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PROJECT TIME LINE

ACTIVITY	1992												1993												
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	
TANK REPLACEMENT (1)	■																								
ADDITIONAL SOIL INVESTIGATION (2)		■																							
GROUNDWATER INVESTIGATION (3)		■				▨																			
GROUNDWATER	REMEDATION SYSTEM DESIGN (4)					■																			
	SYSTEM PERMITTING (5)							■																	
	EQUIPMENT PROCUREMENT (6)									■															
	SYSTEM CONSTRUCTION AND START-UP (7)											■													
	SYSTEM OPERATION AND MAINTENANCE (8)																								
	PERFORMANCE EVALUATION (9)																								
	REMEDATION SYSTEM DESIGN (10)						■																		
	SYSTEM PERMITTING (11)								■																
	EQUIPMENT PROCUREMENT (12)										■														
SOIL	SYSTEM CONSTRUCTION AND START-UP (13)											■													
	SYSTEM OPERATION AND MAINTENANCE (14)																								
	VERIFICATION SOIL BORINGS (15)																								
	VERIFICATION GROUNDWATER MONITORING (16)																								
	SITE CLOSURE (SOIL AND GROUNDWATER) (17)																								

LEGEND

- (X) FOR NOTES AND ASSUMPTIONS REFER TO PLATES 2 THROUGH 5.
- PROBABLE SCHEDULE
- ▨ ESTIMATED SCHEDULE



GeoStrategies Inc.

REMEDATION IMPLEMENTATION SCHEDULE
 ARCO Service Station #2169
 889 West Grand Avenue
 Oakland, California

PLATE
1

JOB NUMBER
7927-RTL

REVIEWED BY

DATE
1/92

REVISED DATE

(1) Tank Replacement

- Tank replacement will be completed by June 1992
- All stockpiled soil will be aerated and removed from the site by the end of May 1992

(2) Additional Soil Investigation

- Soil contamination is on-site only
- The work plan, which has been submitted, will be approved by the Alameda County Health Agency within one month
- Soil contamination will be delineated after completion of the activities proposed in the work plan
- Alameda County Flood Control and Water Conservation District (Zone 7) permits can be obtained within two to three weeks after permit application is made
- Field work, data evaluation, and reporting of the soil investigation can be completed two months after issuance of applicable permits

(3) Ground-water Investigation

- The work plan, which has been submitted, will be approved by the Alameda County Health Agency within one month
- Field work, data evaluation, and reporting of the ground-water investigation phase will require approximately two months to complete after issuance of applicable permits
- Additional work will be required off-site to complete ground-water delineation
- A second work plan will be prepared for an off-site ground-water investigation
- The second work plan will be approved by the Alameda County Health Agency within one month after submittal
- Ground-water contamination will be delineated after completion of the activities proposed in the second work plan
- It will take approximately four months to obtain a City of Oakland Public Works Agency Encroachment Permit
- Field work, data evaluation, and reporting of the ground-water investigation phase will require approximately two months to complete after issuance of applicable permits



GeoStrategies Inc.

REMEDIATION IMPLEMENTATION ASSUMPTIONS

ARCO Service Station #2169

889 West Grand Avenue

Oakland, California

PLATE

2

JOB NUMBER
7927-RTL

REVIEWED BY

DATE
1/92

REVISED DATE

(4) Remediation System Design (Ground-water)

- The tank replacement project will be completed by June 1992
- Ground-water remediation will only be required onsite
- A Remediation Action Plan (RAP) will be prepared detailing the design of the on-site ground-water remediation system
- The RAP will be approved by the Alameda County Health Agency within one month of submittal
- No revisions will be required following agency review

(5) Remediation System Permitting (Ground-water)

- No modifications to design required for permitting
- Planning/Building department approval within 120 days
- BAAQMD permit within 90 days
- Discharge permit approval within 90 days

(6) Equipment Procurement (Ground-water)

- No equipment modification due to agency/permitting requirements
- Equipment available from manufacturers stock within six weeks

(7) System Construction and Startup (Ground-water)

- No delays due to underground storage tank replacement
- No delays from utility companies
- No special dealer/property owner requirements
- No unusual contractor delays
- No unforeseen on-site conditions
- No weather delays



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REMEDIATION IMPLEMENTATION ASSUMPTIONS
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PLATE

3

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(8) System Operation and Maintenance (Ground-water)

- Five-year operation of system to meet cleanup levels
- Regulatory approval of system shutdown after five years

(9) Performance Evaluation (Ground-water)

