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**Technical Guidance Package for:  
Combustion Sources**

# **SOIL REMEDIATION**



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## **Technical Guidance for Combustion Sources**

### *THIS PACKAGE IS INTENDED FOR INSTRUCTIONAL USE ONLY*

References to abatement equipment technologies are not intended to represent minimum or maximum levels of Best Available Control Technology (BACT). Determinations of BACT are made on a case-by-case basis as part of the New Source Review of permit applications. BACT determinations are always subject to adjustment in consideration of specific process requirements and recent developments in abatement technology. Additionally, specific health effects concerns may indicate stricter abatement than required by the BACT determination..

The represented calculation methods are intended as an aid in the completion of acceptable submittals; alternate calculation methods may be equally acceptable if they are based on, and adequately demonstrate, sound engineering assumptions or data.

The enclosed regulations are applicable as of the publication date of this package, but are subject to revision during the application preparation and review period. It is the responsibility of applicants to remain abreast of regulation developments which may affect their industries.

The special conditions included in this package are for purposes of example only. Special Conditions included in an actual permit are written by the reviewing engineer to address specific permit requirements and operating conditions.

The electronic version of this package may or may not contain attachments or forms (such as the PI-1, Standard Exemptions, Tables, etc.) that can be obtained electronically elsewhere on the TCEQ Bulletin Board.

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ATTACHMENTS:

Instructions for Claiming a Standard Exemption

Standard Exemption No. 68 (Equipment Used to Reclaim or Destroy Chemicals)

Standard Exemption No. 68 Checklist

Standard Exemption No. 80 (Smokeless Gas Flares)

Standard Exemption No. 88 (Direct Flame Incinerators)

Standard Exemption No. 106 (Physical or Operational Changes to a Facility)

Standard Exemption No. 118 (Physical or Operational Changes to a Facility Authorized  
By, but Not Meeting the Requirements of, Another Exemption)

PI-1 Form - General Application for Air Quality Permit

PI-7 Form - Registration Form for Standard Exemptions

Table 1(a) - Emission Sources

Table 30 - Certification of Estimated Capital Cost and Permit Application Fee

§ 116.211 - Permit Exemptions - Applicability Checklist

# **TECH NOTE**

## **SOIL REMEDIATION**

### **OVERVIEW**

The Texas Clean Air Act requires permitting of any emitter of pollutants to the atmosphere. The Act is implemented through 30 TAC Chapter 116, “Control of Air Pollution By Permits for New Construction or Modification.” This is generally known as Regulation (Reg) VI which states that “Any person who plans to construct any new facility or to engage in the modification of any existing facility which may emit air contaminants into the air of this state shall obtain a permit pursuant to 30 TAC § 116.111 of this title (relating to General Applications) or satisfy the conditions for exempt facilities pursuant to Subchapter C of this chapter (relating to Permit Exemptions) before any actual work is begun on the facility.”

### **SPECIFIC REMEDIATION RELATED AIR POLLUTION ISSUES**

On-site remediation of contaminated water or soil generally involves removing petroleum products or man-made chemicals using processes that may emit volatile organic compounds (VOC) and other air pollutants. Fortunately, most remediation processes involve very low air pollution emissions rates. This generally allows the work to be covered by the exemption process, as outlined in 30 TAC § 116.211 (attached) of Reg VI and Standard Exemption No. 68 (attached). If you cannot meet the requirements of Standard Exemption 68, which incorporates portions of Standard Exemptions No. 80 (attached), 88 (attached), and 118 (attached), you will need to obtain a permit.

### **STANDARD EXEMPTION NO. 68**

This exemption covers “Equipment used to reclaim or destroy chemicals removed from contaminated ground water, contaminated water condensate in tank and pipeline systems, or contaminated soil, for the purpose of remedial action....” Its provisions allow air emissions of total petroleum hydrocarbons (TPH) of one pound per hour, with or without abatement devices. An emissions limit formula in Standard Exemption No. 118, Section (c), is used to determine maximum allowable emissions rates for benzene and chemicals other than petroleum fuels. In addition, for man-made chemicals, air emissions vents or stacks must be at least 100 feet away from any home, business, or recreation area not legally a part of the property involved in remediation.

The exemption applies only to on-site (or nearby property secondarily affected by the contamination) remediation. Virtually any technique can be used, either designed specifically for the site or a mobile unit capable of treating a variety of contaminants. Soil vapor extraction (SVE), pump and treat, air sparging, and in situ bioremediation are often used. Part 68(e) provides technical conditions to be met when abatement is required to meet the one pound per hour total petroleum hydrocarbon emissions limit or the chemical limits calculated using the equation in Standard Exemption No. 118(c).

### **FILING A STANDARD EXEMPTION NO. 68 REGISTRATION**

The primary document required is the PI-7 form (attached). It provides data on what is to be covered, where the emissions points are, what is emitted, and in what quantities. It must be signed. The PI-7 also directs a number of attachments.

- A. Emissions calculations based on analysis of the soil and/or water contamination must be submitted. There are standard formulas (normally found in EPA Manual AP-42) that apply to categories of emitters often used at remediation sites, such as air strippers. Estimates of emissions for VOCs or other chemicals should be figured conservatively. One commonly used assumption is that the entire or worst case TPH load (in ppmv) in the remediated soil or water will be stripped and vented to the atmosphere during the remediation process, whether or not such stripping is intended. These calculations should also be compared to the limit values found for each compound.
- B. A description of the remediation process and any air pollution control equipment to be used should be included. Diagrams are quite helpful. If a confidential or proprietary control process is to be used, describe it separately. It will be retained in our confidential files. There must, however, be an acceptable non-confidential process description suitable for the public record.
- C. A site map is very important. It should have a scale and show, as a minimum, the location of any vents or stacks emitting air contaminants, and all immediately adjacent neighbors.

