United States
Environmental Protection
Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R06-84/001
June 1984

EPA

Superfund Record of Decision:

Bio-Ecology Systems Site, TX

TECHNICAL REPORT DATA
(Please read Instructions on the reverse before completing)

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4. TITLE AND SUBTITLE SUPERFUND RECORD OF DECISION: Bio-Ecology Systems Site, TX		5. REPORT DATE 06/06/84
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15. SUPPLEMENTARY NOTES

16. ABSTRACT

The Bio-Ecology site is an 11.2 acre tract located in Grand Prairie, Texas. The site is bounded in all directions by private property and also on the east and south by the tributaries of Old Mountain Creek. The Bio-Ecology waste disposal site was a Class I industrial solid waste management facility which was permitted to: (1) incinerate combustible liquids, slurries and sludges; (2) chemically treat acids, caustics and other waste chemical solutions, excluding those containing heavy metals; (3) treat waste waters using biological oxidation; and (4) landfill solids from other treatment processes. The site was actively operated from June 1972 through 1978.

The cost-effective remedial alternative includes: raising the elevation above the 100-year flood plain; construction of an on-site disposal cell with synthetic liner and a leachate collection system; construction of a final cover, liner and leachate collection and removal system in accordance with RCRA Part 264; stabilize the waste and encapsulate in an on-site cell; construct a fence; and install a ground water monitoring system in accordance with RCRA Part 264. The capital cost for the selected alternative is estimated to be $2,709,600. Operation and maintenance costs for the first year are estimated to be $20,000.

Key Words: On-Site Containment; RCRA Landfill; Ground Water Contamination; Ground Water Monitoring, RCRA Part 264

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Record of Decision Bio-Ecology Systems Site, TX Contaminated media: gw, sw, soil, sludge Key contaminants: solvents, PCBs, TCE, metals		

18. DISTRIBUTION STATEMENT	19. SECURITY CLASS *(This Report)* None	21. NO. OF PAGES 38
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ROD ISSUES ABSTRACT

Site: Bio-Ecology Systems Site, Texas

Region: VI

AA, OSWER
Briefing Date: February 6, 1984

SITE DESCRIPTION

The Bio-Ecology site is an 11.2 acre tract located in Grand Prairie, Texas. The site is bounded in all directions by private property and also on the east and south by the tributaries of Old Mountain Creek. The Bio-Ecology waste disposal site was a Class I industrial solid waste management facility which was permitted to: 1) incinerate combustible liquids, slurries and sludges; 2) chemically treat acids, caustics and other waste chemical solutions, excluding those containing heavy metals; 3) treat waste waters using biological oxidation; and 4) landfill solids from other treatment processes. The site was actively operated from June 1972 through 1978.

SELECTED ALTERNATIVE

The cost-effective remedial alternative includes: raising the elevation above the 100-year flood plain; construction of an on-site disposal cell with synthetic liner and a leachate collection system; construction of a final cover, liner and leachate collection and removal system in accordance with RCRA Part 264; stabilize the waste and encapsulate in an on-site cell; construct a fence; and install a ground water monitoring system in accordance with RCRA Part 264. The capital cost for the selected alternative is estimated to be $2,709,600. Operation and maintenance costs for the first year are estimated to be $20,000.

ISSUES AND RESOLUTIONS

1. A source control remedy was considered which provided a degree of protection somewhat less than that of the fully protective RCRA consistent remedy. However, the source control remedy which includes construction of an on-site RCRA landfill was selected because it complies with appropriate RCRA regulations and provides a high degree of long term reliability with a minimal increase in cost.

KEY WORDS

- On-Site Containment
- RCRA Landfill

ISSUES AND RESOLUTIONS

2. A waiver was not granted from RCRA ground water protection regulations (Part 264 Subpart F). Existing data was not adequate to determine if contaminated ground water was leaving the site. A monitoring program was developed to comply with RCRA. If contamination is identified in the future, remedial action will be evaluated consistent with the NCP.

KEY WORDS

- Ground Water Contamination
- Ground Water Monitoring
- RCRA Part 264

RECORD OF DECISION

REMEDIAL ALTERNATIVE SELECTION

SITE: Bio-Ecology Systems, Inc., Site, 4100 East Jefferson Avenue, Grand Prairie, Texas

DOCUMENTS REVIEWED

I have reviewed the following documents describing the analysis of cost-effectiveness of remedial alternatives for the Bio-Ecology Site:

- Bio-Ecology Site Investigation, Woodward & Clyde Consultants, April 1983.
- Bio-Ecology Remedial Alternatives Analysis, Woodward & Clyde Consultants, July 1983.
- Staff summaries and recommendations.

Description of Selected Remedy

- Raise the elevation of the site above the 100-year flood plain.
- Construct an on-site disposal cell with synthetic liner and a leachate collection system.
- Construct a final cover and liner and leachate collection and removal system in accordance with standards promulgated under 40 CFR Part 264 and applicable guidance.
- Stabilize the waste and place in on-site cell.
- Construct a fence with warning signs.
- Install a ground water monitoring system in accordance with standards promulgated under 40 CFR Part 264.

DECLARATION

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 containment of wastes in an on-site landfill in compliance with applicable technical regulations of RCRA is a cost-effective remedy and provides adequate protection of public health, welfare, and the environment. The State of Texas has been consulted and agrees with the approved remedy.

I have also determined that the action being taken is appropriate when balanced against the availability of Trust Fund monies for use at other sites.

I am also approving a ground water monitoring program to determine the existence of any present ground water contamination outside the containment area; however the decision to proceed with this cleanup does not encompass remedial action with respect to any ground water contamination that may be discovered. If such ground water contamination is found, appropriate remedial response will be evaluated, and I will make a future determination regarding the compliance of this response with RCRA requirements. If no existing contamination is found, the monitoring program will ensure the continued effectiveness of the selected containment remedy. In accordance with section 104(c)(3), the State is required to ensure the continued operation and maintenance of the selected remedy.

Lee M. Thomas
Assistant Administrator
Office of Solid Waste and Emergency Response

June 6, 1984
Date

Remedial Implementation Alternative Selection
Bio-Ecology Systems, Inc., Site
Grand Prairie, Texas
September, 1983

Site Location and Description

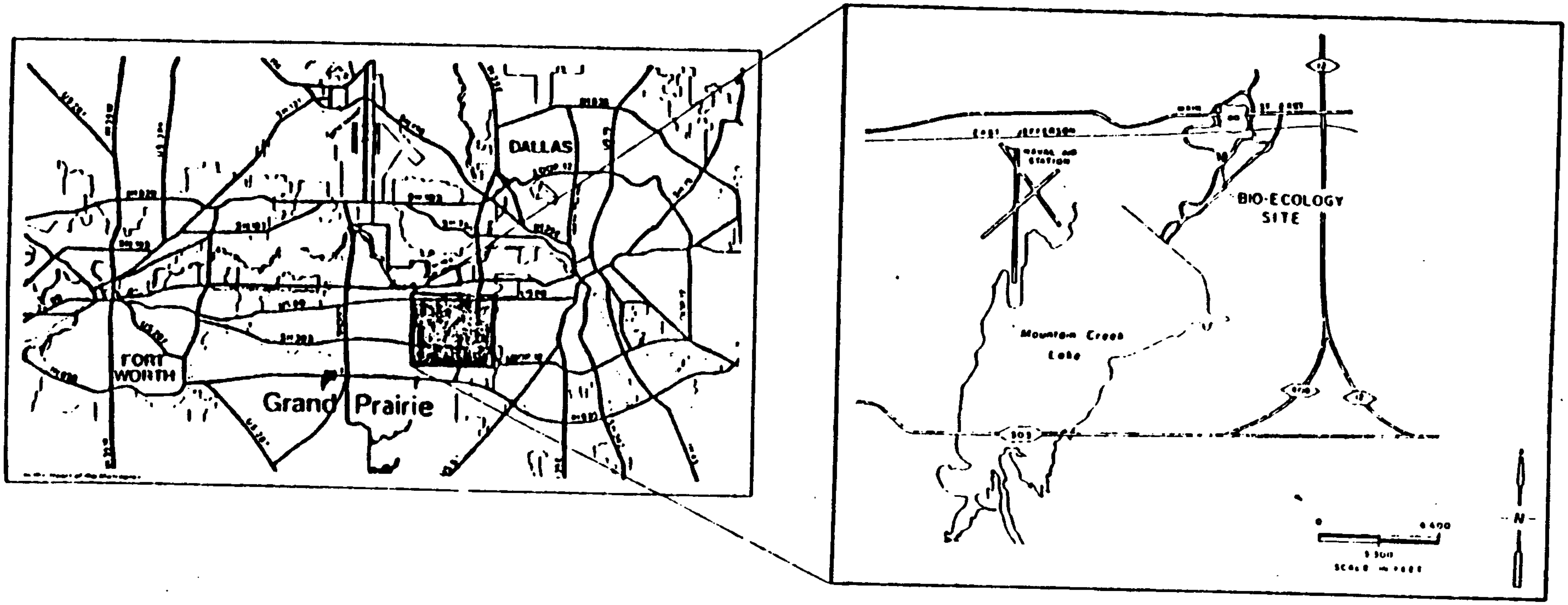
The Bio-Ecology site is an 11.2 acre tract located at 4100 East Jefferson Avenue in Grand Prairie, Texas shown in Figure 1. The actual waste disposal facility occupied a portion of the 11.2 acres owned by Bio-Ecology. The site is bounded in all directions by private property and also on the east and south by the tributaries of old Mountain Creek. Mountain Creek Lake and the Trinity River are located approximately 0.75 miles southwest and 2.5 miles north of the site, respectively. The site is located in the floodplain of Mountain Creek (Trinity River Basin) and has been extensively flooded on at least two past occasions during operations (June 1973 and June 1974). A site diagram of the Bio-Ecology Facility is shown in Figures 2 and 3.

Site History

The Bio-Ecology waste disposal site was a Class I industrial solid waste management facility, originally authorized by a permit issued by the Texas Water Quality Board on April 24, 1972. Permitted activities included: (1) incineration of combustible liquids, slurries, and sludges (subject to Texas Air Control Board standards for odors and emissions); (2) chemical treatment of acids, caustics, and other waste chemical solutions, including those containing heavy metals; (3) biological oxidation of waste waters resulting from separation of mud-water and oil-water mixtures and from chemical treatment of other wastes; and (4) a modified landfill of solids resulting from the other treatment processes. The site was actively operated from June 1972 through June 1978.

Operations at the site were characterized by frequent litigation filed by the Texas Department of Water Resources and its predecessor agency (Texas Water Quality Board). Both agencies had attempted to force the company to comply with permit standards and all the applicable Federal and State laws and regulations. During the 6-year operation of the facility, Bio-Ecology was cited for a number of major violations including: (1) construction of new facilities (i.e. - retaining basins) without proper authorization, (2) discharge of wastewater into Mountain Creek, (3) allowing liquid levels in holding basins to reach the brink without any freeboard, (4) storage of drums, several times beyond the permit maximum (200 drums), and (5) several incidents of oil spills.

FIGURE 1



BIO-ECOLOGY SITE

TDWR

Woodward-Clyde Consultants

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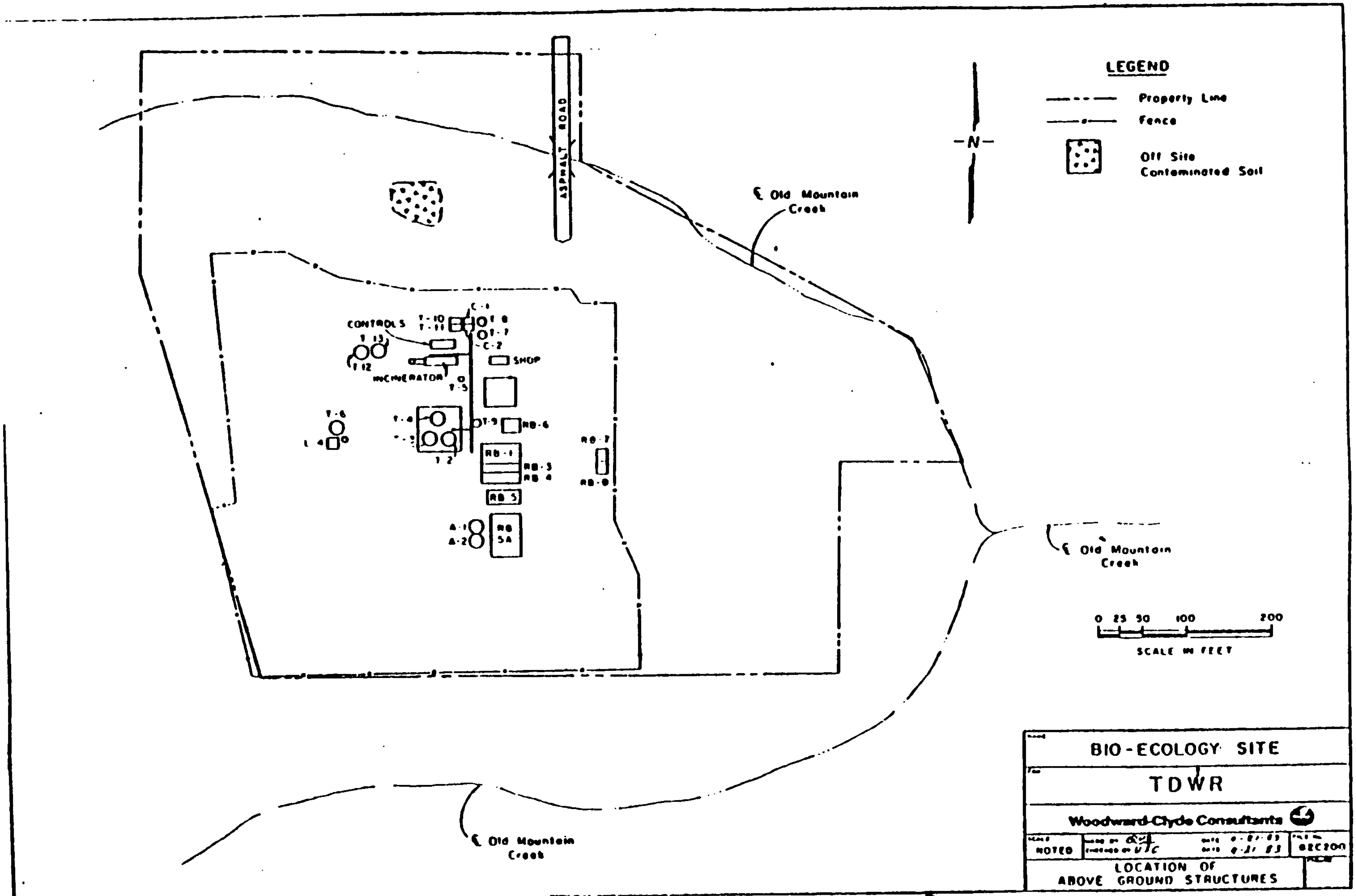
SITE LOCATION MAP