- Will show system is operating as designed and does not require modifications

(10) Remediation System Design (Soil)

- The tank replacement project will be completed by June 1992
- Soil remediation will be required onsite only
- A RAP will be prepared detailing the design of the on-site soil remediation system
- The RAP will be approved by the Alameda County Health Agency within one month of submittal
- Soil vapor extraction is a feasible remediation method
- No revisions due to agency review

(11) System Permitting (Soil)

- No modifications to system design required for permitting
- BAAQMD approval within 120 days
- Building/Planning department approval within 120 days

(12) Equipment Procurement (Soil)

- No special agency requirements
- Available from manufacturer stock within eight weeks



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REMEDATION IMPLEMENTATION ASSUMPTIONS
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Oakland, California

PLATE

4

JOB NUMBER
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REVISED DATE

(13) System Construction and Startup (Soil)

- No delays due to underground storage tank replacement
- No delays from utility companies
- No special dealer/property owner requirements
- No unusual contractor delays
- No unforeseen on-site conditions
- No weather delays

(14) System Operation and Maintenance (Soil)

- One year operation of system to meet cleanup levels
- Regulatory approval of system shutdown after one year

(15) Verification Borings

- Borings demonstrate soil cleanup has been achieved - no further system operation

(16) Verification Monitoring

- One year (four quarters) of monitoring water-levels and sampling
- Sampling demonstrates ground-water cleanup has been achieved - no further system operation

(17) Site Closure

- Agency approval based on results of verification borings and monitoring and sampling



GeoStrategies Inc.

REMEDIATION IMPLEMENTATION ASSUMPTIONS
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PLATE

5

JOB NUMBER
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DATE
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REVISED DATE

EXPLANATION OF ARCO 2169

REMEDIATION SCHEDULE

(1) **Tank Replacement**

A tank replacement project is currently underway at the site. It is assumed that the project will be completed and that all stockpiled soil will be aerated and removed by June 1992.

(2) **Additional Soil Investigation**

A work plan has been submitted proposing additional soil investigation on-site. It is assumed that the work plan will be approved by the Alameda County Health Agency within one month. Soils data obtained from the tank replacement project will also be evaluated as part of the soils investigation. It is assumed that after completion of the proposed work, no further soils investigation will be required.

The soils investigation will begin following the scheduled underground storage tank replacement. It is assumed that tank replacement will be completed by June 1992. It is also assumed that soil contamination will be onsite only.

Field work, data evaluation, and reporting of the soil investigation can be completed approximately two months after issuance of drilling permits.

(3) **Ground-water Investigation**

No ground-water investigation has been performed to date. A work plan has been submitted proposing additional ground-water investigation on-site. It is assumed that the work plan will be approved by the Alameda County Health Agency within one month. Field work, data evaluation, and reporting for this phase will require approximately two months to complete after receipt of encroachment and drilling permits.

It is assumed that contamination will extend offsite into the public right-of-way and that further investigation will be required off-site. A second work plan will be prepared for an off-site ground-water investigation. It is assumed that the work plan will be approved by the Alameda County Health Care Services Agency within one month after submittal and that after completion of the proposed work, no further work will be required. Encroachment permits, hold harmless documents, and bonds will be required from the City of Oakland Public Works Agency. Based on prior experience, approximately four months will be required to obtain permits.

Field work, data evaluation and reporting will require approximately two months to complete after receipt of permits.

(4) Remediation System Design (Groundwater)

After on-site ground-water contamination has been delineated, a ground-water remediation system will be designed. It will include location and design of extraction wells and treatment equipment, process flow diagrams, and enclosure specifications. Aquifer testing will be required and is included in the schedule.

It is assumed that ground-water remediation will be required on-site only and that the additional ground-water investigation will not indicate that off-site remediation is required. A Remedial Action Plan, (RAP) will be prepared detailing the design of the on-site system. It is assumed that the RAP will be approved by the Alameda County Health Agency within one month of submittal. The schedule assumes no revisions will be required due to agency review.

(5) System Permitting (Groundwater)

The following permits are required for installation of a ground-water system at this site:

Discharge - The East Bay Municipal Utility District (EBMUD) will accept the discharge of treated groundwater into the sanitary sewer system provided it does not exceed 25,000 gallons per day. It is assumed that the permit can be applied for and issued within 90 days.

Bay Area Quality Management District (BAAQMD) - If an oil/water separator is part of the system design, a BAAQMD permit is required. It is assumed that the permit can be applied for and issued within 90 days.

