall describe the performance of the monitoring system and request approval to modify or terminate the monitoring program.

Water Quality Criteria are established for contaminated groundwater in the NSCZ outside the vertical barrier wall and monitoring shall be conducted in the NSCZ in order to demonstrate compliance with the criteria. Treatment will be required for this groundwater only if concentrations exceed the criteria.

4. Site Maintenance and Control

The amended remedial action continues to be based on maintaining permanent site control that restricts access to the site by means of a fence or similar barrier. The property within the restricted area shall be graded to allow storm water to drain toward Mud Gully. The site cover shall be landscaped with hardy grasses well suited to the local climate.

5. Mud Gully

Except in the event of Mud Gully relocation, channel improvements shall be installed in the section of Mud Gully immediately adjacent to Brio North. These improvements shall consist of a concrete lined channel that will ensure that the hydraulic flow capabilities of this section of Mud Gully are consistent with the areas of the gully immediately upstream and downstream of this section. Surface water quality testing will be conducted quarterly to monitor compliance with water quality standards if such improvements are made.

EPA recognizes that in response to community input, Harris County or the Harris County Flood Control may relocate Mud Gully such that it no longer runs adjacent to the site. If Harris County or the Harris County Flood Control has made a firm commitment to relocate Mud

²For monitored compounds where the MCL is below the Practical Quantitation Limit (PQL), the relevant detection limit shall be the PQL.

Gully prior to design activities, then the channel improvements portions of this remedial action will not be required. The schedule for implementing the cover portion of the remedy shall be staged accordingly to take advantage of any excess fill material made available by the relocation. If a timely commitment to relocation is not made by Harris County or the Harris County Flood Control, the channel improvements will continue to be required.

6. Public Participation

EPA recognizes the significant role community input and support have played in reaching this amended remedial decision. EPA will continue to seek active community input and involvement during the design and implementation phases of the remedial action. EPA plans to continue to maintain a community outreach office in the local community. The EPA shall continue to maintain a document depository at the local community college until NPL deletion, or until five years after completion of the Remedial Action phase, whichever is sooner. All major deliverables under this amended ROD shall be made available in both the EPA community office and the local repository to allow an adequate opportunity for community review and comment prior to final EPA approval. Copies of all major deliverable documents during the Operational and Maintenance phase of this remedy, shall also be supplied to a chosen repository.

STATUTORY DETERMINATIONS

Under CERCLA section 121, EPA must select remedies that are protective of human health and the environment, comply with applicable or relevant and appropriate requirements (unless a statutory waiver is justified), are cost-effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduce the volume, toxicity, or mobility of hazardous wastes as their principal element. The following sections discuss how the selected remedy meets these statutory requirements.

Protection of Human Health and the Environment

The selected remedy protects human health and the environment by eliminating, reducing or controlling risk through containment along with access restrictions. The containment technologies include a sub-grade vertical barrier wall, a cap system that includes a compacted clay layer, a liner, and a gas collection system, and groundwater flow controls. Contaminants will be removed from the site via the groundwater collection system and the gas collection system in addition to the existing dense non-aqueous phase liquid extraction program. The cap/cover will act as a barrier that restricts infiltration of storm water, release of volatile organic emissions and direct contact with the contaminated soils. The containment remedy will require periodic maintenance to ensure its effectiveness.

Migration of the shallow groundwater will be mitigated with the extended barrier wall and the groundwater recovery and treatment system. These two elements will mitigate the potential for migration of affected groundwater to Mud Gully and eventually Clear Creek.

Compliance with Applicable or Relevant and Appropriate Requirements

The selected remedy of subgrade vertical barrier wall, cover with gas collection system, and groundwater flow control will comply with all applicable or relevant and appropriate requirements (ARARs). The 1988 ROD identified ARARs for the site and the cap and cover alternative. ARARs in addition to those identified in the original Record of Decision are presented below. Any numerical criteria that have been modified in the existing ARARs since the 1988 ROD will be updated.

