SANTA BARBARA COUNTY APCD
GUIDANCE DOCUMENT FOR EMISSION VERIFICATION OF CONTAMINATED SOIL/GROUNDWATER CLEANUP (CSC) PROCESSES

I. INTRODUCTION

To insure compliance, each "Contaminated Soil/Groundwater Cleanup" (CSC) project shall follow the procedures outlined in this Guidance Document. Each system used for CSC projects shall install the process instrumentation outlined in Section II (Instrumentation) of this document. Each applicant shall submit, for APCD approval, the information outlined in Section III (Authority to Construct Application Requirements) of this document. This information shall be compiled into one document which shall be termed the "Emission Verification Test Plan" (EVTP). Once an ATC is issued, the applicant shall conduct a 3-hour "Emission Verification Test" (EVT) during the first 14 days of the "Source Compliance Demonstration Period" (SCDP). The EVT will verify that the emission and operational information used in preparing the ATC are accurate. The EVT shall be conducted as stated in Section IV (Emission Verification Test Procedures) of this document. At the completion of the EVT, the system will be allowed to operate for 10 continuous days while a written report containing the information listed in Section V (Emission Verification Report) is prepared and submitted to the APCD. The APCD may require the system to be shut down if the written report is not received within 10 calendar days of EVT completion, or if the APCD cannot determine compliance based on the results of the written report.

II. INSTRUMENTATION

The instrumentation listed below shall be permanently installed while the CSC system is in operation.

A. Each system shall have process instrumentation to monitor the process parameters listed in Table 1.

B. The instruments used to monitor the above parameters shall be of the type listed in Table 2. The use of any instrument not listed in this Guidance Document shall be prohibited unless approved by the APCD in writing.

C. Each instrument used to monitor the above parameters shall be sized such that the average expected value of the parameter will be 50% of the span value for that instrument.

D. All instruments used to monitor the above parameters shall be calibrated as specified in Table 2, maintained according to manufacturer's recommendations, and permanently installed on the system.

III. AUTHORITY TO CONSTRUCT APPLICATION REQUIREMENTS

The following EVT information shall be submitted with all CSC applications for authority to construct permits. Failure to submit complete information to the list below may lead to the denial of the application. The information shall be compiled into a document called the Emissions Verification Test Plan.

A. An "as-built" process flow diagram which shows the sampling locations and the required process instrumentation locations, pipe diameters, and stack size (height and diameter).

B. An instrumentation list showing the parameter to be monitored, the type of instrument, the span of the instrument, the serial number of the instrument, the date of the most recent calibration, and the calibration method used.

C. Calibration data sheets for each instrument which presents the results of the most recent calibration.

D. The manufacturer's recommended maintenance procedure for each instrument used to monitor the parameters in Table I.

IV. EMISSION VERIFICATION TEST PROCEDURES

A. PROCESS START-UP

1) The permittee shall notify the APCD (in writing) when initial operations of the system are to commence. This establishes the beginning of the SCDP.

2) The system shall be allowed to operate for a maximum of 14 calendar days from the initiation of the SCDP to perform system shakedown, establish the operational parameters of the equipment and complete EVT testing.

3) The system shall be tested for 3 continuous hours during the EVT. This 3-hour test shall be used to verify the emissions under the worst case condition (highest inlet vapor concentration). An APCD Inspector (or representative) may be present during this test.

4) During the 3-hour EVT, the system parameters listed in Table I shall be recorded every half hour and stream sampling will be conducted as specified in Section IV.B. (Stream Sampling for Laboratory Analysis) and Section IV.C (Stream Monitoring for Total Petroleum Hydrocarbons (TPH)).

5) After completion of the emission verification test, the system will be allowed to operate for 10 continuous days while the permittee prepares and submits a written report documenting the results of the EVT. This report must be received by the APCD no later than 10 calendar days after completion of the EVT if continued operations (within the limits of the 60-day SCDP) are desired. If a report is not submitted within 10 days of

completion of EVT testing or the report is incomplete or the facility cannot demonstrate compliance with permit conditions, then the system shall be shut down until written approval for continued operations from the APCD is obtained.

