TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
PETROLEUM STORAGE TANK PROGRAM
CAP WORKSHEETS

Date Prepared:

ENHANCED AEROBIC BIOREMEDIATION (EAB)

Facility Name:	LPST ID No.:
Facility Address/City:	CAPM:
Facility County: -- Select One --	RCAS:
Facility ID No.:	P.E.:
TCEQ Region: -- Select One --	Prepared By:

Please refer to the appropriate section in the EPA CAP Manual for definitions, equations and tables to assist you when completing these worksheets. When supplying the information requested below, please make certain that any calculations and methodology used to arrive at the value or conclusion you have entered is included in the CAP. This document must not be altered in any manner.

SOIL CHARACTERISTICS

Hydraulic Conductivity K (m/sec) obtained by:

☐	Feasibility Test	☐	Laboratory Analysis	☐	Other:
	Check one:	☐	$K > 10^{-5}$		(effective)
		☐	$10^{-5} \geq K \geq 10^{-7}$		(needs evaluation)
		☐	$K < 10^{-7}$		(not effective)

GROUNDWATER CHARACTERISTICS

Target concentrations:

Depth to Water > 50 ft bgs?	☐ YES ☐ NO
Target concentrations ≤ Plan A Beneficial Use Category II target concentrations?	☐ YES ☐ NO
Concentration reduction >95% to meet target concentrations?	☐ YES ☐ NO

If the answer to any of the questions above is **yes**, enhanced aerobic bioremediation alone is not feasible.

Fe^{+2} concentration (mg/L) obtained by:

☐	Field Screening	☐	Laboratory Analysis	
	Check one:	☐	$Fe^{+2} < 10$	(effective)
		☐	$10 \leq Fe^{+2} \leq 20$	(needs evaluation)
		☐	$Fe^{+2} > 20$	(not effective)

Plate count for background Heterotrophic bacteria:

	Check one:	☐	>1,000 CFU/gram dry soil	(effective)
		☐	<1,000 CFU/gram dry soil	(needs evaluation)

Groundwater between 5 < pH < 9?	☐ YES ☐ NO
Background dissolved oxygen (D.O.) concentration > 2 mg/L?	☐ YES ☐ NO

GROUNDWATER CHARACTERISTICS (cont.)	
Is groundwater shallow enough to allow introduction of atmospheric oxygen through infiltration of rain, snow, etc.?	☐ YES ☐ NO
If the answer to any of the questions above is **yes**, enhanced aerobic bioremediation is effective.	

CONSTITUENT CHARACTERISTICS					
Non-aqueous phase liquid (NAPL) type released:	☐	Gasoline	☐	Diesel	☐ Other:
Heavy metals > 2500 ppm?					☐ YES ☐ NO
Do any of the target COCs present have a K_{oc} > 2500 cm^3-water/g-carbon?					☐ YES ☐ NO
Is MTBE required to be biodegraded to an established target concentration?					☐ YES ☐ NO
If the answer to any of the questions above is **yes**, enhanced aerobic bioremediation is not likely to be effective.					

FEASIBILITY TEST					
Selected Technology (Injection or Extraction):					
☐ Biosparging	☐ Bioventing	☐ Hydrogen Peroxide Injection	☐ Pure Oxygen Injection	☐ Ozone Injection	
☐ Other:					
Is enhanced aerobic bioremediation an addition to the existing remediation system?				☐ YES ☐ NO	
Feasibility test duration (hrs):					
Test well construction					
Diameter:	Total Depth:	Screen Interval:	Depth to Water:	Injection Depth:	
Observation well construction					
Diameter:	Total Depth:	Screen Interval:	Depth to Water:		
Soil gas monitoring point (if any):			Number of monitoring points:		
Distance from Injection point (ft):			Sampling interval:		
Soil gas concentrations at SVE, DPE, or Vapor Probe* (mg/m^3)					

*Use this format for data entry: XXX mg/m^3 (MW-1), XXX mg/m^3 (MW-2), XXX mg/m^3 (MW-3), etc.

Prior to test	**After test**
Benzene:	Benzene:
Ethylbenzene:	Ethylbenzene:
Toluene:	Toluene:
Xylenes:	Xylenes:
TPH:	TPH:
MTBE:	MTBE:
O_2:	O_2:
CO_2:	CO_2:

FEASIBILITY TEST (cont.)			
Additional information:			
Radius of influence (ft):		Injection flow rate (scfm/lpm):	
Injection pressure (psig):		Vacuum at well head (H_2O"):	
Air flow rate (scfm):			
Groundwater concentrations* (mg/L)			
*Use this format for data entry: XXX mg/L (MW-1), XXX mg/L (MW-2), XXX mg/L (MW-3), etc.			
Prior to test	Test Well:	**After test**	Test Well:
Benzene:		Benzene:	
Ethylbenzene:		Ethylbenzene:	
Toluene:		Toluene:	
Xylenes:		Xylenes:	
TPH:		TPH:	
MTBE:		MTBE:	
D.O.:		D.O.:	
CO_2:		CO_2:	
Observation Well concentrations* (mg/L)			
*Use this format for data entry: XXX mg/L (OB-1), XXX mg/L (OB-2), XXX mg/L (OB-3), etc.			
Prior to test		**After test**	
Benzene:		Benzene:	
Ethylbenzene:		Ethylbenzene:	
Toluene:		Toluene:	
Xylenes:		Xylenes:	
TPH:		TPH:	
MTBE:		MTBE:	
D.O.:		D.O.:	
CO_2:		CO_2:	
Groundwater Recovery Rate (lbs/hr):			

REMEDIATION SYSTEM DESIGN

Designed application well construction

Diameter:	Total Depth:	Screen Interval:	Depth to Water:	Injection Depth:

Designed injection pressure (psig):	Designed radius of influence (ft):
Area of the plume above target concentrations (ft^2):	Number of injection wells:
Designed injection flow rate (scfm/lpm):	Total designed injection flow rate (scfm/lpm):

If Extraction technology

Vacuum at well head (H_2O"):	Air flow rate (scfm):
Estimated hydrocarbon mass at startup (lbs):	Total oxygen supply (lbs/day):
Total oxygen required (4 times of mass, in lbs):	Estimated cleanup time (years):

Estimated final mass remaining (lbs):

Which of following system(s) will be operated concurrently with enhanced aerobic bioremediation?

☐	Dual Phase Extraction System	☐	Groundwater Pump & Treat System	☐	Soil Vapor Extraction System	☐	Air Sparging System

Permit requirements:

OPERATION, MONITORING AND PERFORMANCE (OMP) PLAN

Does OMP Plan include daily monitoring for the start-up phase (up to 7 days)?								☐ YES	☐ NO		
What is the scheduled frequency of long term monitoring?	☐	Monthly	☐	Quarterly	☐	Other:					

Which of the following will be included in the OMP Plan?

☐	BTEX	☐	TPH	☐	D.O.	☐	Redox	☐	pH	☐	Fe^{+2}	☐	Fe^{+3}

CLOSURE PLAN

Does the closure plan include the following?

☐	Confirmation of target concentrations	☐	Submission of site closure request	☐	Removal of equipment
☐	Plugging of wells	☐	Waste disposal	☐	Paving/resurfacing
☐	Deed Recordation	☐	Institutional Controls		