Instructions for Conducting Sampling During Aboveground Storage Tank Closure

Permitting and Compliance Assistance Program

Division of Waste Management

Florida Department of Environmental Protection

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INTRODUCTION

This document establishes procedures for conducting and reporting storage tank system closures to meet the requirements of Chapter 62-762, Florida Administrative Code (F.A.C.), Aboveground Storage Tank Systems.

As an integral part of a system or a system component closure performed at an Aboveground Storage Tank (AST) facility a Closure Report or a Limited Closure Report, as applicable, shall be prepared and submitted to the Department or contracted County program as required in subsections 62-762.801, F.A.C., and 62-762.802, F.A.C. The report is to describe the work that was performed at the facility during the system or system component closure, and summarize any data collected at that time.

A Site Assessment in accordance with Chapter 62-780, F.A.C., conducted and approved by the Department will satisfy the requirements of this guideline. However, these guidelines do not meet the criteria to qualify for the issuance of a Site Rehabilitation Completion Order (SRCO) as specified in Chapter 62-780, F.A.C. If a facility intends to demonstrate that all No Further Action requirements of Chapter 62-780, F.A.C., have been met, a Closure Report which meets the Site Assessment requirements of Chapter 62-780, F.A.C., must be prepared and submitted, and the report must be signed and sealed by a Professional Engineer (PE) licensed in the State of Florida or a Professional Geologist (PG) licensed in the State of Florida.

A. Closure Report

In cases where an investigation is required at the time of closure in accordance with this document and as specified in Rule 62-762.801, F.A.C., and 62-762.802, F.A.C., a Closure Report with the following elements and documentation shall be prepared and submitted in writing or electronic format to the County within 60 days of completion of closure.

1. Summary Narrative

   The Closure Report shall summarize closure actions and provide:

   a. Information on the procedures (soil field screening procedures, analytical sample collection, etc.) followed during closure;
   b. Information on the dimensions of the excavation(s), depth to groundwater, volume of soil

excavated, and disposal method for the excavated soil;

c. Disposition of excavated contaminated soil;
d. Disposition of removed system components;
e. Disposition of accumulated sludge / liquids removed from system components; and
f. Recommendation for no additional actions or for site assessment under Chapter 62-780, F.A.C.

2. Supporting Documentation
   a. A scaled site map showing the area(s) excavated and approximate locations of all samples collected;
   b. Table(s) summarizing all field and analytical results obtained, listing the approximate depth at which each sample was collected;
   c. DEP Form 62-762.901(2) "Storage Tank Facility Registration Form" (due within 10 days after closure);
   d. Copies of laboratory reports.

B. General Sampling Guidelines

All samples must be analyzed using approved methods listed in Chapter 62-780, F.A.C., or methods approved through protocols described in Chapter 62-160, F.A.C.

Composite soil samples cannot be used to meet the requirement of Closure Investigation sampling. Soil samples collected during Closure Investigation must be discrete grab samples. Composite samples are only allowed for analysis of contaminated soil for the purposes of disposal.

Benzo(a)pyrene equivalents must be calculated for soil samples as there are no longer individual direct exposure Cleanup Target Levels (CTLs) for several of the Polycyclic Aromatic Hydrocarbons (PAHs).

Soil samples for volatile analyses must be collected pursuant to EPA Method 5035. However, if the substrate to be sampled consists of large particles such as pea gravel, contains debris or is consolidated, soil samples for volatile analyses may be collected in a bulk jar.

Note: Chapter 62-780, F.A.C., allows Level 1 Risk Management alternative closure options for both

the total recoverable petroleum hydrocarbons (TRPH) CTLs and leachability CTLs, and in accordance with these procedures, further analysis of the soil sample can be run. As such, enough soil should be collected during sampling efforts so that the laboratory can perform additional tests on that soil if necessary. The laboratory should be advised that in the event that contamination is detected which exceeds the TRPH Direct Exposure Residential CTL or TRPH Leachability Based on Groundwater CTL specified in Table II of Chapter 62-777, F.A.C., TRPH fractionation using either the Massachusetts method or the Working Group method should be performed on that soil sample. The laboratory should also be advised that in the event that contamination is detected that exceeds the Department's Leachability Based on Groundwater Criteria Soil CTLs specified in Table II of Chapter 62-777, F.A.C., for any other contaminant of concern, a Synthetic Precipitation Leaching Procedure (SPLP) extraction and analysis of that soil sample should be performed. Additionally, the acceptable holding times for the soil samples need to be met. If TRPH fractionation or SPLP is utilized, the Closure Report needs to be signed and sealed by a PG or PE.