LEGEND
Property Line
Fence
Off Site Contaminated Soil
N
ASPHALT ROAD
Old Mountain Creek
Old Mountain Creek
Old Mountain Creek
CONTROLS
INCINERATOR
SHOP
RB-6
RB-1
RB-3
RB-4
RB 5
RB 5A
RB-7
RB-8
A-1
A-2
T-6
T-4
T-2
T-9
T-5
T 12
T 13
T-10
T-11
C-1
C-2
0 25 50 100 200
SCALE IN FEET
BIO-ECOLOGY SITE
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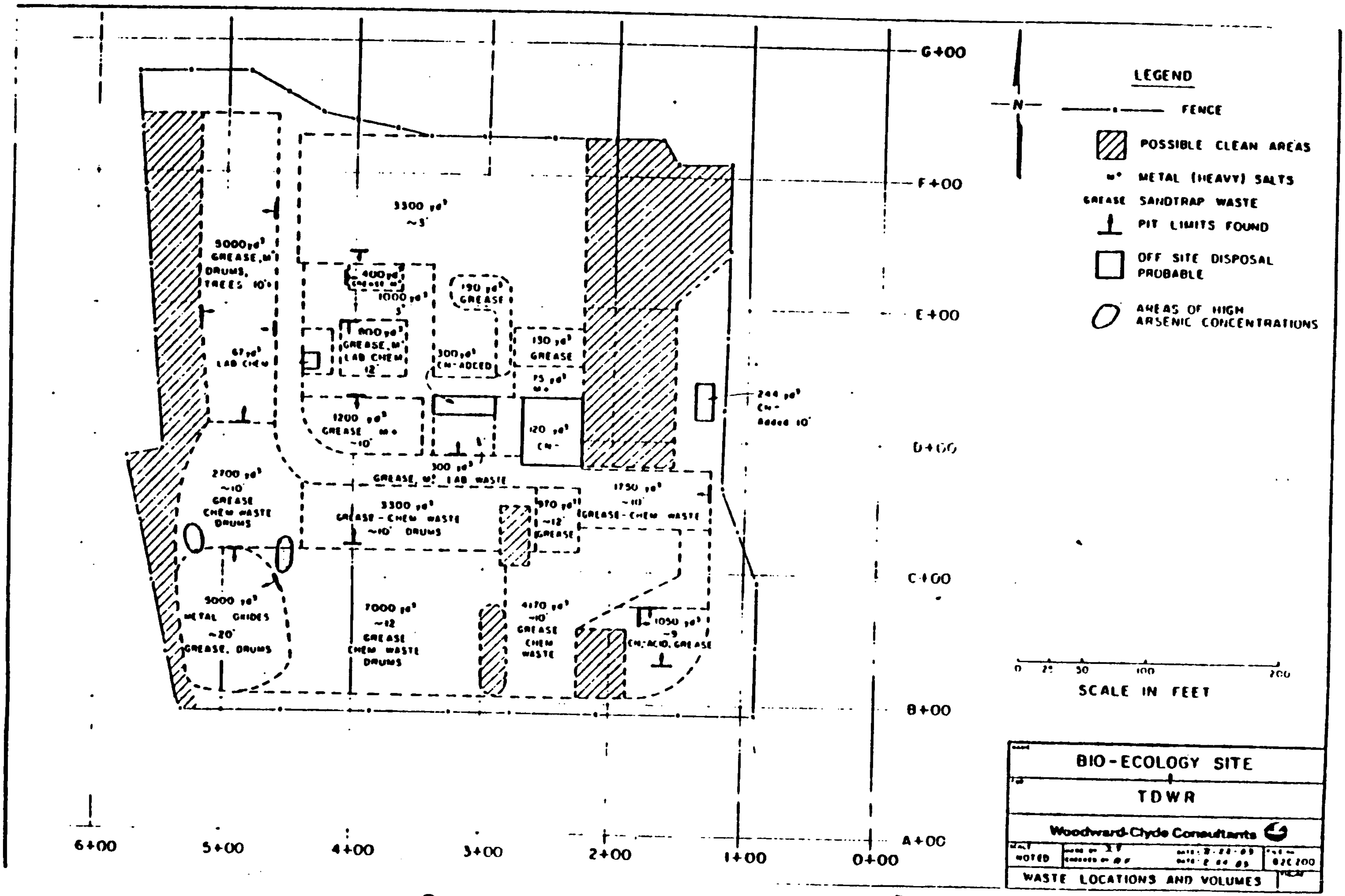
LOCATION OF ABOVE GROUND STRUCTURES

FIGURE 3


G+00
F+00
E+00
D+00
C+00
B+00
A+00
6+00
5+00
4+00
3+00
2+00
1+00
0+00
N
LEGEND
FENCE
POSSIBLE CLEAN AREAS
METAL (HEAVY) SALTS
GREASE SANDTRAP WASTE
PIT LIMITS FOUND
OFF SITE DISPOSAL PROBABLE
AREAS OF HIGH ARSENIC CONCENTRATIONS
3300 yd³ ~3'
5000 yd³ GREASE, M° DRUMS, TREES 10'
400 yd³
1000 yd³ 3'
190 yd³ GREASE
800 yd³ GREASE, M° LAB CHEM 12'
67 yd³ LAB CHEM
300 yd³ CN-ADDED
130 yd³ GREASE
75 yd³ M°
1200 yd³ GREASE M° ~10'
120 yd³ CN-
244 yd³ CN- Added 10'
300 yd³ GREASE, M° LAB WASTE
2700 yd³ ~10' GREASE CHEM WASTE DRUMS
3300 yd³ GREASE - CHEM WASTE ~10' DRUMS
370 yd³ ~12' GREASE
1750 yd³ ~10' GREASE-CHEM WASTE
5000 yd³ METAL OXIDES ~20' GREASE, DRUMS
7000 yd³ ~12 GREASE CHEM WASTE DRUMS
4170 yd³ ~10' GREASE CHEM WASTE
1050 yd³ ~9 CN, ACID, GREASE
0 25 50 100 200
SCALE IN FEET
BIO-ECOLOGY SITE
TDWR
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NOTED
02C200
WASTE LOCATIONS AND VOLUMES

From June 3 through June 4, 1973, approximately 5 inches of rain fell on the site during a 24-hour period. Approximately 90 percent of the Bio-Ecology facility (11.2 acres) was inundated. State inspections of the site observed flooding in several storage basins and wastewater runoff into Mountain Creek. The site was to have been designed to adequately protect against a 24-hour, 25-year rainfall; however, the rainfall during June 3 through June 4 was of less than a 25-year frequency. Judgments were entered by the Texas courts on July 6, 1973, and March 24, 1977, requiring Bio-Ecology to comply with its permit and remedy the above mentioned violations. On June 13, 1978, Bio-Ecology filed for bankruptcy under the provisions of Chapter XI of the Bankruptcy Act.

After payment of all priority creditors, the Texas Department of Water Resources was able to recover $28,870.50 from Bio-Ecology for cleanup activities. In December 1979, a contract was made to partially close the site. Under the contract, (1) all open receiving basins and pits were drained, (2) all containerized wastes were buried onsite and covered with a pelletized lime blanket, and (3) sludges in various lagoons and landfills were moved to consolidate them onsite. Due to constraints in funding, a number of metal tanks containing oils, solvents, and paint sludges remained at the site. Approximately $34,000 (including $28,870.50 obtained from Bio-Ecology bankruptcy) was expended during the period from December 12, 1979, through February 15, 1980, for the partial site cleanup.

In November 1981, the application for a Cooperative Agreement for remedial investigations and feasibility studies at the Bio-Ecology site was filed. The Cooperative Agreement between EPA and the State of Texas was approved on April 12, 1982. An award of $328,000 was authorized to conduct a remedial investigation and feasibility study (RI/FS) at the Bio-Ecology site. In November 1982, Woodward-Clyde Consultants of Houston, Texas, was selected to conduct the RI/FS. The site work for the investigation was completed in January of 1983 and the final report was approved in April of 1983. The Feasibility Study was started in February of 1983 and was completed in July of 1983. The major findings of the investigation and feasibility reports are discussed in the section titled "Current Site Status".

In addition to the above work an Initial Remedial Measure (IRM) has been performed at the Bio-Ecology site in September of 1983, to perform the removal of all surface structures at the site. The IRM cleanup activities included the following:

1. Remove and dispose of approximately 80,000 gallons of hazardous liquids and sludges. (Organics, PCB's, Heavy Metals)

2. Decontaminate and remove the 15 storage tanks and other surface structures.

3. Remove and dispose of about 35 cubic yards of contaminated soil.

4. Surface cleanup. (miscellaneous debris, site grading, etc.)

This action was deemed necessary according to the National Contingency Plan (NCP) section 300.68 with regard to hazardous substances in drums, barrels, tanks, or other bulk storage containers above surface posing a threat to public health or the environment and contaminated soils largely at or near the surface posing a threat to public health or the environment.

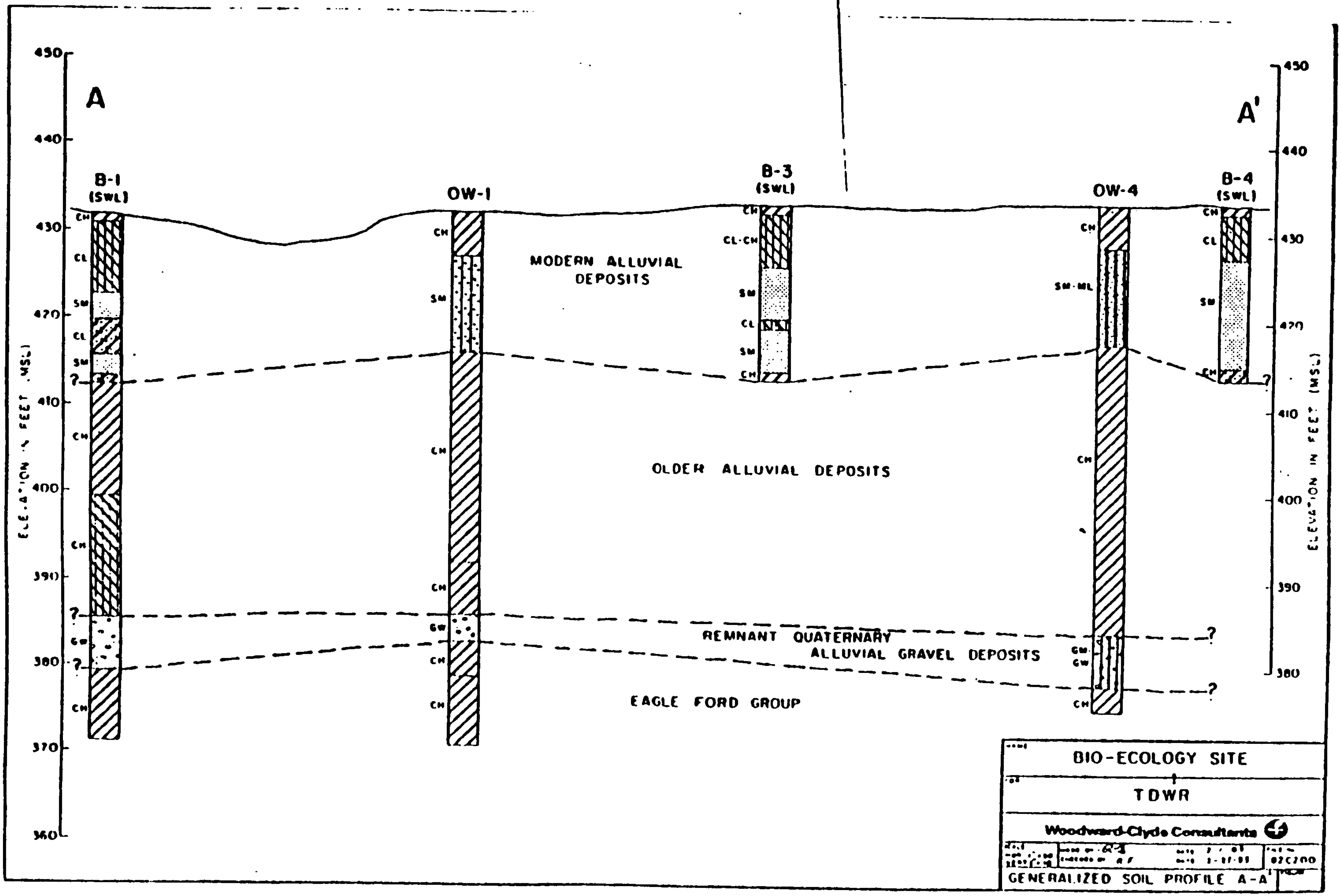
CURRENT SITE STATUS

The Bio-Ecology remedial investigation that was performed included a hydrologic analysis, a stratigraphy analysis, a hydrogeological analysis and a geochemical analysis. The following is a summary on the results of this investigation.