After approval for continued operations are granted, routine sampling (monthly or quarterly) shall be performed for TPH and process parameters in Tables 4A and 4B, as applicable, in accordance with the methods identified in Tables 2 and 3 below.

B. STREAM SAMPLING FOR LABORATORY ANALYSIS

1) Samples of the control device inlet and outlet vapor stream shall be taken once an hour for laboratory analysis. The inlet and outlet samples for any given hour shall be taken within fifteen minutes of each other. The laboratory analysis will quantify reactive organic compounds (ROC's), TPH, MTBE, and benzene as applicable. TPH analysis per Table 3 may be used to quantify ROC, if specified in the EVTP and approved in writing by the APCD. All other carcinogenic compounds as required by the permit in addition to benzene shall also be quantified. Carcinogenic compounds are those compounds identified by either the US EPA, the Office of Environmental Health Hazard Assessment (OEHHA), or the Santa Barbara County APCD.

2) The inlet and outlet samples may be taken by the APCD observer using the methodology specified in this Guidance Document.

3) The applicant shall supply all the materials necessary to do the sampling. Sample line shall be constructed of stainless steel, Teflon or glass.

4) All samples shall be analyzed by a State certified laboratory using the methods specified in Table 3. If sampling is required for a compound or group of compounds which is not listed in Table 3, the sampling methodology must be specified in the EVTP and approved in writing by the APCD before the ATC permit is issued.

C. STREAM MONITORING FOR TOTAL PETROLEUM HYDROCARBONS (TPH)

1) The control device inlet and outlet vapor streams shall be monitored once an hour for TPH. The inlet and outlet vapor stream monitoring for any given hour shall be done within fifteen minutes of each other.

2) The TPH monitoring shall be done using an Organic Vapor Analyzer (OVA) calibrated using a Hexane standard.

3) If it is not physically possible to put the OVA probe in the stream to be analyzed, the following procedure must be followed:

a) Obtain a sample of the stream in a Tedlar bag using procedures described in Table 3.

b) Use the OVA to analyze the contents of the Tedlar bag for TPH.

4) The inlet and outlet TPH monitoring may be done by the APCD observer using the methodology specified in Table 3.

5) The applicant must provide all the materials necessary to do the TPH monitoring including the Tedlar bag, the OVA, and the OVA calibration gas. Sample line shall be constructed of stainless steel, Teflon or glass.

6) The OVA must be calibrated against a hexane calibration gas on a daily basis, following manufacturer's recommended procedures.

V. EMISSION VERIFICATION REPORT

A. An "Emission Verification Report" (Report) shall be prepared and submitted to the APCD. The Report must be received by the APCD within 10 calendar days of completion of the EVT if continued system operations (within the 60-day SCDP) are desired.

B. The Report shall include an "as-built" process flow diagram which includes all sampling locations.

C. The Report shall contain the results summarized in a format equivalent to that in Tables 4 and 5 which includes the following information:

a) A compilation of the half-hour system parameters stipulated in Table 1, and all field data.

b) The time that each gas sample was taken and the time of each TPH monitoring analysis was performed.

c) Laboratory analysis results of the samples for concentration of benzene, MTBE, TPH and any other carcinogenic compounds specified in units of PPMV.

d) Field monitoring results for TPH in units of PPMV.

e) Calculations of the emission rates (in units of pounds per hour), inlet feed rates (in units of pounds per hour), and control device efficiencies for TPH, benzene, and MTBE. If any constants are used in the calculations, they shall be defined with proper units.

D. The report shall include one complete example calculation, each for control device inlet and outlet flows (scfm) and emissions (lb/hr) for any one lab sample point.

E The Report shall include any additional information which describes any modifications to the system design, adjustments of the preliminary operating parameters (ex. temperature, flow rate, etc.…), and any revisions to the extent and degree of contamination.

Table 1. Recorded System Parameters

a)	Control device inlet temperature in ºF
b)	Stack outlet temperature in ºF
c)	Control device inlet gas flow in scfm or velocity in fpm or pressure difference in "H_2O (post dilution, if present)
d)	Stack outlet gas flow in scfm or velocity in fpm or pressure difference in "H_2O*
e)	Control device inlet pressure in psig
f)	Control device outlet pressure in psig*
g)	Catalytic oxidizer bed temperature in ºF*
h)	Coefficients (constants) when an orifice plate is used for flow measurement
i)	Amount of supplemental fuel combusted in gallons or scf**

* Required for thermal oxidizer and catalytic control devices.