1. Gasoline and Kerosene Analytical Groups

   a. Soil Samples

      Soil samples obtained during closure of a storage tank system are to be screened in the field using an instrument or method approved by the Department. A sample from the location in each source area (tank farm, integral piping, and dispenser island[1]), that yields the highest hydrocarbon measurement is to be analyzed for volatile organic aromatics (VOAs), PAHs and TRPHs. If no positive screening results are obtained, the sample, from each source area, is to be collected from the location within each source area believed to be most likely to have contamination, such as next to a fill port. Only one sample is needed to confirm a new discharge and then the facility enters the site assessment initiation phase under 62-780, F.A.C.

      (1) If an organic vapor analysis instrument with a Flame Ionization Detector (FID) or a Photo Ionization Detector (PID) is used, it must be in the survey mode. PIDs should not be used in situations where humidity will interfere with the instrument's sensitivity (i.e., during rainy periods, measuring moist or wet soil). Readings must be obtained from the headspace of samples in half-filled, 8-ounce or 16-ounce jars. Each soil sample should be obtained from the vadose zone (the area above the water table), brought (if necessary)

[1] *Each island is considered a source area. If there are five islands with two dispensers on each island, five samples are to be collected.*

to a temperature of between 20°C (68°F) and 32°C (90°F), and the reading obtained five to thirty minutes thereafter. If an FID is used, each soil sample must be split into two jars, and one of the readings must be obtained with the use of an activated charcoal filter unless the unfiltered reading is 10 parts per million (ppm) or less. The total corrected hydrocarbon measurement must be determined by subtracting the filtered reading from the unfiltered reading. Analytical instruments must be calibrated in accordance with the manufacturer's instructions.

(2) If soil that yields positive field screening results (hydrocarbon measurements greater than 10 ppm) is identified and remains on-site, a grab sample from the location in each source area that yields the highest hydrocarbon measurement must be analyzed for VOAs, PAHs and TRPHs. If the evidence suggests that products from both the Gasoline Analytical Group and Kerosene Analytical Group were released at different locations within a source area, then the sample from each distinct product area with the highest hydrocarbon measurement is to be collected for laboratory analyses.

(3) If contaminated soil is identified and excavated, a minimum of four or five samples (at least one from the bottom of the excavation if the water table was not reached and at least four from the walls of the excavation) are to be obtained for field screening. The sample that yields the highest hydrocarbon measurement is to be analyzed for VOAs, PAHs and TRPHs. If no positive screening results are obtained, the sample is to be collected from the location believed to be most likely to have contamination. This sampling is in addition to the sampling required in B.1.a., above.

Removal of soil greater than 20 feet of depth and/or in a 20 foot radius laterally from the edge of excavation is allowable provided that an Interim Source Removal Report is submitted in accordance with the requirements of Rule 62-780.500, F.A.C., and is signed and sealed by a PE or PG.

b. Groundwater Samples

Groundwater samples obtained during closure of a tank must be analyzed for all parameters specified in Table C of Chapter 62-780, F.A.C.

2. Used Oil

   a. Soil Samples

      (1) Soil samples obtained during closure of a used oil tank are to be inspected for signs of staining or discoloration. If the tank appears to have discharged or if soil contaminated or saturated with used oil is identified and remains on-site, a sample that represents the location believed to be most likely to have contamination must be analyzed for all parameters specified for used oil in Table D of Chapter 62-780, F.A.C.