The hydrologic analysis showed the site to be poorly drained and subject to surface run-off, erosion and flooding. Approximately 75 percent of the site is within the 100-year floodplain.

The stratigraphic analysis identified four subsurface strata within the upper 60 feet at the site. The uppermost stratum from the surface to about 20 feet in depth consists of modern alluvial deposits from the meander deposition of Old Mountain Creek on the north, east and south of the site. These modern alluvial deposits are pervious deposits capable of transmitting water vertically and laterally and are thus subject to infiltration by rainfall and high flood waters of Old Mountain Creek. Underlying the modern alluvial deposits are older alluvial deposits from floodbasin deposition of the Mountain Creek valley. These deposits are primarily high plasticity clays with occasional beds of low plasticity clays. The older floodbasin soils contain fissures and cracks caused by cyclic shrinkage and swelling. The older alluvial deposits therefore act as a leaky aquitard capable of transmitting fluids vertically. These deposits vary in thickness from 25 to about 40 feet across the site. Below this stratum is about a 5-ft layer of remnant quaternary gravel deposits which is the first significant aquifer encountered. Beneath the gravel deposits is about a 200-ft section of the Eagle Ford shale. This shale is for all practical purposes impervious and overlies the Woodbine aquifer. The Woodbine Aquifer is used as a drinking water supply for the City of Grand Prairie (See Figure 4 for a typical cross section).

The ground water flow, at the time of investigation, was generally from northwest to southeast across the site in the remnant gravel aquifer. Ground water encountered was also under an artesian head of about 15 feet (measured from the older alluvial deposits). This aquifer is slightly contaminated in the vicinity of the site and is subject to contamination from wastes at the site migrating through the secondary structure of older alluvial deposits. Ground water is present in the upper alluvial deposits at water levels below the level of surface water in the adjacent stream channel and nearby pond northwest of the site. These surface waters are recharging the alluvium at the site.


A
A'
B-1 (SWL)
OW-1
B-3 (SWL)
OW-4
B-4 (SWL)
MODERN ALLUVIAL DEPOSITS
OLDER ALLUVIAL DEPOSITS
REMNANT QUATERNARY ALLUVIAL GRAVEL DEPOSITS
EAGLE FORD GROUP
ELEVATION IN FEET (MSL)
450
440
430
420
410
400
390
380
370
360
CH
CL
SM
CL-CH
SM-ML
GW
BIO-ECOLOGY SITE
TDWR
Woodward-Clyde Consultants
GENERALIZED SOIL PROFILE A-A'
82C200

The geochemical analysis showed that surface contamination at the site is primarily restricted to on-site locations and to off-site drainage areas. On-site surface contamination is extensive for metals, cyanide and organics. Composite samples from the site indicate high concentrations of lead (1,100 mg/kg), arsenic (210 mg/kg), and cyanide (1,030 mg/kg). Analysis also indicated the presence of many organic contaminants including toluene (19,000 ppb), trichloroethylene (1,000,000 ppb), benzene (1,500 ppb), methylene chloride (87 ppb), and naphthalene (240,000 ppb). Off-site contamination did not appear to be severe at the time of the field investigation. Likewise, subsurface contamination appears to be primarily restricted to waste deposits and their vicinity.

There are approximately 40,000 cubic yards of wastes and highly contaminated soils at the site.

The conclusions of the remedial investigation are the following:

- Significant waste quantities containing high concentrations of metals, cyanides and aromatic organics are present at the Bio-Ecology site;
- Seventy-five percent of the site is located within the 100-year floodplain and is susceptible to severe flooding;
- Migration pathways and migration mechanisms are present at the site for potential significant long-term waste migration to surface and subsurface waters and adjacent areas;
- Evidence of surface contamination in off-site drainage ditches and traces of subsurface contamination in the quaternary gravel aquifer beneath the site were found;
- Waste migration to date has been primarily restricted to on-site locations with the exception of past surface off-site migration caused by flooding;
- Target receptors currently impacted are adjacent land areas (dead and dying vegetation) and surface waters;
- Remedial actions should be undertaken to prevent future surface and subsurface migration of wastes to surface water, ground waters and adjacent property; and
- A search of drinking water well records was conducted during the investigation and did not reveal anyone using the shallow aquifer.

The feasibility study completed by Woodward & Clyde Consultants in July 1983 developed the following objectives based on the results of the remedial investigation:

- Remove above ground structures, dispose of contents, and treat the associated northern off-site contaminated soil area;
- Raise site above 100-year floodplain;
- Provide adequate site drainage;
- Treat special wastes (PCBs in Tank T2; buried drums and containers including medical vials and laboratory chemicals; areas of high arsenic concentrations; and areas of cyanides); and
- Control off-site migration of wastes by surface and subsurface migration pathways to surface and subsurface waters and adjacent land areas in order to mitigate future impacts on these target receptors. (No significant air migration problems were detected during the site investigation.)

The feasibility study developed nine alternatives based on these objectives. A no-action alternative was also considered for the Bio-Ecology site, but was eliminated prior to initial screening based on its inadequacy for meeting response objectives to mitigate the site-specific problems and the fact that pathways exist for significant potential migration of surface and subsurface contamination.

The nine alternatives were screened for performance, cost and environmental factors. The Feasibility Study includes a detailed screening procedure and the results are summarized here. Three alternatives were rejected based upon performance and the low reliability of adequately controlling the source of contamination. One alternative (off-site transport and disposal) was rejected based on cost since its cost was about three times more than the next most costly alternative and did not provide substantially greater public health or environmental benefit.

The remaining five alternatives were developed and fully evaluated. More accurate cost estimates were prepared for each. They are:

Alternative	Estimated Costs Design	Estimated Costs Construction
4 - Stabilize wastes in-place and install slurry trench through modern alluvium (30-ft)	$136,300	$1,604,200
5 - Stabilize and consolidate waste and install slurry trench through modern alluvium (30-ft)	156,700	1,844,800
6 - Stabilize wastes in-place and install slurry trench through quaternary sand/ gravel layer (60-ft.)	178,800	2,104,000
7 - Stabilize and consolidate wastes in clay lined cell (with leachate collection system)	177,200	2,085,200
8 - Stabilize and consolidate wastes in synthetic/clay lined cell (w/leachate collection system) (RCRA approved facility)	212,000	2,497,400

All the above alternatives include a clay cap, a ground water monitoring system, and raising the site elevation above the 100-year floodplain. The costs noted above include capital costs. In addition to the costs mentioned above, post closure monitoring costs are estimated to be about $20,000 the first year and then about $7,000 per year for 30 years and O&M costs for each alterntive are estimated to be $1000 to $2000 per year for 30 years.

A cost-effectiveness evaluation was performed by professional engineers on the Woodward Clyde staff on the above alternatives. This evaluation process used a weighted rating system to quantitatively rank the effectiveness of the alternatives. Four categories are listed below along with the available number of points for each:

Category	Available Points
(1) Human Health Impacts	30
(2) Feasibility and Performance	30
(3) Environmental Impacts	10
(4) Timeliness	5
	750

The following is an explanation of the elements considered in each of the five evaluation categories:

(1) Human Health Impacts (30 points): Impacts on human health were judged on anticipated impacts of each alternative on air, soil and water in the region, that could potentially affect the health of humans. Human contact with affected ground water, run-off and run-on water, air in the site area, and site soils were considered during both the remedial activities and after cleanup of the site. One-half of the category weight was alloted for impacts during construction, and one-half for after construction. Alternatives anticipated to have small adverse effects on human health received high points. Alternatives anticipated to have large adverse effects on human health received low points.

(2) Feasiblity and Perfomance (30 points): Feasibility of each alternative was judged based on the applicability and degree of sophistication of the alternative. Performance of each alternative was rated on its potential to accomplish four main objectives: (1) raise site above 100-year floodplain, (2) provide adequate site drainage, (3) treat special wastes, and (4) control off-site migration of contaminants. Alternatives judged to be the most feasible and most effective in accomplishing the objectives were given the most points. Alternatives judged to be less feasible and effective were given lower points.

(3) Environmental Impacts (10 points): Each alternative was evaluated using two main criteria: (1) impacts during construction (short term) and (2) impacts under normal conditions (long term). These evaluation criteria include environmental impacts on air, water and soil. Factors specific to the site considered were: degree of contaminant hazard, availability of pathways for contaminant movement, and sensitivity of potential receptors. The above items were considered in judging each alternative's impact on air, water and soil. Although environmental impacts are allocated only 10 points in the evaluation, performance (30 points) and human health impacts (30 points) are directly related to alternative effectiveness in mitigating site specific environmental problems. The evaluation of environmental impacts was therefore limited to the immediate (direct) and long term impact of implementing the alternative. High points were given to alternatives that were judged to have low environmental impacts and low points were given to alternatives judged to have high environmental impacts.

(4) Timeliness (potential for phasing) (5 points): Each alternative was reviewed to determine which activities may be conducted independently and which activities must be conducted concurrently. Alternatives which were judged to have the greatest flexibility (activities which may be conducted independently) were awarded high points. Alternatives whose activities could not be isolated from one another were awarded low points.

The effectiveness of each alternative was evaluated on a basis of 750 possible total points, and judged in each of the four categories on an absolute scale from 1 to 10 (10 considered excellent, 1 considered poor). Environmental Impacts were divided into two groups --- short term and long term. Impacts during construction (short term) were allotted 30% and impacts after construction (long term) were allotted 70% of the environmental impact category rating. The 1 to 10 ratings for each category were multiplied by the respective total possible points for each category to obtain a total weighted average evaluation score for each alternative.

The cost of installing or implementing each alternative was estimated to be compared against their effectiveness. A list of individual cost items estimated for each alternative is presented below:

- Engineering Design
- Mobilization
- Insurance and Bonds
- Temporary Installations
- Transportation
- Water Treatment
- Contaminant Treatment
- Site Cleanup
- Security
- Land Lease
- Reporting
- Disposal
- Equipment Cleanup
- O&M Costs

The following table illustrates the results of the evaluation:

EVALUATION RESULTS

EVALUATION CATEGORY	MAXIMUM POSSIBLE SCORE	Alternative No. 4	5	6	7	8
EFFECTIVENESS FACTORS						
Human Health Impacts	300	200	185	235	192.5	240
Feasibility and Performance	300	175	192.5	237.5	230	250
Environmental Impacts	100	63.5	70.7	76	71.3	76
Timeliness	50	35	36.7	37.5	20	18.3
Effectiveness Scores	750	474	485	588	514	584
COST						
Cost Estimate ($k)		$1,604.2	1,844.8	2,104	2,085.2	2,497.4

Based on this evaluation, alternatives 6 and 8 are more effective than the other alternatives, but roughly comparable to each other. Alternative 8 is slightly more protective of human health and is also expected to perform better over an extended period of time. Alternative 6 can be implemented sooner and it costs less. Overall, Alternative 8 is more effective than Alternative 6 in that it provides the highest level of public health protection and the best long-term reliability.

Community Relations

Documents made available for public comment included the Remedial Investigation and Feasibility Study reports, two addenda to the Feasibility report, the draft Record of Decision (ROD), and a copy of the press release announcing the comment period. The public comment period for the selected alternative was held December 2 through December 23, 1983. A press release was issued announcing this on November 23, 1983. A public meeting was held at the Grand Prairie Community Center on December 15, 1983. Two representatives from TDWR and two from EPA were present. William B. Hathaway (EPA, Region VI) gave a general presentation on Superfund and the key alternatives and Charles Faulds (TDWR) presented the technical data from the study. Comments received at the meeting were all favorable, expressing confidence in and thanks to EPA for their timely response to the problem at the Bio-Ecology site. Written comments were received by three of the potential responsible parties. Responses to these comments are in the Responsiveness Summary attached.

Recommended Alternative

Section 300.68 (j) of the NCP states that "The appropriate extent of remedy shall be determined by the lead agency's selection of the remedial alternative which the agency determines is cost-effective (i.e. the lowest cost alternative that is technologically feasible and reliable and which effectively mitigates and minimizes damage to and provides adequate protection of public health, welfare, or the environment)." It is EPA policy to consider the degree to which a remedy under CERCLA is consistent with other environmental laws and regulations in determining whether that remedy provides fully adequate protection to human health, welfare, and the environment.