Chemical-specific ARARs:

- Texas Surface Water Quality Standards, TAC §307
- Risk Reduction Standards, Texas Water Code, Subchapter S

Location-specific ARARs:

None

Action-specific ARARs:

- 30 TAC Chapter 116, Standard Exemption 118, Standard Exemption 68

Cost-Effectiveness

EPA believes this remedy will eliminate the risks to human health at an estimated cost of \$22.7 million. The selected remedy assures a much higher degree of certainty that the remedy will be implemented without short-term risks due to volatile emission releases inherent in intrusive remedies. The cost of the selected remedy of containment is less dependant on a variation of quantity of wastes that could significantly impact a remedy such as incineration.

Utilization of Permanent Solutions and Alternative Treatment Technologies (or Resource Recovery Technologies) to the Maximum Extent Practicable and Preference for Treatment as a Principal Element

The principal threats at the site are discharges of contaminated groundwater to surface water, air emissions from on-site wastes, and direct contact with on-site wastes. The sources of contamination to these pathways include the presence of DNAPL in the NSCZ and pit residuals located in the near surface.

The remedy contains several treatment components while addressing the principal threats at the site. The discharge of contaminated groundwater is restricted by the installation of a sub-grade barrier wall, and groundwater pump and treat will be utilized in conjunction with the barrier wall to assist in the containment of the contaminated groundwater. The barrier wall is dependant on a treatment component (i.e. groundwater pump and treat) for long-term effectiveness. The air pathway is

addressed through the gas collection layer. This component utilizes treatment of the contaminants in the gas collection layer via carbon adsorption (or other absorptive media) followed by off-site incineration of the carbon. In addition, the extraction and treatment (off-site incineration) of the DNAPL remains a component of the remedial action for the site.

The amended remedy does provide for significantly less treatment than the original remedy. Inclusion of treatment to a greater degree would require more intrusive activities that could result in higher air emissions. The community is adamantly opposed to any remedy that would increase the risk of short-term air emissions from the site.

DOCUMENTATION OF SIGNIFICANT CHANGES

The Proposed Plan for the Brio site was released for public comment on April 4, 1997. The Proposed Plan identified Containment as the preferred alternative. EPA reviewed all written and verbal comments submitted during the public comment period. Upon review of these comments, it was determined that no significant changes to the remedy, as originally identified in the Proposed Plan, were necessary.

A modification to Table 2 (Revised Surface Water Criteria) was required following input from the TNRCC. The Mud Gully criteria was modified to accurately reflect the identified standards submitted by the TNRCC on February 27, 1997. In addition, a change in the criteria utilized as the most protective standard was made. For 1,2 dichloroethane it was noted by TNRCC that the human health criteria was now higher than the fresh water quality criteria because the adjustment factor of one hundred (100) times the criteria for Clear Creek has changed from the original factor of ten (10). Due to this change, the human health criteria was no longer the most protective and the fresh water quality criteria should be used. The ROD is modified to reflect this change.

**BRIO REFINING SUPERFUND SITE
HOUSTON, TEXAS
AMENDED RECORD OF DECISION
RESPONSIVENESS SUMMARY**

This Responsiveness Summary is prepared from written and oral comments received during the public comment period on the Proposed Plan. The comment period ran from April 7, 1997, through May 7, 1997. Less than ten written comment letters were received. The letters were supportive of the proposed remedy.

A public meeting was held on April 15, 1997, at the San Jacinto College, South Campus. Approximately 40 people attended the meeting. Nine people provided comment during the meeting. A transcript of the meeting was prepared. Written comments and the transcript are part of the amended Administrative Record.

Summary of Major Comments Received

1. Comment - The Brio-CAG's support of the plan is based on the assumption that all of the critically important language on the Preferred Remedial Alternative in the Proposed Plan will remain without changes in the final ROD.

Response: As stated in the ROD's Documentation of Significant Changes, no significant changes to the proposed alternative were necessary as a result of public comments received.

2. Comment - The Brio-CAG's support for the plan is contingent on EPA providing continued funding for its TAG so that the Brio-CAG can remain engaged in the remedial design and remedial action phases of the cleanup. The national Superfund Ombudsman should remain involved at the site.

Response: Two technical assistance grants have already been awarded at the Brio site totaling \$100,000. Future grants will require a waiver from EPA headquarters, and this issue is currently under review by headquarters. The national Superfund Ombudsman is expected to have continued involvement with the Brio site.