** Required for systems which use fossil fuel (e.g., diesel oil, natural gas, propane) for any device within the system (e.g., thermal oxidizer, pump driven by an internal combustion engine)

TABLE 2

PARAMETERS AND PREFERRED TEST EQUIPMENT

	PARAMETERS	TYPE OF EQUIPMENT	CALIBRATION*
1.	Temperature	Thermometer Thermocouple	Calibrated against a known NBS traceable standard. Calibrated within six months prior to the test.
2.	Pressure	Magnehelics Std. Pressure Gauges Aneroid-barometers	Calibrated against a Standard Pressure barometer or pressure device that is NBS certified. Calibrated within six months prior to the test.
3.	Gas flow	Averaging Pitot Tube Orifice Meter Turbine Flow meter Hot wire Anemometer	Must be calibrated as per manufacturer's recommendations. Proof of calibration must be reviewed and approved by the APCD.
4.	Fluid Flow	Rotameter or other equivalent devices	Must be calibrated as per manufacturer's recommendations. Proof of calibration must be reviewed and approved by the APCD.

* Instrumentation must be calibrated in increments no greater than ten (10) percent of the span value of the instrument. Manufacturer calibration of instrumentation is acceptable if date of certification, accuracy and length of certification are certified by the manufacturer.

TABLE 3

SAMPLING AND ANALYTICAL METHODS

ANALYSES	SAMPLING METHODS[1,2]	PREFERRED ANALYTICAL METHODS[1]	ALTERNATE ANALYTICAL METHODS[1]
BENZENE MTBE BTEX	CARB 410A/B (Tedlar Bag) or EPA TO-14 (Summa Canister) or EPA 18 (Tedlar Bag)	EPA 8020 (GC, MS) or EPA 8260B (GC, MS)	CARB 410A MOD. (GC, PID/FID) or EPA TO-14 (GC, MS)
TPH	CARB 410A/B (Tedlar Bag) or EPA TO-14 (Summa Canister) or EPA 18 (Tedlar Bag)	EPA 8015M-G (GC, MS)	EPA TO-3 (GC, MS) or EPA TO-14
ROC[3]	(same as for TPH)	EPA 8015M (GC, MS)	EPA TO-14 Or EPA TO-3

TABLE 3 continued . . .

SAMPLING AND ANALYTICAL METHODS

ANALYSES	SAMPLING METHODS[1,2]	PREFERRED ANALYTICAL METHODS[1]	ALTERNATE ANALYTICAL METHODS[1]
Total Petroleum HC (Monitoring)	Field Survey Instrument	Organic Vapor Analyzer (Flame Ionization Detector) (Calibrated against hexane)	
Other organics	Contact the Source Test Section of the Air Pollution Control APCD for details.		

1 QA/AC procedures within each method must be followed

2 Gases sampled for collection by these methods should be no higher than 300º F, due to the physical properties of the collection vessels. Samples from exhaust streams of catalytic oxidizers or thermal incinerators must be cooled prior to collection. The cooling method must be of a non-contacting nature. For example, the cooling method could be as simple as a set of empty impingers in an ice bath.

3. This is an option to TPH. ROC analysis to speciate for C3, C4, C5, C6+, and the individual PPMV concentrations (corrected to hexane) summed together.