Alternative 8 complies with RCRA requirements for a hazardous waste landfill and also would include ground water monitoring to determine if there is contamination that has already migrated from the site. If ground water contamination is detected beyond the waste management boundaries of the landfill, RCRA would also require implementation of a corrective action program. The lined landfill with a leachate collection and cap system would have a high degree of reliability for containing the wastes placed in the landfill.

The feasibility study also evaluated another source control remedy (Alternative 6) which provided a degree of protection somewhat less than that of the fully protective/RCRA consistent remedy but at slightly less cost.

Alternative 6 includes the installation of a 60-foot slurry trench around the perimeter of the site, raising the site above the 100-year flood plain, stabilizing the wastes, construction of a clay cap, and construction of a fence. The cap and slurry wall, keyed into an impermeable stratum, are expected to be effective for an extended period in preventing migration of wastes beyond the site boundary. In addition, the slurry wall is susceptible to leakage over time due to possible long-term increase in permeability. In contrast, synthetic liner systems, combined with leachate collection, are expected to be effective indefinitely given the nature of the wastes present at the Bio-Ecology site. Long-term ground water monitoring outside of the containment cell should be sufficient to detect any leakage. If necessary, implementation of a corrective measure addressing the leakage would be performed.

The remainder of the alternatives evaluated were clearly not as effective or reliable as either Alternatives 8 or 6. Alternatives 4 and 5, although less costly, are not as reliable as Alternative 6. These alternatives propose a shallow slurry trench constructed into the alluvial system. The alluvial deposits are not a good tie-in stratum for a slurry wall because of the presence of secondary structures of slicken sides and fissures. This would allow ground water to flow into and through the containment area. Therefore, alternatives 4 and 5 pose a higher risk for waste migration. Alternative 7, although less costly than alternative 8, is less reliable due to long-term increases in permeability similar to the problems described for Alternative 6.

The potentially responsible parties also proposed a remedy which would cap the site but did not include waste stabilization or fixation. Their plan does not propose either a deep slurry wall or a synthetic liner system. This remedy has poor reliability and does not adequately contain the wastes.

Alternatives 4, 5, 6 and 7 do not comply with RCRA technical requirements. Hazardous wastes in each alternative are removed, stabilized and/or fixed and placed into new or expanded trenches. These alternatives do not comply with Part 264.251(a) and 264.301(a) of RCRA technical requirements (design and operating requirements for waste piles and landfills). The alternative proposed by the potential responsible parties is not consistent with these RCRA technical regulations.

Based on this analysis, Alternative 8 is the least cost option that adequately protects public health, welfare, and the environment and is consistent with other environmental acts. Therefore, Alternative 8 is the recommended cost-effective remedy. Details of the recommended alternative are shown in Figures 6 and 7. The recommended remedy includes ground water monitoring. If existing ground water contamination is found beyond the boundaries of the containment cell, EPA will make a separate evaluation to determine whether a corrective action program is consistent with the NCP. Presently, available information is insufficient to determine the need for, and cost of, such a program.

Since the site is located in the 100-year floodplain, the requirements of Executive Order No. 11988 covering Floodplain Management were reviewed. A Floodplain Management Assessment was prepared (Addendum 1) for the proposed remedy. This assessment concludes that the proposed remedy will not create a substantial risk to public health or the environment due to a 100-year flood if certain measures are followed. The responsible government agencies will be contacted during the design stage to ensure that the recommendations are implemented.

Tentative Schedule

- Complete Enforcement Negotiations	January 1984
- Sign ROD	May 1984
- Issue Administrative Order	May 1984
- Cooperative Agreement Amendment (to fund and to incorporate the design)	June 1984
- Start Design	July 1984
- Complete Design	September 1984
- Start Cleanup	February 1985
- Complete Cleanup	September 1985

Figure 6

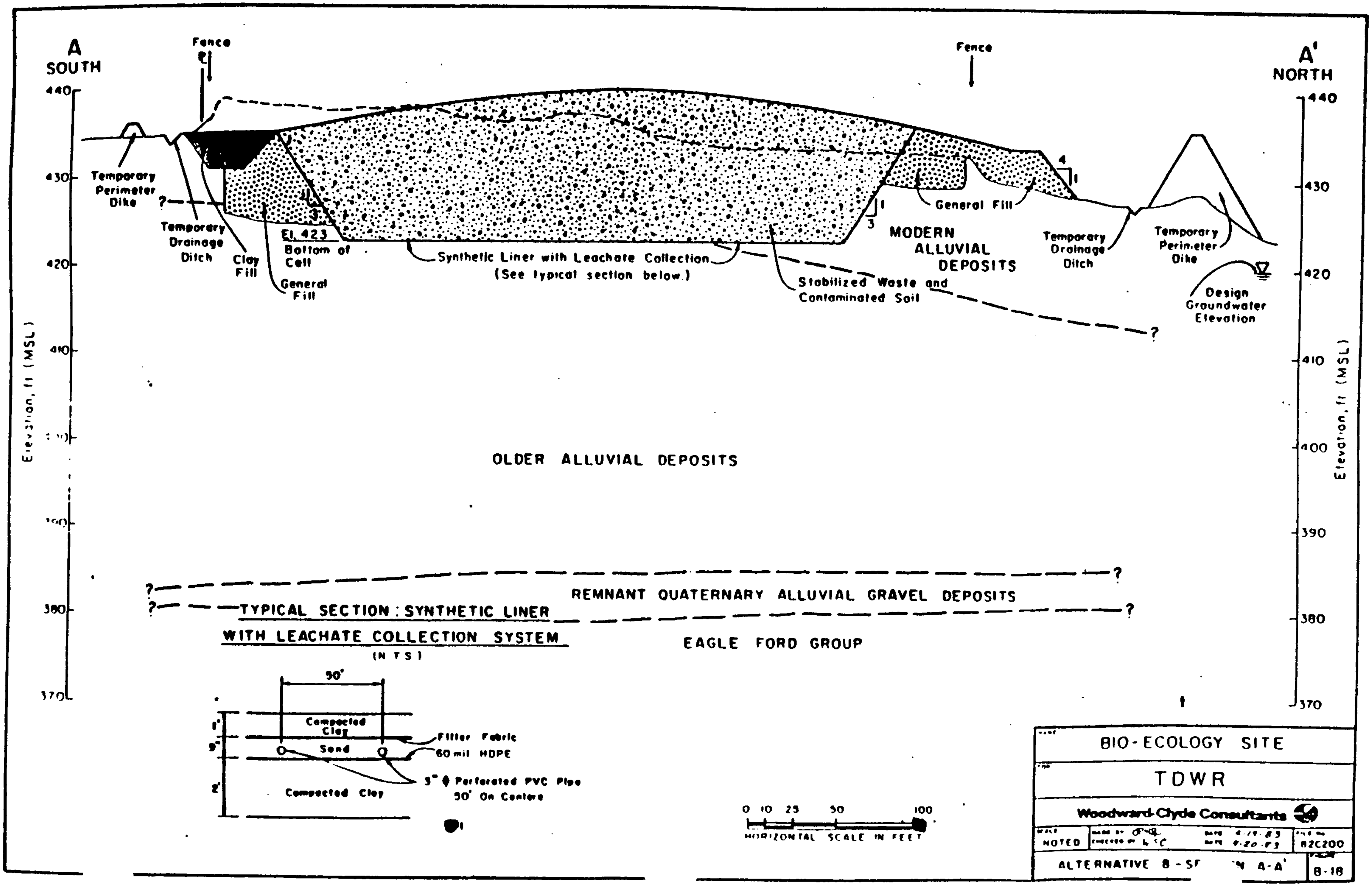
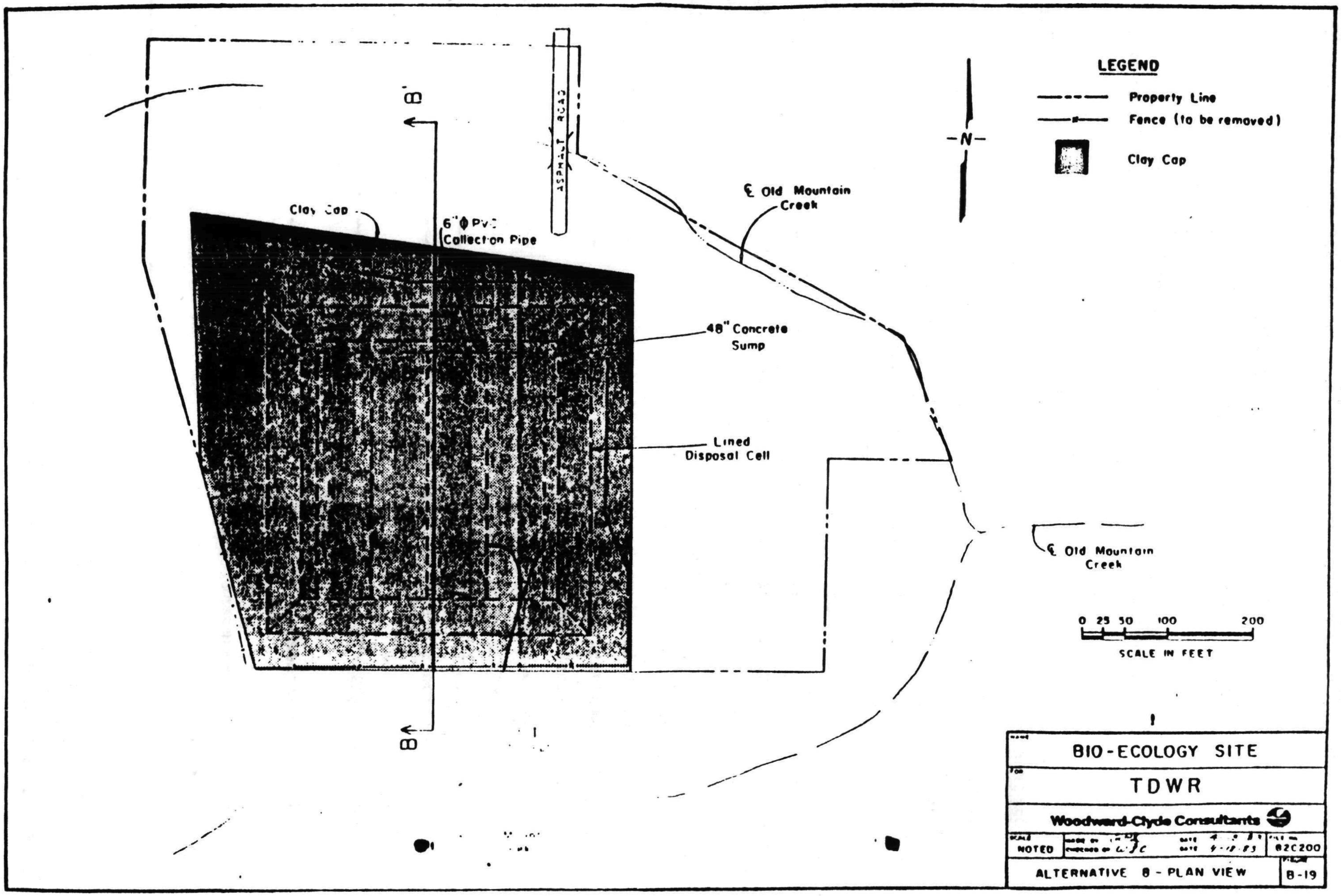

A
SOUTH
Fence
Fence
A'
NORTH
Temporary Perimeter Dike
Temporary Drainage Ditch
Clay Fill
El. 423 Bottom of Cell
General Fill
Synthetic Liner with Leachate Collection (See typical section below)
Stabilized Waste and Contaminated Soil
MODERN ALLUVIAL DEPOSITS
General Fill
Temporary Drainage Ditch
Temporary Perimeter Dike
Design Groundwater Elevation
Elevation, ft (MSL)
OLDER ALLUVIAL DEPOSITS
REMNANT QUATERNARY ALLUVIAL GRAVEL DEPOSITS
EAGLE FORD GROUP
TYPICAL SECTION : SYNTHETIC LINER WITH LEACHATE COLLECTION SYSTEM
(N T S)
50'
Compacted Clay
Sand
Compacted Clay
Filter Fabric
60 mil HDPE
3" Perforated PVC Pipe 50' On Centers
0 10 25 50 100
HORIZONTAL SCALE IN FEET
BIO-ECOLOGY SITE
TDWR
Woodward-Clyde Consultants
NOTED
82C200
B-18

Figure 7



LEGEND
Property Line
Fence (to be removed)
Clay Cap
N
ASPHALT ROAD
B'
B
Clay Cap
6" Φ PVC Collection Pipe
℄ Old Mountain Creek
48" Concrete Sump
Lined Disposal Cell
℄ Old Mountain Creek
0 25 50 100 200
SCALE IN FEET
BIO-ECOLOGY SITE
TDWR
Woodward-Clyde Consultants
NOTED
82C200
ALTERNATIVE B - PLAN VIEW
B-19