3. Comment - The Brio-CAG strongly supports the inclusion of the described gas collection component of the preferred remedial alternative. The gas collection component should be fully implemented and used to the maximum extent practical to remove VOCs which if not removed would pose a long term public health threat to the community.

Response: The gas collection system described in the proposed plan remains a component of the selected remedy. The system will be fully implemented during the remedial action and operated at an optimal rate to ensure recovery of VOCs and effective collection and

treatment. However, the gas collection layer is not intended as a treatment remedy for the contaminated soils.

4. Comment - The ROD should present more information concerning the 1994 SRO Report, particularly with regards to dioxin testing. Any future subsurface soil testing for construction of the remedy should include dioxin testing.

Response: The 1994 SRO Report is included in the Administrative Record and does not require further discussion in the ROD. The inclusion of the recommendation to do dioxin testing in the SRO Report was based on addressing community concerns with the incineration remedy. There is no technical basis to use dioxin testing to guide the construction of the containment remedy as all contaminants will be addressed by the cap.

5. Comment - The ROD should discuss findings of the flux tests in direct support of the gas collection component of the preferred alternative.

Response: The flux testing reports are included in the Administrative Record and were considered in the decision making process for the ROD.

6. Comment - The ROD should contain more explanation for extending the containment remedy into the Southbend Subdivision.

Response: The purpose of the vertical barrier wall is to limit the potential of migration of affected groundwater. The vertical barrier wall extends into the former Southbend Subdivision to address the presence of contaminated groundwater. Sampling data to support the conceptual location of the cap and barrier wall is contained in the Administrative Record. The exact location of the vertical barrier wall will be determined in the Remedial Design.

7. Comment - The ROD should provide additional detail regarding emission problems during the previous remedy.

Response: Information concerning emissions during implementation of the incineration remedy is documented in the Administrative Record. This information was considered during the decision making process for the ROD.

8. Comment - Due to uncertainty about the exact amount of the contaminants at the site, EPA should re-consider the statement that insignificant volumes of contaminants would be removed through treatment.

Response: EPA bases its analysis on current estimates of the mass of contaminants shown to be present at the site and the expected efficiency of removal of mass through a pump and treat system or collection of VOC vapors. Based on these estimates, EPA believes that its statement is correct.

9. Comment - EPA should discuss the importance of the gas collection component under the

evaluation of long-term effectiveness and permanence.

Response: A discussion of the gas collection component has been included under the evaluation of long-term effectiveness and permanence.

10. Comment - The re-routing of Mud Gully should be expedited so that it no longer flows through the site.

Response: If the project is undertaken by Harris County, the timing of the re-routing will be determined in the remedial design. Several steps are required for the relocation, such as an engineering evaluation and the securing of right of way, before the construction of the re-routing could begin by the county.

11. Comment - Expand the remedial design to include an evaluation of the sections of Clear Creek downstream of site to determine the extent and degree of contamination.

Response: Considerable testing has been conducted in Clear Creek to date by EPA and various state and local agencies. A health consultation was prepared by the Agency for Toxic Substances and Disease Registry stating that the level of contaminants found does not pose a human health risk. Additional testing of Clear Creek is not necessary based on previous sampling and further information is not required to provide an adequate characterization of risk.

12. Comment - Provide a funding mechanism to cover the increased costs associated with future Clear Creek projects that involve contact with and/or reentrainment of the contaminated sediments.

Response: EPA's use of the Superfund is governed by CERCLA and its implementing regulations. The suggested funding mechanism would not be appropriate pursuant to these authorities.

13. Comment - The community should be educated of the hazards of the buried chemical at the site. The best remedy for the site is containment.

Response: The EPA will continue meeting with the Brio Community Advisory Group throughout the implementation of the remedy. The CAG meetings are open to the public and are an excellent source of information regarding the status of site operations as well as an educational opportunity regarding site hazards. EPA also maintains a local community relations office that focuses on providing citizens with information regarding the site. Also, a repository will be maintained near the site that will contain the Administrative Record for the site.

14. Comment - Will the liner in the cap degrade over time? A rubber or hard plastic layer should be used that will not deteriorate.