D. An overall summary of how the project satisfies the requirements of 30 TAC § 116.211 (a)-(d) and Standard Exemption No. 68.

E. A map or written description showing how to get to the site by road.

Checklists have been developed for both 30 TAC § 116.211 and Standard Exemption No. 68. There is also an instruction sheet for claiming exemptions that has a copy of 30 TAC § 116.211 on the back. Copies are attached. We recommend their use. They may be made part of your registration, but are not required. The checklists restate the rule and exemption in simple yes or no questions. They also highlight the additional data that must be included with a PI-7.

### **EMISSIONS BASIS**

Site specific data should always be used as a basis for emissions calculations when available. Most remediation work that will cause emissions begins after a site is assessed for soil and groundwater contaminant concentration, so site specific data should be available. Be sure the concentration units are clearly designated (i.e., ppm-v versus ppm-w). The following emissions estimation guidance will cover most cases. We welcome more detailed analysis where our conservative assumptions may be shown to be unrepresentative. A temperature of 20°C and atmospheric pressure are assumed.

1. **SOIL WATER CONTAMINANT CONCENTRATION DATA IS AVAILABLE:** Results of soil water analysis are usually provided in a weight per volume basis (milligram per liter of water). Select the worst (highest) concentration found that does not reflect free product. Assume that the remediation system (usually an air stripper) is 100% effective. Multiply the contaminant concentration in mg/l by the water flow rate in gallons per minute and convert to pounds per hour (conversion factor is  $5.042 \times 10^{-4}$  lb-l-min/mg-gal-hr). Account for any control device used. Compare the amount estimated to be emitted to the atmosphere to the appropriate limit from SE 68 and/or SE 118(c).
2. **SOIL VAPOR CONTAMINANT CONCENTRATION DATA IS AVAILABLE:** Results of direct soil vapor analysis are usually provided on a volume per volume basis, ppmv. Multiply (contaminant concentration in ppmv) x (contaminant's molecular weight in lb/lb-mole) x (air

pump or flow rate in cubic feet per minute) x (1.581 x 10<sup>-7</sup> lb-mole-min/ft<sup>3</sup>-ppmv-hr) to get the emission rate in lb/hr. Account for any control device used. Compare the amount to be emitted to the appropriate limit.

3. **SOIL CONTAMINANT CONCENTRATION DATA IS AVAILABLE:** Results of soil contamination analysis are usually provided on a weight per weight basis, such as milligrams per kilogram, dry weight. Select the worst (highest) concentration found that does not reflect free product. Equation 1, Risk-Based Corrective Action for Leaking Storage Tank Sites, TCEQ Publication RG-36, dated January, 1994 (reproduced below), may be used to determine the soil vapor concentration in mg/liter of air for specific chemicals such as benzene. Convert this soil vapor concentration to ppmv (Concentration in mg/liter air x 24040/MW) and proceed as in paragraph 2 above.

Equation 1

$$C_a = \frac{C_T H' \beta}{K_d \beta + \phi_w + \phi_a H'}$$

$C_T$  = bulk soil concentration (mg/kg dry weight from sample)

$C_a$  = soil vapor concentration (mg/l)

$K_d$  = soil water partition coefficient(kg/kg / kg/l)( $K_{oc}$  x  $f_{oc}$ )

$K_{oc}$  = organic carbon partition coefficient (chemical specific).

Note: benzene  $K_{oc}$  is 83. There is no  $K_{oc}$  for TPH.

$f_{oc}$  = soil organic carbon fraction (default: .02% or 0.002)

$\beta$  = dry soil bulk density (default: 1.8 kg/l)

$\phi$  = total soil porosity ( $\phi = 1 - \beta/P_b$ ,  $P_b$  (default)= 2.65 kg/l)

$\phi_a$  = air fill soil porosity ( $\phi - \phi_w$ )

$\phi_w$  = water content (default = 10% or 0.1)

$H'$  = Henry's Law Constant (unitless)  $H' = H \times 41.57$  @ 20°C

$H'$  for gasoline = 54.35  $H'$  for benzene = 0.23



## **PERMITTING REQUIREMENTS**

For off-site soil remediation facilities, a Standard Exemption No. 106 or 118 claim may be possible (Subchapter K facilities, for example) or a permit may be required. If a permit is required, it must be received before construction is begun. Filing an application for a permit requires a PI-1, General Application Form (attached), and a permit application fee, based on the estimated capital cost of the project as calculated per Table 30 (attached). Table 1(a), Emission Sources, should accompany the application, as well as any other tables specific to the type of facility that is proposed.

As a minimum, the same technology requirements would apply to a facility seeking a permit instead of claiming SE 68. However, additional review would be necessary due to the potential emissions from the additional handling of the material. It is up to the applicant to demonstrate that Best Available Control Technology is being applied not only to the stack emissions, but to the fugitives as well. Depending on the results of the dispersion modeling, review by Toxicology and Risk Assessment (TARA) staff may be warranted. TARA staff would either sign-off on the project, or in the case of excessive impacts, would request that impacts be reduced. This is accomplished by increasing control efficiencies, increasing dispersion, or decreasing throughput.