Table 1

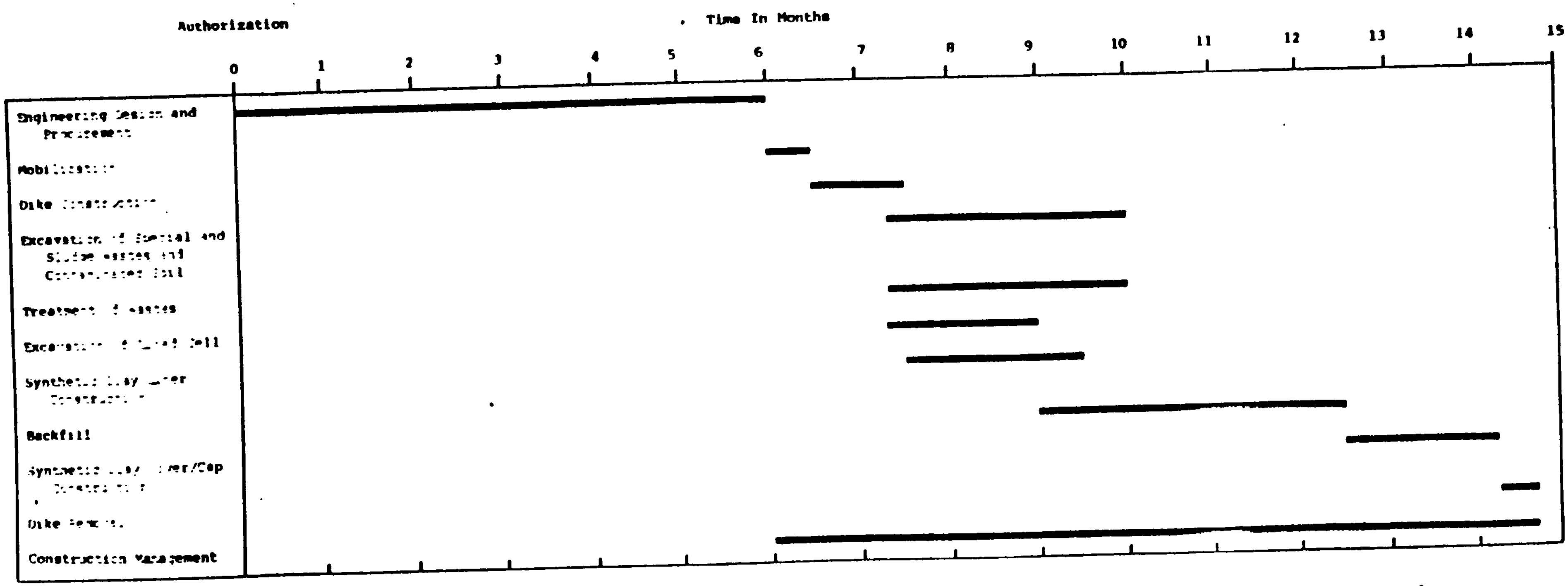
COST SUMMARY - ALTERNATIVE 8
STABILIZE AND CONSOLIDATE WASTES IN SYNTHETIC/CLAY LINED CELL AND CAP

Component	1983 Design Cost ($)	1984 Construction Cost ($) *
Design	212,200	---
Construction		
1. Temporary Site Perimeter Dike/Ditch	---	64,000
2. Excavation of Special Wastes	---	3,500
3. Treatment of Special Wastes	---	16,000
4. Backfill Special Wastes	---	3,100
5. Excavation of Sludge Wastes	---	109,400
6. Stabilization of Sludge Wastes	---	390,100
7. Backfill of Sludge Wastes	---	123,200
8. Excavation of Contaminated Soil	---	17,800
9. Backfill of Contaminated Soil	---	23,000
10. Excavation of Lined Cell	---	71,800
11. Synthetic/Clay Liner (W/Leachate Collection	---	367,900
12. Backfill of Non Contaminated Soil	---	89,700
13. Synthetic/Clay Cover/Cap	---	443,000
14. Temporary Storage Area Dike	---	107,100
Weather Contingency	---	234,300
Contractor Overhead	---	206,400
Construction Management, Engineering & Testing	---	227,100
Total Costs	$212,200	$2,497,400

*1983 Cost adjusted 7% for inflation

Table 2

ALTERNATE NO. 8 - CONSTRUCTION SCHEDULE



ADDENDUM 1

Bio-Ecology Systems, Inc., Site
Grand Prairie, Texas

Remedial Alternatives Analysis (1)

FLOOD PLAIN MANAGEMENT ASSESSMENT

I. Purpose

The purpose of this addendum is to:

1. Review Executive Order No. 11988, May 24, 1977, 42 F. R. 26951 entitled Floodplain Management.
2. Review applicable statutes referred to in the Executive Order as required.
3. Review the Bio-Ecology Site Remedial Alternatives Analysis in areas discussing flood plain management.
4. Summarize the review and describe additional technical requirements to comply with applicable requirements.

II. Introduction

The Site Investigation report (2) developed a hydrological description and analysis of the Bio-Ecology site and is presented in part in this addendum as follows:

> The Bio-Ecology site is located in the West Fork of the Trinity River watershed. Specifically, the site is located at the mouth of the Mountain Creek watershed, downstream of the Mountain Creek Lake and Dam. A small tributary of Old Mountain Creek flows along the north, east and southern boundaries of the site. Two U.S. Geological Survey Gauging Stations No. 08050050 and 05050100 are located upstream and downstream of the site, respectively.
>
> Station No. 08050100, Mountain Creek at Grand Prairie, Texas, has been in operation since 1960. The U.S. Geological Survey maintains the station which is located on the north side of Jefferson Boulevard (State Highway 80). For the period of record noted above, the maximum discharge recorded in Mountain Creek was 38,100 ft.3/sec which occurred on April 19, 1976 (gauge height 24.21 ft). However, the maximum water level recorded at this site was 24.62 feet which occurred on May 7, 1969.

Drainage in Mountain Creek is affected by the volume of releases made at the Mountain Creek Dam and the back water effects of the West Fork of the Trinity River. Approximately 206 square miles of watershed are drained upstream from the site. The U.S. Army Corps of Engineers has estimated the following water surface elevations at the Jefferson Boulevard crossing of the creek:

25-year frequency	Elevation 433.0
50-year frequency	Elevation 434.5
100-year frequency	Elevation 436.0

Based on these elevations, it is estimated the 100 year frequency elevation in the vicinity of the site will be approximately 437.00 feet above mean sea level. Using this elevation, approximately 75 percent of the site is located within the 100-year flood plain as shown in Figure 23.

The site is also located in a high hazard zone (as defined by the U.S. Army Corps of Engineers) with respect to the Mountain Creek Dam. In the event a failure were to occur in the dam, it is likely that the flow velocity and discharges in the vicinity of the site would be high. The Texas Department of Water Resources, Dam Safety Group, has conducted a Phase I Dam Safety Analysis of the structure. These data will be considered in developing remedial plans for the site.

On a local level, the Bio-Ecology site drains radially in all directions (See 1 ft contours of Fig. 23). From Technical Paper 40 "Rainfall Frequency Atlas of the United States", U.S. Department of Commerce, the 100-year 24 hour rainfall in the vicinity of the site is estimated to be 10.50 inches. Based on the site topography, the surface runoff rate depending on unit rainfall and type of cover will range from 0.75 to 1.75 feet per second. This rate of runoff has been sufficient to cause surface erosion and hence surface migration of contaminants during periods of intense rainfall. The surface migration of contamination has been temporarily reduced by the partial soil covering placed during the site closure operations in 1979.

III. Proposed Site Remedial Action

The proposed remedial action at the site involves the stabilization of on-site wastes, treatment and stabilization of special wastes, and construction of a landfill with liner, leachate collection system, and clay cap. The following proposed construction and treatment activities are anticipated on the site:

1. A perimeter dike with a shallow interior drainage ditch will be built around the site outside of the areas of known contamination. The dike and ditch will contain, divert, and store surface water within the site for treatment and/or disposal. All waste material stabilization and remedial action activities will be performed within the diked area. The top of the dike will be of sufficient elevation to hold 100-year floodwaters away from the work area.

The dike will be removed after the remedial action is completed.

2. The special wastes (cyanide and arsenic) which have been identified on-site will be chemically treated, neutralized, and disposed of (buried) in the on-site landfill.

3. The waste sludges will be excavated, stabilized, and replaced in the on-site landfill.

4. The entire site will be raised above the 100-year flood plain.

5. A landfill with liner and leachate collection system will prevent lateral migration of contaminants from the site through the ground water.

6. A clay cap will be placed over the landfill to minimize surface infiltration. Fertilized topsoil will be placed over the cap and seeded to provide a grass cover.

7. Post closure monitoring of the site will be performed after the remedial actions are completed.

IV. <u>Flood Plain Regulatory Requirements</u>

In accordance with Executive Order 11988, Floodplain Management (3), an applicable executive agency shall provide leadership and shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by flood plains. In addition, an agency has the responsibility to evaluate the potential effects of any action that may be taken in a flood plain and to ensure that the design of the action minimizes potential harm to or within the flood plain.

As a part of the preparation of this addendum, the following agencies have been identified as having flood plain management responsibilities:

U. S. Environmental Protection Agency
U. S. Army Corps of Engineers
Texas Department of Water Resources
City of Grand Prairie, Texas
Federal Emergency Management Agency

Specifically for Bio-Ecology site remedial actions, the proposed remedial action will be designed, constructed, operated, and maintained to prevent the washout of any hazardous materials by a 100-year flood.

The listed agencies will be provided with the design and construction sequence of any remedial actions to ensure that the actions meet the above requirement. The submitted design will include the construction of any temporary facilities during the performance of the remedial action.

The EPA has determined that siting and construction of the remedial action within the flood plain is the only praticable alternative consistent with law. The only alternatives evaluated which would not require construction of a permanent cap on the site were the no-action alternative and total excavation and removal of all contaminated soil and ground water. The no-action alternative is inconsistent with the NCP because it fails to address the threat of further migration of wastes from this site; complete removal and off-site disposal of all contaminated material was not cost-effective.

V. Flood Hazard Assessment

Two major flood hazards exist at the Bio-Ecology site. These hazards are:

1. The 100-year flood event

2. The failure of the Mountain Creek Dam

The proposed remedial action at the site involves the construction of a temporary dike to prevent 100-year floodwaters from entering the site. Floodwaters could potentially wash away hazardous materials from the site while these materials are being treated and stabilized during the remedial action.

The proposed remedial action also includes raising the entire site above the 100-year flood plain to prevent the scouring of any materials away from the site. Raising the site elevation will not have an adverse impact on the surrounding environment during flooding because the area being raised is small when compared to adjacent areas in the flood plain.

The design details of both the temporary dike and the impermeable cap will include provisions to prevent the erosion of the sides of the temporary dike and the site cap during floods less than or equal to the 100-year flood. Erosion protection alternatives include: (1) flexible protection such as rock riprap or soil fabrics; (2) solid (rigid) protection such as concrete retaining walls or gabions; (3) and vegetation protection.

The hazard classification of the Mountain Creek Dam is considered high because of the development and habitation on the Mountain Creek flood plain downstream of the dam. Dams in the high hazard category are those located where dam failure may cause the loss of six or more human lives and excessive economic loss. However, an inspection of the dam did not find any immediate hazardous conditions at the dam.

No immediately hazardous conditions exist at the Mountain Creek Dam and Reservoir. The dam is in good condition, and there are no seepage areas of ponded water along the downstream toe. The downstream slopes, including the repaired slide area, are in good condition. The sprinkler system has resulted in a good cover of grass on the downstream slope. The spillway structure is sound and shows little or no sign of cracking or settling. The gates and hoist mechanisms appeared to be in good condition. In summary, the project is judged to be in good condition.

It is, therefore, reasonable to conclude that the proposed remedial actions at the Bio-Ecology site will not exhibit a substantial risk to the environment or human health due to flooding up to the 100-year flood if the following concerns are addressed:

1. The design of the remedial action is sufficient to prevent erosion of the temporary dike and site cap during flooding.

2. The Mountain Creek dam is operated and maintained to ensure that hazardous conditions at the dam and reservoir do not develop.

3. The raising of the site above the 100-year flood plain does not adversely impact the current extent of the 100-year zone.

These concerns will be addressed through the responsible agencies (See Section IV) during the design phase of the remedial actions to ensure the flood hazards are mitigated.

ADDENDUM 2

Bio-Ecology Systems Site
Grand Prairie, Texas

Remedial Alternatives Analysis (1)

BIO-ECOLOGY GROUND WATER MONITORING PROGRAM

I. Purpose

The purpose of this addendum is to:

1. Review the Bio-Ecology Site Remedial Alternatives Analysis in areas discussing a post closure ground water monitoring plan.

2. Describe in more detail a post closure ground water plan.

II. Introduction

The Site Investigation report (2) presented a description and analysis of the Bio-Ecology site hydrogeology and is presented in part in this addendum as follows:

> The principal aquifers of Dallas County are sands of the Twin Mountain Formation, the Paluxy Formation, and the Woodbine Group. The Paluxy and Twin Mountain Formations are present beneath the site at about an elevation of -600 feet and -1450 feet, respectively. The Woodbine is present at about elevation +180 feet, or about 250 feet below existing ground surface.
>
> The Woodbine Group is the shallowest major aquifer beneath the Bio-Ecology site. The Woodbine is a water table aquifer where it crops out west of the site (Tarrant County and west Dallas County), but beneath most of Dallas County it is artesian. The primary source of recharge for the Woodbine is rainfall on the outcrop, with other sources consisting of surface water seepage from lakes and streams. Sand development is limited in the Woodbine section in the site area; consequently, this section would not be considered a major section of the aquifer in the region.
>
> The Eagle Ford Group overlies the Woodbine and is considered an aquitard. The fact that the Woodbine aquifer is artesian in the area demonstrates this relationship. The Eagle Ford is composed dominantly of shale. When sandy horizons are present, they are

usually dense, rather impervious, and do not constitute consistently porous water horizons. Early investigators characterized the Eagle Ford as highly indurated, of laminated character, and intermixed with selenite gypsum in minute lenticular crystals. Water flowing through this formation is generally bitter and disagreeable to the taste.