TABLE 4A – FIELD SHEET

CONTAMINATED SOIL CLEANUP

REPORTING REQUIREMENTS & CALCULATIONS – CARBON CANISTER

EQUIPMENT OWNER: _____ Permit Type: ATC/PTO

EQUIPMENT OPERATOR: _____ Permit No.: _____

EQUIPMENT/FACILITY LOCATION: _____ Report Type: SCDP/MONTHLY/QUARTERLY

STATIONARY SOURCE DESIGNATION: _____ Report Date: _____

PROCESS START-UP RESULTS

	DAY	TIME	CONTROL DEVICE INLET TEMP (ºF)	STACK OUTLET TEMP (ºF)	STACK GAS FLOW (SCFM)	CONTROL DEVICE INLET PRESSURE (PSIG)
0:00						
0:30						
1:00						
1:30						
2:00						
2:30						
3:00						

TABLE 4B – FIELD SHEET

CONTAMINATED SOIL CLEANUP

REPORTING REQUIREMENTS & CALCULATIONS – THERMAL OXIDIZER/CATALYST

EQUIPMENT OWNER: _____ Permit Type: ATC/PTO

EQUIPMENT OPERATOR: _____ Permit No.: _____

EQUIPMENT/FACILITY LOCATION: _____ Report Type: SCDP/MONTHLY/QUARTERLY

STATIONARY SOURCE DESIGNATION: _____ Report Date: _____

PROCESS START-UP RESULTS

	DAY	TIME	INLET TEMP (ºF)	STACK TEMP (ºF)	CONTROL DEVICE INLET FLOW (scfm)	STACK OUTLET FLOW (scfm)	CONTROL DEVICE INLET PRESS (psig)	CONTROL DEVICE OUTLET PRESS (psig)	OXIDIZER BED TEMP ºF
0:00									
0:30									
1:00									
1:30									
2:00									
2:30									
3:00									

TABLE 4 continued …

TPH MONITORING (PPMV as Hexane)

	DAY/ TIME	TPH OUTLET	TPH INLET
1:00			
2:00			
3:00			

TABLE 5 – LAB RESULTS SUMMARY SHEET

CONCENTRATION (PPMV)

DAY/TIME	INLET			OUTLET		
	BENZENE	MTBE	TPH	BENZENE	MTBE	TPH

TABLE 6

BENZENE, MTBE AND TPH FLOW (lbs/hr) AND CONTROL EFFICIENCIES (% reduction)

DAY/ TIME	BENZ IN	BENZ OUT	BENZ EFF	MTBE IN	MTBE OUT	MTBE EFF	TPH IN	TPH OUT	TPH EFF	IN	OUT	EFF	IN	OUT	EFF

EMISSION EQUATIONS AND CALCULATIONS FOR BENZENE, MTBE AND TPH

1. Contaminant Inlet Mass Flowrate (lbs/hr)

$Q_{mi,c} = (C_{i,c}/F1)\ (V)\ (1/F3)\ (MW_c)\ (F4)$

2. Contaminant Outlet Mass Flowrate (lbs/hr)

$Q_{mo,c} = (C_{o,c}/F1)\ (V)\ (1/F3)\ (MW_c)\ (F4)$

3. Stack Exit Velocity

$v_o = (V/F5)\ (1/[\{F6\}\ \{D_s^2\}])\ ([T_o+460]/[T_s+460])$

4. Control Efficiency of Device

$EFF_c = [(Q_{mo,c} - Q_{mo,c})/Q_{mi,c}]\ (100)$

where:

$C_{I,c}$ = Inlet concentration of contaminate c, ppm
$C_{o,c}$ = Outlet concentration of contaminate c, ppm
D_s = Diameter of Exit Stack, ft.
$F1$ = Conversion factor for ppm = 1×10^6
$F3$ = Ideal gas volume to mass conversion = 379 scf/lb-mole
$F5$ = minute to second conversion factor = 60 sec/min
T_o = Stack outlet temperature, ºF
V = Vapor volume flowrate, scfm

MW_c = Molecular weight of contaminant *c* = 86.00 lb/lb-mole for TPH
= 78.12 lb/lb-mole for benzene
= 88.15 lb/lb-mole for MTBE

$Q_{mi,c}$ = Inlet mass flowrate of contaminate c, lbs/hr
$Q_{mo,c}$ = Outlet mass flow rate of contaminate c, lbs/hr
EFF_c = Efficiency of control device for contaminant c, %
$F2$ = Pound to ton conversion = 2,000 lb/ton
$F4$ = Hour to minute conversion factor = 60 min/hr
$F6$ = pi/4 = 0.7854 (note: pi is equal to 3.1416)
T_s = Standard temperature = 60 ºF
v_o = Stack exit velocity, ft/sec