Response: Compatibility testing will be done as part of the remedial design to ensure that the best material is selected for the site. The most common type of liner, a high density

polyethylene (HPDE) liner, is expected to perform for several hundred years.

15. Comment - The BSTF supports the installation of the remedy set forth in the Proposed Plan, including the site-wide gas collection cap. It is the BSTF position that the performance of this cap be judged on how well it prevents emissions to the atmosphere, and not on the amount of volatile organic emissions recovered.

Response: EPA agrees that the primary function of the gas collection layer is to prevent emissions to the atmosphere, however, this can only be achieved through the removal of volatile organics that would otherwise be released to the surface. The gas collection layer will be operated in a manner that achieves optimal recovery. Optimal recovery will be defined by considering value engineering concepts, cost effectiveness, safety, VOC recovery rates, and the short and long term potential for creating emissions. The gas collection layer is not intended as a treatment remedy for the contaminated soils.

16. Comment - The revised Water Criteria for Mud Gully should apply to NSCZ groundwater outside of the barrier wall unless the BSTF shows (by modeling or other means) that alternate NSCZ action levels are protective of surface water criteria. There is an error in Table 2 in the Proposed Plan.

Response: For contaminated ground waters that discharge to surface water, Water Quality Criteria established under the Clean Water Act, or more stringent State surface water requirements, may also be cleanup level ARARs (Fed. Reg., 1990, Preamble at 8754), [NCP, 300.430(e)(2)(I)(E)]. The application of the Water Criteria as a remediation level for the NSCZ is directly applied to the groundwater, using the groundwater as the point of compliance, not just the receiving surface water body. "For ground water, remediation levels should generally be attained throughout the contaminated plume, or at and beyond the edge of the waste management area when waste is left in place" (Fed. Reg., 1990, Preamble at 8713). Waste will be left in place at the Brio site. The edge of the waste management area would be considered the vertical barrier wall.

17. Comment - The former storage pit areas should not be referred to as "disposal areas". This is not an accurate description of the prior use of these units.

Response: Although the pit areas were originally intended as storage areas, many became disposal areas when the stored product was not fully utilized or partially left in place during close out of the pits. Both terms are appropriate.

18. Comment - EPA states that air monitoring showed that fugitive emissions could leave the site even in an undisturbed state. It is important to point out that these emissions have been evaluated by EPA and the Agency for Toxic Substances and Disease Registry and were found to not present a threat to human health and the environment.

Response: The statement in the ROD concerning fugitive emissions is included to support the conclusion that intrusive activities on site (on-site incineration) would present a short-

term threat during implementation, because emissions occur even in an undisturbed state. The ROD does not attempt to support taking an action solely on the current level of the emissions. Therefore, a discussion of the human health threat posed by such emissions is not warranted.

19. Comment - The description of the composite cap should be clarified in the text to note that the cap will not be installed to the limits of the barrier wall over DOP South.

Response: The text has been modified to incorporate this comment.

Barty R. McBev, *Chairman*
R. B. "Ralph" Marquez, *Commissioner*
John M. Baker, *Commissioner*
Dan Pearson, *Executive Director*



A handwritten signature in black ink, appearing to be "Dan Pearson", written over a horizontal line.

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TEXAS NATURAL RESOURCE CONSERVATION COMMISSION SUPERFUND DIV.

Protecting Texas by Reducing and Preventing Pollution

DIRECTOR'S OFF.

June 26, 1997

VIA OVERNIGHT MAIL

Myron O. Knudson, P.E., Director
Superfund Division
U.S. Environmental Protection Agency
Region 6
1445 Ross Avenue
Dallas, TX 75202-2733

Re: Brio Refining Superfund Site
Amended Record of Decision

Dear Mr. Knudson:

The Texas Natural Resource Conservation Commission concurs with the Amended Record of Decision (ROD) for the Brio Refining Superfund Site, as presented in the draft ROD received May 30, 1997.

Please contact Mr. Ashby McMullan, Superfund Engineering Project Manager, at (512) 239-2595 for any additional information concerning the site.

Sincerely,

A handwritten signature in black ink, appearing to be "Dan Pearson", written over a horizontal line.

Dan Pearson
Executive Director