III. Proposed Site Remedial Action

The proposed remedial action at the site involves the stabilization of onsite wastes, treatment and stabilization of special wastes, and construction of a deep slurry trench and clay cap around the stabilized and contaminated areas of the site. The following proposed construction and treatment activities are anticipated on the site:

1. A perimeter dike with a shallow interior drainage ditch will be built around the site outside of the areas of known contamination. The dike and ditch will contain, divert, and store surface water within the site for treatment and/or disposal. All waste material stabilization and remedial action activities will be performed within the diked area. The top of the dike will be of sufficient elevation to hold 100-year floodwaters away from the work area. The dike will be removed after the remedial action is completed.

2. The special wastes (cyanide and arsenic) which have been identified onsite will be chemically treated, neutralized, and disposed of (buried) onsite.

3. The waste sludges will be excavated, stabilized, and replaced in the excavated areas of the site.

4. Wastes will be placed in an on-site disposal cell with synthetic liner and a leachate collection system and capped in accordance with RCRA regulations (40 CFR Part 264).

5. The entire site will be raised above the 100-year flood plain.

6. Post closure monitoring of the site will be performed after the remedial actions are completed.

IV. Proposed Post Closure Ground Water Monitoring Plan

A ground water monitoring plan is intended to detect any migration of contaminated ground water from the treated and stabilized wastes within the containment slurry trench. The proposed plan will include the following items:

1. Install ground water monitoring wells of sufficient number and at the appropriate locations and depths to yield ground water samples from the quaternary aquifer. This plan includes six to eight wells around the disposal cell completed in the quaternary aquifer. The exact locations and depths, including well screen lengths, will be determined in the detailed design of the plan.

2. A ground water sampling and analysis plan will be developed to include the procedures and techniques for the following activities:

a. Sample collection.
b. Sample preservation and shipment.
c. Analytical procedures including quality control procedures.
d. Chain of custody control.

Prior to sampling a ground water monitoring well, the ground water surface elevation should be measured.

3. Ground water sampling and analyses will be conducted quarterly for the first year after the completion of the remedial action to establish background parameter concentrations in the ground water.

After the first year, ground water sampling and analysis will be conducted semi-annually to determine whether there is a statistically significant increase over background concentrations in the ground water. If a statistically significant increase occurs over background concentrations, EPA and the Texas Department of Water Resources will jointly evaluate the release to determine if additional remedial actions are necessary.

4. The ground water analyses should determine, at a minimum, the following parameters:

Arsenic	Silver
Barium	Cyanide
Cadmium	pH
Chromium	Specific Conductance
Lead	Total Organic Carbon
Mercury	Total Organic Halogen
Selenium	

In addition to the above parameters, one sample from a downgradient well and one sample from an upgradient well will be analyzed for priority pollutants.

5. Ground water monitoring will continue for at least 30 years after the remedial action. After 30 years, the site will be reevaluated to determine if additional monitoring is required.

REFERENCES

1. Remedial Alternatives Analysis, Bio-Ecology Site, Grand Prairie, Texas, Texas Department of Water Resources, July 1983, Contract No. 14-300247.

2. Site Investigation, Bio-Ecology Site, Grand Prairie, Texas, Texas Department of Water Resources, April 1983, Contract No. 14-30027.

3. Executive Order 11988, 42 F.R. 26951, May 24, 1977 Floodplain Management.

4. Phase 1 Inspection Report, National Dam Safety Program, Mountain Creek Dam, Dallas County, Texas, Inventory No. TX00827, U. S. Corps of Engineers and Texas Department of Water Resources, January 1978.

ADDENDUM 3

Bio-Ecology Responsiveness Summary

The following responsiveness summary contains responses to comments received during the public comment period. The feasibility study report and draft Record of Decision made public at that time indicated a preference for Alternative 6 (on-site containment with a cap and slurry wall). EPA has determined that Alternative 8 (on-site containment in a landfill with liner and leachate collection system) should be implemented because it is consistent with the applicable RCRA technical regulations and provides greater long-term reliability and therefore results in a level of protection of public health, welfare, and the environment considered adequate by EPA.

Response To
Thompson & Knight Letter
Comments on the Proposed Remedial Alternative
For the Bio-Ecology Site
Grand Prairie, Texas

I. Comment - The EPA proposal is not cost-effective and contains technical deficiencies

Response

EPA's rationale for the selection of Alternative 8 is set forth in this document in the section entitled "Remedial Implementation Alternative Selection." The response to each comment concerning alleged technical deficiency is detailed below.

The following statements respond to the 8 points mentioned on pages 2 and 3 of the Thompson and Knight letter dated December 23, 1983.

1. The cost of obtaining permission from various landowners to construct a temporary off-site berm around the site was not included because this cost is expected to be negligible. Permission from only two adjacent landowners will be required. In previous discussions with these landowners, a willingness to cooperate was expressed on their part. One landowner has specifically stated that temporary installations on his property were acceptable. Both parties have expressed a desire to "clean this mess up." It is therefore reasonable to assume that little more than simple administrative expenses will be incurred. It should be noted that the feasibility report (p. 64) included consideration of land lease costs. The omission of these minor charges as a line item does not affect the validity of EPA's selection of the appropriate remedial option.

2. The proposed stabilization method will not increase the possibility of excessive leachate from the site. Alternative 8 offers the greatest degree of protection against leachate escaping from the site; otherwise, only the "pick it up and haul it off" alternative would significantly decrease the possibility of leachate escaping from the site.

3. Damage to the proposed cap from erosion, dessication, and root penetration will be prevented or mitigated by a regular operational and maintenance (O&M) schedule.

4. Stabilization activities will be conducted within a diked area such that there will be no increased surface water release during the remedial action. Similar to the proposed stabilization activities,

backhoe excavations conducted during the site investigation and air monitoring during this same time did not reveal any air release impact beyond the immediate excavation area inside the site fence. Health threats to employees engaged in remedial action are minimized through the extensive safety requirements mandated by EPA. All employees engaged in remedial action do so only under controlled conditions. This one-time risk under monitored and controlled conditions is proposed in order to alleviate the long-term risk to the public of an uncontrolled site.

5. The environmental implications of moving truckloads of soil to the site are insignificant within the context of the environmental improvement afforded by the remedial action, the existing adjacent land uses, and the existing local traffic which includes movement of truckloads of soil.

6. Ponding, other than temporary storage, will not result from the construction of the dikes; thus, there will be no increased infiltration. Dikes will retain storm water runoff from the site for treatment, if necessary, and subsequent disposal to the local municipal wastewater treatment system.

7. Stablization is necessary to provide load bearing capacity for equipment used to emplace the cap, for the cap itself, and for future operations and maintenance activities. Testing has demonstrated that for the extreme worst case, leachate quality will not be significantly impacted by waste stabilization.

8. Raising the site above the 100-year floodplain is the most cost-effective method for meeting the objective of preventing migration or washout of wastes from the site during a 100-year flood. Thus, raising the site is not inconsistent with the National Contingency Plan.

II. Comment - EPA's analyses of appropriate remedies fail to identify and quantify any danger to the public health, welfare, and the environment.

Response

According to Section 300.68(e)(2) of the NCP (source control), remedial actions may be appropriate if a substantial concentration of hazardous substances remain at or near the area where they were originally located and inadequate barriers exist to retard migration of substances in the environment. This is exactly the condition at the Bio-Ecology site.

The Investigation Report documents the following conditions:

1) Significant waste quantities containing high concentrations of metals, cyanides, and aromatic organics are present at the Bio-Ecology site.

2) Seventy-five percent of the site is located within the 100-year floodplain and susceptible to severe flooding.

3) Migration pathways and migration mechanisms are present at the site for potential significant long-term waste migration to surface and subsurface waters and adjacent areas.

4) Surface contamination in off-site drainage ditches and traces of subsurface contamination in the quaternary gravel aquifer beneath the site.

5) Waste migration to date has been primarily restricted to on-site locations with the exception of past surface offsite migration caused by flooding.

6) Target receptors currently impacted are adjacent land areas (dead and dying vegetation) and surface waters.

The NCP further states that if source control remedial actions are determined to be needed, these actions may include alternatives to contain the hazardous substances where they are located or to eliminate potential contamination by transporting the hazardous substances to a new location. It was determined by TDWR and EPA, based on the findings of the Investigation Report, that on-site source control remedial action is needed to adequately protect public health and the environment.

The criteria developed in section 300.68(e)(2)(i) were assessed in the Investigation/Feasibility Report. They are the following:

1. The extent to which substances pose a danger to public health, welfare, or the environment include the following factors:

   A. The population at risk was discussed in general terms throughout the report and is delineated below:

      1. Adjacent commercial auto salvage workers.
      2. Downstream commercial surface water users.
      3. Residents of a nearby mobile home park.
      4. Plants and animals.
      5. Future shallow groundwater users.

   B. Amount and form of the substance present: Approximately 40,000 cubic yards of sludges with:

      1. Containerized wastes, some of unknown description.
      2. Perched water in and around the wastes.
      3. Large quantities of jelly-like waste of a flowing consistency.
      4. Contaminated soil.

C. Hazardous properties of the substances include:

1. Poisons - CN, Arsenic, and various metals.
2. Carcinogens - PCB, chrome, chlorinated Benzene.
3. Corrosives - containerized acids.
4. Reactives - CN, Red phosporous, picric acid.
5. Priority pollutants.

D. Hydrogeological factors are discussed extensively in the Investigation and Feasibility Report. The alluvial deposits have a secondary structure of cracks and fissures capable of transmitting contaminants.

E. Climatic factors of concern are:

1. Rainfall causing flooding.
2. Dry periods causing dessication of soils and alluvium.

2. Contaminant migration at the present time is restricted to the vicinity of the site. The only adequate barrier providing containment at the site is a natural geological formation, the Eagle Ford shale.

3. EPA and TDWR experiences and approaches used in similar situations are limited, but generally tend toward effective containment.

4. Environmental effects and welfare concerns were discussed in the contaminant migration and target receptors sections of the Investigation Report.

The NCP has no specific requirement to definitively address the extent or likelihood to which identified substances could migrate from their current location, particularly within the context of how quickly they would move, and in what concentrations they would be found, if they did move. The development of an accurate and calibrated contaminant migration model is unnecessary for a source control situation.

The overriding objective or performance standard is to "control offsite migration of wastes by surface and subsurface pathways". This objective along with others stated in the Feasibility Study allow the determination of Alternative 8 as the appropriate remedy for the site.

III. Comment - EPA was required to prepare an Environmental Impact Statement

Response

EPA is not required to prepare an Environmental Impact Statement for actions taken at Superfund sites. However, the remedial investigation/ feasibility study prepared at this site addressed the human health and environmental impacts of various response options, their feasibility and reliability, and the costs of each alternative. In addition, EPA has provided an opportunity for public review and comment on EPA's evaluation of the site and of the range of remedial options considered.

Response to ERM-Southwest, Inc.
Comments on the
Proposed Remedial Alternative
for the Bio-Ecology Site
Grand Prairie, Texas

I. Response to Major Comments (from ERM report summary)

1. The data demonstrate that the gravel aquifer is subject to contamination from wastes at the site migrating through the secondary structure of alluvial deposits. The secondary structure has been reported in geotechnical observations in the Texas Department of Water Resources (TDWR) Bio-Ecology file 39009 (National Soil Service, 1978) and by Woodward & Clyde Consultants (WCC) Site Investigation and Remedial Reports for the Bio-Ecology site. The existence of secondary structure is further supported by subsurface contaminant distribution in subsurface soils and groundwaters. Geotechnical laboratory data further supplement the data.

2. Consistent with a permanent remedy, stabilization of the wastes is required in order to provide load bearing capacity. This load bearing stability is required for equipment used to emplace a cap, for the cap itself, and for future operation and maintenance considerations. During the temporary closure, the investigation phase of the project conducted by the TDWR, and the Initial Remedial Measure conducted by the Environmental Protection Agency (EPA), problems were encountered regarding insufficient load bearing capacity for equipment at the site.

   As a secondary function, waste stabilization is expected to provide some control of leachate generation. In the Feasibility Study, leachate testing was conducted using high shear mixing which resulted in the worst case leachate concentrations to be expected under the field conditions.

3. The effect of Joe Poole Reservoir being constructed upstream from the site was not taken into account when determining floodplain elevation at the site. It is the understanding of TDWR and EPA that when completed in 1985 or 1986, the reservoir should result in a lower 100-year floodplain elevation. The design of the remedial alternative will take this effect into consideration and will be designed accordingly.

4. The Feasibility Study objective "Prevent migration of wastes during a 100-year flood" is indeed procedurally correct and should replace the objective, "Raise the site above the 100-year floodplain elevation." However, this will not have a significant impact on the final remedial alternative.

5. Erosion considerations will be examined in detail during the design of the remedial alternative. The need to raise the site above the 100-year floodplain follows only as a cost-effective component of a remedial alternative which meets the objective of preventing migration of wastes during a 100-year flood.