City of Oakland Planning Department - The planning department must review and approve the equipment enclosure. Planning and building department approvals should be received within 120 days.

City of Oakland Building Department - After planning department approval, the building department must issue permits for electrical, plumbing, and enclosure structural work. This is an administrative process which should not require modification to current proposals.

It is assumed that no modifications to design are required for permitting. Planning/Building department approval should be received within 120 days.

(6) Equipment Procurement (Ground-water)

An equipment list will be provided to ARCO by GeoStrategies Inc., the project consultant to order selected equipment directly from the vendors. It is assumed that agencies will approve of the equipment specified and that vendors can provide delivery within six weeks.

(7) System Construction and Startup (Ground-water)

System construction is contingent upon receipt of all necessary permits. Scheduled construction time assumes no delays due to weather, contractor difficulties, unforeseen onsite conditions, utility company scheduling, or owner/dealer requirements.

(8) System Operation and Maintenance (Ground-water)

The estimate of system operation time assumes that ground-water cleanup levels can be achieved in 5 years. Actual operation period cannot be predicted and will depend on the accuracy of assumptions made during modeling and design, fluctuation in ground-water levels, unforeseen variations in site hydrogeology and chemistry, and ability to meet regulatory cleanup levels.

Regulatory approval of system shut down will be required.

(9) Performance Evaluation (Ground-water)

A performance evaluation will be performed after system startup to evaluate the hydrodynamic effects of system operation. Among the parameters evaluated will be actual versus anticipated zones of capture, effects of ground-water extraction on chemical concentrations in groundwater, and contaminant levels in effluent discharge. Modifications of the system and/or additional extraction wells may be required.

The schedule assumes the system will perform as designed and no modification will be required.

(10) Remediation System Design (Soil)

After completion of the tank replacement project (assumed to be June 1992) and the soils investigation, a soil remediation system will be designed. It is assumed that soil remediation will be required onsite only. The design will include location and design of wells and treatment equipment, process flow diagrams and enclosure specifications. It is assumed that soil vapor extraction will be a feasible remediation method. Vapor extraction testing or biotreatability evaluations may be required for design. Time for these activities has been included in the schedule.

A Remedial Action Plan (RAP) will be prepared detailing the design of the on-site system. It is assumed that the RAP will be approved by the Alameda County Health Care Services Agency within one month of submittal. The schedule assumes that no design revisions will be required as a result of agency review.

(11) System Permitting (Soil)

The following permits are required for installation of a soil treatment system:

BAAQMD - Approval of soil vapor extraction equipment is required by the BAAQMD. The permitting process requires approximately 120 days.

City of Oakland Planning Department - The planning department must review and approve the equipment enclosure.

City of Oakland Building Department - After planning department approval, the building department must approve all electrical, plumbing, and enclosure structural work.

Planning and building department approvals should be received with 120 days.

(12) Equipment Procurement (Soil)

An equipment list will be provided to ARCO by GeoStrategies Inc., the project consultant. ARCO will order the equipment directly from the vendors. It is assumed that agencies will approve of the equipment and that vendors can provide delivery within eight weeks.

(13) System Construction and Startup (Soil)

System construction is contingent upon receipt of all necessary permits. Construction time assumes no delays due to weather, contractor difficulties, unforeseen onsite conditions, utility company scheduling, or owner/dealer requirements.

(14) System Operation and Maintenance (Soil)

The estimate of system operation time assumes that soil cleanup levels can be achieved in 1 year. Actual operation period will depend on the accuracy of assumptions made during modeling and design, unforeseen variations in site geology and chemistry, and ability to meet regulatory cleanup levels.

Regulatory approval of system shut down will be required.

(15) Verification Soil Borings

After the soil remediation system has been shutdown, borings will be drilled and soil samples collected and analyzed to verify that soil contamination has been remediated to meet regulatory cleanup levels.

The schedule assumes that these borings will verify that soil remediation has been achieved and no further system operation will be required.

(16) Verification Ground-water Monitoring

After ground-water contamination levels have been reduced to meet cleanup goals, with agency approval, the ground-water treatment system will be shut down. A minimum of one year (i.e. four quarters) of monitoring and sampling is required to verify cleanup.

The schedule assumes that ground-water monitoring and sampling will demonstrate that ground-water remediation has been achieved and that no further system operation will be required.

(17) Site Closure (Soil and Ground-water)

Based on results of verification borings and monitoring, site closure will be applied for. Concurrence by the State Water Resources Control Board is required to obtain site closure.

The schedule assumes that the Board will review and approve a site closure plan within one year of submittal.