6. TDWR acknowledges that cost savings may follow from considering the waste management practices for the northeast corner of the site as proposed by ERM-Southwest, Inc. These waste management practices will be considered during the design phase of the project.

7. The remedial measure proposed by ERM-Southwest, Inc. is not acceptable as explained below. The ERM proposal does not address:

   a. Treatment of special wastes;
   b. Stabilization of waste sludges for load bearing capacity and elimination of perched water;
   c. Control of subsurface contaminant migration through the secondary structure of the older alluvial deposits; and
   d. Management of rainfall runon and runoff during site construction.

II. Response to Comments (ERM report section two)

1. <u>Deep Slurry Trench</u>

The secondary structure of the older alluvial deposits is supported by data and references in both WCC project reports. This support includes five separate but correlated features which encompass geotechnical observations, contaminant distribution in soils and groundwaters, and geotechnical laboratory data.

a. The boring logs in Appendix A of the Site Investigation Report contain references to secondary structuring in the older alluvium. This is a geotechnical observation by a geologist on the professional staff of WCC. (ERM does not dispute these observations.)

b. Another geotechnical observation is made in reference to the vertical transmissive paths of water through fissures and slicken sides of the stratum on pages 29 and 42 of the Investigation Report. This in reference to a report (No. 4-78016-1) undertaken by NFS/National Soils Services, Inc., entitled "Phase I Geotechnical Investigation Industrial Waste Landfill Bio-Ecology Systems, Inc., Grand Prairie, Texas." It should be noted that this report was undertaken in April 1978 and has been a part of the public record of TDWR file No. 39009 for Bio-Ecology since at least February 20, 1980. The report is an investigation of subsurface conditions at the proposed industrial waste landfill site to the west of the site which was never constructed.

The significant statement of the report with regard to secondary structure resulted from a dramatic and unusual drilling phenomenon encountered in all six field borings undertaken.

The drilling method used was a rotary wash technique and the phenomenon is repeated below in its entirety from page 5 of the NFS report.

"There was no drill water return* below depths of 8.0 feet in borings B-3, B-4, B-5, and B-6, below 10.0 feet in boring B-1, and below 21.0 feet in boring B-2. All water disappeared into cracks and fractures in the underground formations. Previous experience with the type of clays encountered has shown that during periods of rainfall and high ground moisture, the underground fractures and joints remain closed and impermeable.

However, if the clays are permitted to lose moisture, or if the water table is extremely deep as it is in this area, large cracks develop and the clays exhibit substantial permeability.* The cracks may extend large distances in both horizontal and vertical directions, and can be either continuous or discontinuous."

"The major problem which will occur during the development of the site as a landfill is to eliminate the numerous large cracks and fissures which are generally present below an approximate depth of 8.0 feet as evidenced by the large water losses experienced during the drilling operations. Only because of the cracks, the underlying clays are not presently impervious".

c. Contaminant distribution in the subsurface soils is discussed on page 32 of the investigation report. WCC states on page 33 that "the elevated test results shown in Table 8 at depth may be indicative of the leading edge of waste migration". This is the type of contaminant distribution expected from contaminant migration in a secondary structure.

d. Contaminant distribution in the groundwaters is discussed on page 33 of the Investigation Report. The data results of Table 6 are discussed and the following pattern is revealed. "Data for on-site wells show higher levels of nickel, TOX, and TOC than for off-site wells, with lead and nickel exceeding EPA standards". This is coupled with the statement that "Groundwater data for wells off-site indicate lead and nickel exceed EPA standards, while cadmium levels are just slightly elevated". From this, WCC further states that "Shallow groundwater flow in the modern alluvial deposits is expected to be adjacent stream beds and low areas, plus a portion of the flow vertically downward toward the gravel layer".

e. Further evidence of secondary structure follows from an analysis of the geotechnical data itself. Page 22 of the investigation report discussed geotechnical testing and states that the data were used to develop the shallow stratigraphy. The geological setting is also described on pages 3-7 of the investigation report. WCC considers these factors in concluding on page 42 of the Investigation Report that:

> The older alluvial deposits that underlie the modern sediments were deposited in a floodbasin environment and are composed of low to high plasticity clays. A secondary soil structure consisting of slicken sides and fissures due to cyclic shrinkage and swelling during seasonal changes is present in the stratum.

It is common knowledge among soil scientists, civil engineers, and others that moisture loss in clays causes shrinkage. At the surface, this is evidenced by distinctive visible cracks in the soil. These were pointed out to ERM personnel in a site visit on August 25, 1983. These cracks result from field soil moisture which is significantly lower than at some point in the past.

"The site is situated within the modern floodplain of Mountain Creek." "The surficial sediments at the site are recent alluvial deposits of Old Mountain Creek and were deposited in a floodplain meander." These statements come from pages 3 and 5, respectively, of the Investigation Report. Thus, at the time of deposition in a floodplain environment, it is safe to assume that the alluvial deposits had a significant moisture content.

Now consider the geotechnical test results of Appendix C of the Investigative Report. The two determinations of interest are the field percent moisture and the plastic limit of the Atterberg Limits series. These data are listed in Appendix C and are graphically displayed on the boring logs of Appendix A for easier visualization. The field moisture is the actual percent moisture of undisturbed samples secured and sealed in the field for testing in the laboratory. The plastic limit measures the moisture content of the soil at which the sample crumbles when rolled into 3/8-inch threads.

Comparison of the plastic limit and moisture content for the alluvial deposits at the site reveal a significant feature. The bulk of the data reveals a moisture content which is near or below the plastic limit. A total of 23 data pairs allow for the comparison. Out of the 23 pairs for the alluvial clays, 19 reveal a moisture content within the range of concern. If the surface pairs are disregarded, and the alluvial clays are examined, only one sample pair shows a moisture content which is significantly higher than the plastic limit.

Thus, the alluvial materials were deposited in a floodplain manner which would give them a higher moisture content. As the deposits were dessicated to a lower field moisture, the moisture change caused shrinkage. The shrinkage was manifested as secondary structure and is documented by the geotechnical data.

Taken together as a whole, these five points conclusively support the WCC Investigation Report Conclusion that secondary structure is present and that migration pathways and migration mechanisms are present at the site for potential significant long-term waste migration to subsurface.

On page 2-2 of its report, ERM states its confusion as to how WCC concluded the existence of slight contamination of groundwater on pages 33 and 34 of the Investigation Report. These data in Table 6 of the Investigation Report clearly show EPA standards as being exceeded for lead and nickel.

ERM confuses the WCC discussion of subsurface soil contamination which summarizes the soil metals data in Table 2-1 and concludes on page 2-3 that "the heavy metals content of the downgradient borings are essentially the same as the upgradient boring." ERM simply refers to soil variability and ignores a distinctive trend. Soils metals downgradient increase in all but one case. For the data present in ERM Table 2-1, soils metals increase downgradient 86 percent of the time (6 of 7) with an average increase of 82.7 percent. If the data were variable, there should be no trend.

Other soils metals trends noted by WCC are dismissed by ERM as "probably" a natural geologic phenomenon without an explanation or even a supposition and with no supporting data.

ERM discussion of quaternary gravel water quality differs from WCC basically in the interpretation of contamination source. ERM apparently considers upgradient and downgradient somewhat fixed and does not recognize the possibility of groundwater contamination from the hazardous waste site itself. WCC (on page 42 of the Feasibility Report) recognizes that "groundwater flow is subject to change depending on site conditions." Thus, the historical downgradient well, OW-6, is not necessarily downgradient at all times. WCC also recognizes (on page 33 of the Investigation Report) that "shallow groundwater flow in the modern alluvial deposits is expected to be from onsite (within fenced area) to offsite (outside of fenced area) to adjacent stream beds and low areas, plus a portion of the flow vertically downward toward the remnant gravel layer." The contaminant migration could easily be extended in the modern alluvial deposits to a point updip (north) of the upgradient well OW-1. Thus, the ERM conclusion on page 2-7 that "this shallow aquifer is not suitable use for human consumption even if the Bio-Ecology site did not exist," is not fully supported.

ERM properly noted that the Bio-West monitor well was screened for almost its entire length and that it should be plugged as a part of the remedial plan.

Although the WCC report states that the residential development is unlikely within certain distances of the site, the TDWR and the EPA have no control over land development. If certain improvements were made, the land could be developed.

The reference in the Investigation Report (page 46) regarding low yield is within the context of central municipal supplies. The contamination referenced is likely to be from bacterial or other non-hazardous contamination as the reference (Morgan, 1965) refers to the drilling to underlying artesian sands in the 1880's time frame. It in no way implies that the groundwater cannot be used by individuals.

Public desire to contain the contamination at the site was expressed at the public meeting regarding the site conducted on December 15, 1983, in Grand Prairie. Additionally, an adjacent auto yard owner/operator expressed an interest to use shallow groundwater. One shallow well has been documented in the area. Thus, within the context of a permanent solution, protection of the shallow aquifer is clearly appropriate.

2. Stablization of Waste

The remedial alternative selected by EPA includes waste stabilization in order to provide load bearing capacity. This load bearing stability is required for equipment used to emplace a cap, for the cap itself, and for future operation and maintenance considerations.

Leachate testing in the feasibility report was undertaken as a "worst-case" test. This was to ensure that stabilization did not significantly impair leachate quality. The test used high shear mixing in order to approximate the highest leachate concentrations to be expected under field conditions. (Feasibility Report pages 22, 23). ERM has properly noted that stabilization "could" increase the role of contaminant migration from the waste. However, this possibility is very small because the "worst-case" testing does not significantly increase leachate concentrations.

The waste stabilization was undertaken to "determine the optimum ratio of cement flue dust necessary to solidify the sludge." (Feasibility report page 20). The waste sampling portion of the WCC investigation report (pages 13-17g) is replete with references regarding the stuctural properties of the waste.

Page	Comment
14	The (chrome) pit was under standing water during the site investigation and was of the consistency of jelly. Therefore, sampling was limited to the northern half of the chrome pit.
15	It was found that the proposed grease trap contained 14 feet of jelly-like sludge at Pit 5/6. The adjacent southern lagoons were filled with water and were of low load bearing strength. Excavations were made next to the lagoons.
17	Following a determination of adequate support for the backhoe, Pit 17c was dug.
17a	Pit 4A: Milky perched water. Pit 4B: Pit caved in.
17b	Pit 16A: Much perched water, drums, trash, yellow fluids, chemicals

17c	Pit 17C: Drums, perched water at 2 feet Pit 17D: Perched water (Various drums in several pits)
17d	Pit 21C: Caved in Pit 28: Perched water Pit 28A: Rubble over trees and vegetation
17f	Pit 49A, 50A, 50B (water under timber mat)

The inability of the wastes to support a cap has been demonstrated on at least three occasions. First, during the temporary site closure, the contractor (Hancock) experienced problems emplacing a cover over sludges. The sludges "erupted" into the area of tanks T2, T3, and T4. (This was mentioned to ERM personnel during a site visit on August 25, 1983). Other sludges slumped and were unable to maintain a crowned slope. Second, during the waste sampling undertaken by Rollins, the TDWR onsite investigator noted the backhoe sinking into sludge at least once to the point that tracking slipped and the bucket had to be used to "pull" the backhoe out of a sinking situation. Third, during the initial remedial measure, EPA's contractor (Coastal Environmental Corp.) experienced similar problems with certain areas being unable to support remedial equipment. Thus, the need for waste stabilization has been adequately demonstrated.

The degree to which the waste is stabilized will be further specified in the design phase. The feasibility testing discussed in the feasibility report for waste stabilization is routinely used by the hazardous waste management professionals at Rollins. Acceptable test results were recommended based upon their broad experience base in dealing with similar hazardous wastes. Their testing goal is stated on page 21 as one which is "sufficient to impart load bearing stability to the mass."

Actual numerical design standards to meet this performance criteria have not been promulgated. The feasibility stability testing has demonstrated the feasibility of stabilizing the Bio-Ecology waste up to the 500 lbs/in^2 range. The proposed ERM load bearing capacity of 450 lbs/ft^2 is much less and is based only upon the weight of a clay cap and does not consider the weight of vehicles used to emplace the cap. ERM has included no factor of safety for testing variability or construction error. Yet it proposes to cover the undisturbed waste without providing a technical basis to demonstrate that its method is either feasible or reliable. No assurances of long-term performance of the ERM capping approach have been provided.

Thus, consistent with a permanent remedy (NCP 300.68a), the lack of waste stabilization is not acceptable. Although the degree of stabilization need not be as high as 500 lbs/in^2, stabilization for load bearing support is required and will be further refined in the design phase once the methods of construction and types of equipment are specified. Failure to deal with the significant amounts of perched water at the site is another unacceptable feature of the ERM proposal.

ERM has provided comments on several factors regarding the WCC discussion of waste permeability and leachate quantity. These comments are duly noted. However, the WCC position is not without merit and as a secondary function, waste stabilization is expected to provide improved control of leachate generation, particularly in light of the current saturated conditions of the waste due to extensive perched water.

3. Effect of New Dam on Floodplain

The ERM comments regarding the new Joe Poole reservoir and its potential to significantly reduce the downstream flooding effects along Mountain Creek are duly noted. The revised information will be used in all design aspects regarding the site.

4. Floodplain Objective

ERM has properly noted that the floodplain objective should have been to prevent waste migration during the 100-year floods. However, it is not likely that a less costly remedial plan could have been developed. Even under current 100-year flood conditions, and with additional topsoil as recommended by ERM, the WCC cap meets the revised objective for a 1984 estimated construction cost of $313,430. The ERM proposed cap must have a geofabric to be emplaced according to ERM, and since it will be below the flood level, it must have a synthetic membrane and cover materials to prevent uplift of wastes. Once these considerations are made, the ERM cap design, if feasible, would meet the design objective but at an estimated cost of $349,000.

5. Effect of 100-Year Flood on the Cap

ERM comments regarding the effect of the 100-year flood on the cap are duly noted. These comments will be considered in during the final design of the cap. Furthermore, because the area being raised is small when compared to adjacent areas in the floodplain, raising the site to the 100-year floodplain is not expected to have an adverse impact on the surrounding environment.

6. Cost for Smaller "L" Shaped Cap Versus Larger Rectangular Shaped Cap

The ERM comments regarding an "L" shaped cap are duly noted and will be considered in the design phase of the project.

7. Critique of the Proposed No. 6 Cap Design

ERM comments regarding inadequacy of the proposed cap under Alternative 6 generally ignore the provision for routine operational and maintenance (O & M) activities. TDWR, as a condition of its Cooperative Agreements with EPA, has assured future O & M.

As a result, damage to the proposed cap or the cap to be implemented for the chosen alternative (No. 8) from erosion, dessication, and root penetration will be prevented or mitigated by a regular O & M schedule. Erosion damage will be repaired. Dessication will be minimized by watering as necessary. Root penetration will be minimized by allowing only grasses to grow on the site. A regular mowing schedule will prevent the development of trees on the site. In concert with the proposed remedial action, these O & M measures will prevent the release of encapsulated materials. ERM comments regarding the thin soil layer of the WCC proposed cap are not without merit, however, and minor changes of this aspect may be considered during the design phase of the project.

Any design which includes extension of the cap onto adjacent property is not acceptable because of the easements required. EPA and TDWR have no control over adjacent land uses and as a result cannot recommend any alternative which impinges upon adjacent land. With a lower design elevation, due to the Joe Poole reservoir, slopes and subsequent erosion will be minimized.

III. Response to ERM Recommended Alternative (No.10)

1. Features

Although the ERM proposed alternative shows an innovative approach and presents some interesting design features, it is not an acceptable substitute for either WCC Alternative No. 6 or No. 8. It fails to meet objectives for the site which have not been questioned by either ERM or Thompson and Knight. It also fails to comply with RCRA technical regulations for on-site disposal of hazardous wastes.

a. An "L" shaped slurry trench is acceptable but must be extended to a 60 feet depth (previously discussed).

b. The proposed ERM cap is not reliable due to poor load support capacity (previously discussed).

c. Surface shaping and fill as proposed by ERM is possibly acceptable, but once again, is probably not feasible due to poor load support capacity. Additionally, no provision is made to control stormwater during construction.

d. Four groundwater monitoring wells may not be sufficient to detect all contaminated groundwater plumes, and would require further consideration.

The ERM alternative has no provision to treat the special wastes as outlined in all WCC alternatives. Neither ERM nor Thompson and Knight have protested this provision contained in the site specific response objectives, but this element of work is omitted from the ERM plan.

2. Function

Since the ERM report does not demonstrate or establish that feasible and reliable practices are being employed, it is impossible to establish that the ERM alternative effectively blocks pollutant migration pathways. Furthermore, the ERM alternative fails to meet several criteria of the National Contingency Plan (NCP).

Section 300.68(a) of the NCP calls for remedial actions to be consistent with permanent remedy to prevent or mitigate the migration of hazardous substances into the environment. The ERM proposal is deficient in this aspect because it does not address:

a. Treatment of special wastes (cyanide and arsenic): unlike the selected remedy, the ERM alternative does not provide for stabilization and neutralization.

b. Stabilization of waste sludges for load bearing capacity and elimination of perched water;

c. Control of subsurface contaminant migration through the secondary structure of the older alluvial deposits: the shallow slurry wall proposed by ERM does not extend to an appropriate stratum, and thus might allow ground water migration into and through the site.

d. Management of rainfall runon and runoff during site construction.

3. Cost

Although the ERM proposal is less costly, it has not been demonstrated to be as feasible and reliable and it does not as effectively mitigate the problems as well as the cost-effective or the selected remedy.

4. Discussion

As pointed out by Thompson and Knight, the NCP presents criteria for assessment in formulating source control remedial actions in Section 300.68(e)(2). None of these criteria were adequately considered by ERM in the development of their proposal. For example, Subheading II.1.b. of this reference calls for an assessment of the extent to which substances have migrated or are contained by natural barriers. The only adequate natural barrier at the site is the Eagle Ford formation.

The ERM proposal recognizes the need for a shallow slurry wall but even in light of the secondary structure of the older alluvium, they fail to recognize the need to eliminate potential migration by either the use of a landfill to contain wastes or of a deep slurry wall keyed into the Eagle Ford. The incremental cost of this activity is worth the incremental benefit of eliminating uncertainty and is consistent with a permanent remedy for the site.

WCC's method of dealing with stormwater during construction is acceptable waste management practice which is critized by ERM. Since ERM fails to manage stormwater during construction, it is reasonable to expect significant adverse effects during implementation which is inconsistent with Section 300.68(h)(2) of the NCP.

Response to
Air Force Comments on the
Proposed Remedial Alternative
for the
Bio-Ecology Systems, Inc., Site
Grand Prairie, Texas

1. Comment

The report's recommended alternative (Number 6) appears to provide a good balance between environmental/health considerations and cost of remedial action. However, the elimination of cheaper alternatives should be explained in detail rather than to eliminate them "based on performance". We say this because all eight options pose much the same risks to the environment after completion of the remedial action.

Response

Providing a good balance between environmental/health considerations and cost of remedial action is certainly the goal in selecting a remedial alternative. Alternative Six minimizes risk to the environment and thus, based upon performance, Alternative Six was recommended originally. The less expensive alternatives were eliminated because they did not provide risk minimization for the Quaternary Sands. The deeper slurry wall provides more reliability over less costly alternatives as it provides for risk minimization for the Quaternary Sands, thereby assuring better performance. However, the slurry wall is susceptible to leakage over time due to possible long-term increase in permeability. In contrast, synthetic liner systems, combined with leachate collection are expected to be effective indefinitely given the nature of wastes presented at the site.

2. Comment

The design life used for the comparison of alternatives was not stated. This is an important fact since the desirability of the various alternatives will shift by varying the design life. We note that RCRA facilities have a 30 year design life.

Response

A design life of 30 years was used in the report (pp. 4, 42, 55). This design life is analogous to RCRA facilities.

3. Comment

Removal of all contaminants from the site is an alternative that does not appear in this final cut. If the design life of the recommended alternatives was 100 years, would the alternative to remove all contaminants from the site be practical? At what point would removal from the site be practical?

Response

If the design life of the recommended alternatives were 100 years, the alternative to remove all contaminants from the site still would not be economically practical. This is because the present worth of the annual O & M costs (approximately $100,000) would still represent a relatively small portion of the total cost of the proposed remedial action (approximately $2,700,000). This compares with a cost of $4,470,000 to remove all contaminants from the site. The point at which removal of contaminants from the site would be economically practical is uncertain. It is more than 100 years and thus not within the planning range of the Texas Department of Water Resources (TDWR).

4. Comment

O & M costs are only extended for 30 years. What will be Air Force obligations during and after the O & M period.

Response

It is the intent of the TDWR to recover O & M funds from responsible parties, either in a lump sum or a continuing payments basis. The Texas Water Development Board has instructed the Executive Director to recommend state legislation concerning this subject. This effort is being developed at the current time.

5. Comment

The cost of the slurry wall is in general agreement with the attached Pollution Equipment article for a 60' wall with fair soil conditions.

Response

Your comment on the appropriateness of slurry wall costs is hereby acknowledged.

6. Comment

Page 5 of the "Remedial Implementation Alternative Selection" indicates the State's partial site closure included burying containerized waste on site. These containerized wastes were presumably 55 gallon drums. If the burying of these wastes on-site significantly increased the cost of the ultimate clean-up, then the State's share of the cleanup should be increased.

Response

The burying of containerized waste onsite during the partial site closure is not expected to significantly increase the ultimate cleanup costs. The containerized wastes were already present at the site and would have to be remedied in any event. During the waste sampling phase of the field investigation, buried drums were encountered in a random fashion throughout all landfilled areas of the site. It should be noted that the partial site closure has significantly minimized the risk of release during the interim period preceding implementation of a final remedial alternative.

7. Comment

The "initial remedial measure" (Page 50) includes the removal and disposal of approximately 80,000 gallons of hazardous liquids and sludges. If this has not yet occurred, it would be preferable to incinerate the material, rather than moving it to another landfill, only to run the risk of having the problem reoccur in the future.

Response

The initial remedial measure has already been completed. Some of the liquids removed contained a significant percentage of water and were not incinerable. It is the understanding of TDWR that where possible, PCB liquids removed from the site have been or will be incinerated.

8. Comment

There doesn't appear to be anything included in the alternatives for removal of significant amounts of off-site soil in the stream bed should contamination (heavy metals, most probably) be detected. Are we truly finished with Bio-Ecology once the waste is stabilized and the site capped, or are these costs just the beginning?

Response

The removal of offsite soils from the streambed was not included in the alternatives because significant contamination was not detected in these soils. The alternatives focused mainly on source control remedial measure since the hazardous substances located at the site have not migrated significantly beyond the immediate site area. With the exception of routine O & M, once the remedial alternative is implemented the closure of the site should be complete.

9. Comment

The "Evaluation Results" (Page 11) show a "degree of significance" far in excess of what is actually the case for a relatively subjective process. One simply cannot quantify "potential human health impacts" to four significant figures. Only cost is a solid number, and even then, it is a subjective decision that 250 points out of 1,000 are for economics. Furthermore, it is not clear why the lowest cost alternative, Number 4, didn't receive the maximum number of points, rather than 175 of 250. If there are additional, feasible alternatives, they should be discussed. The table would be far more credible with two significant figures for each category.

Response

The Evaluation Results (Table 13 of the Feasibility Report) show several significant figures due to the development of scores and the averaging of these scores. Scoring began by considering each of the categories on an absolute scale from 1 to 10, which essentially represents only one significant figure. Allocation of short-term and long-term effects, consideration of the total points for each category, and averaging six total scores yield several significant figures. The scoring process is described on page 64 of the Feasibility Report and evaluation sheets are included in Appendix D. The lowest cost alternative, Number 4, received the most points of any alternative in the cost category. TDWR and EPA acknowledge that the process, like many others, is subject to a certain amount of subjectiveness. Woodward & Clyde Consultants (WCC) developed the process and have routinely used it successfully in their work with other clients. TDWR and EPA do not endorse the procedure as a fail-safe selection process, but belive that the selected remedy is consistent with the NCP and necessary to protect human health and the environment.

10. Comment

In regard to the suggested Ground Water Monitoring Program, (1) four monitoring wells may not be sufficient to pick up all contaminated ground water plumes and (2) Monitoring for only 13 contaminants appears inadequate considering that organics and PCB's were also disposed of at the site. It would be prudent to periodically monitor for specific volatile and purgeable organics in upslope and site monitoring wells.

Response

The ground water monitoring program is described on pages 42 and 43 of the WCC Report and in the EPA Addendum 2. The 13 parameters listed in the Addendum are minimimum testing requirements required in addition to priority pollutant analysis for upgradient and downgradient wells. As stated in the Addendum, the program will include the installation of groundwater monitoring wells of sufficient number and at the appropriate locations and depths to yield representative groundwater samples from the quaternary aquifer. The exact parameters will be determined in the detailed design for the plan.

11. Comment

There is no explanation for the weighting applied to the numerical factors which makes it difficult to determine if the differences in the values obtained for the various options (Page 11) is significant. The cost variances are significant, and an explanation of the rating system would aid in the evaluation of the alternatives.

Response

An explanation of the weighting applied to the numerical factors is included on pages 52-53 and 61-64 of the WCC Report.

12. Comment

The selected option appears redundant. The waste is fixed in place and then a clay cap is applied. Both of these techniques are used to control the downward migration of contaminants. If the clay cap is correctly applied, fixation should not be required. The converse is also true. The slurry wall, intended to prevent migration of contaminants down the groundwater hydraulic gradient, appears to be overdesigned. The only benefit to be gained from the downstream portion of the slurry wall is containment of water which has intruded from the surface of the site. If the clay cap has been correctly installed, there should be no such intrusion. A slurry wall installed around the upgradient half of the site would appear to be an effective approach. Please explain.

Response

The recommended option considers several integrated factors in achieving a long-term reliable remedial alternative. A clay cap at the site will provide the coverage of waste required to prevent direct contact of wastes by intruders, surface migration of wastes by weathering, and will provide some degree of control over the downward migration of contaminants. Stabilization of wastes is required in order to provide loadbearing capacity for equipment used to emplace the cap, for the cap itself, and for future operation and maintenance considerations. As a secondary function, waste stabilization is expected to provide some improved control of leachate generation. Due to the secondary structure in the alluvial deposits, a slurry wall would serve to ensure control over subsurface migration of contaminants. A partial slurry wall would not be as effective an approach as it would not provide containment of contaminants. The option selected by EPA essentially replaces the slurry wall with a liner and leachate collection system to contain wastes on-site. EPA feels that the selected option, although slightly more expensive than the option recommended previously, is more reliable over the long term.