      (2) If soil visually stained or saturated with used oil is identified and excavated, at least one sample is to be obtained from the bottom of the excavation if the water table was not reached and at least one sample is to be obtained from the wall of the excavation at an equivalent depth of the soil visually stained or saturated with used oil that was removed, and analyzed for those contaminants detected in the sample collected from the most visibly stained area or during pre-burn analyses.

   b. Groundwater Samples

      Groundwater samples must be analyzed for all parameters specified for used oil in Table D of Chapter 62-780, F.A.C.

C. Sampling Requirements for Storage Tank Removals [see Section E and F for requirements during closure of individual system components]

1. Gasoline and Kerosene Analytical Groups

   a. Soil Samples

      During the removal of an aboveground storage tank system or component, field screening of soils in accordance with B.1.(a), above shall be conducted in the area of soil contact. The screening locations are to be spaced on a five (5) foot grid pattern, beginning at the edge of the undisturbed soil, with soil collection from ground surface at discrete points at a depth of two feet and five feet below land surface (bls), then continuing at five foot intervals to 20 feet bls, unless groundwater is encountered.

      Note: If it is anticipated that a very large sampling area will be required and if an alternate soil sampling frequency is requested, a proposal under subsection 62-762.851(1), F.A.C.,

(Alternative Procedures) can be submitted to the Department for approval under that rule.

b. Groundwater Samples

Groundwater samples must be obtained from a properly constructed temporary monitoring well or a direct push well as discussed below whenever the depth to the groundwater table is less than 20 feet. If the depth to the groundwater table is greater than 20 feet, a groundwater sample is not required if:

- the screening and laboratory results indicated that contaminated soil was not present; or
- contaminated soil was identified and was left in place requiring the discharge to be reported and a site assessment to be conducted in accordance with Rule 62-780.600, F.A.C.; or
- contaminated soil was identified, excavated and results demonstrated that groundwater should not have been affected based on the:
  - degree of contamination,
  - horizontal and vertical extent of contamination in the excavated soil,
  - type of product believed to have been discharged, and
  - site stratigraphy

Subsequent to backfilling, the temporary monitoring well is to be installed in the area that represents the location believed to be most likely to have contamination as determined by the soil field screening results. If no soil contamination is found, the well is to be installed near the center of the former tank location. Minimum well construction details for a temporary monitoring well require a sand pack placed around the well screen prior to sampling and the well screen intercepting the groundwater table.

2. Used Oil

a. Soil Samples

When a used oil tank is being removed, a visual inspection of the excavation, of the tank condition and of the removed soil is to be performed to document the integrity of the tank. If the tank appears to have discharged or if soil staining is documented, a soil sample is to be obtained in accordance with Section B.2.(a) above.

b. Groundwater Samples

Groundwater sampling is not required if visual observations or laboratory results from sampling indicate that contaminated soil is not present. However, if the tank appears to have discharged or if soil staining is documented, and the depth to the groundwater table is less than 20 feet, a temporary monitoring well is to be installed in the area that represents the location believed to be most likely to have contamination as determined by the visual observations of the soil samples. If the depth to the groundwater table is greater than 20 feet, a groundwater sample is not required if:

- the visual observations or laboratory results from sampling indicated that contaminated soil was not present; or
- contaminated soil was identified and was left in place requiring the discharge to be reported and a site assessment to be conducted in accordance with Rule 62-780.600, F.A.C.; or
- contaminated soil was identified, excavated and results demonstrated that groundwater should not have been affected based on the:
  - degree of contamination,
  - horizontal and vertical extent of contamination in the excavated soil,
  - type of product believed to have been discharged, and
  - site stratigraphy.

D. Sampling Requirements for Storage Tanks Closed in Place [see Section E and F for requirements during closure of individual system components]

1. Gasoline and Kerosene Analytical Groups

a. Soil Samples

Soil borings must be placed around each aboveground storage tank, with a maximum distance of 20 feet between borings. Each boring is to be placed as close to the tank as possible, with one of the borings placed as close to the fill port as possible while still being beyond the edge of the tank so that the boring can continue to the groundwater table or 20 feet, whichever is less. Soil must be screened at two foot intervals to a depth of 10 feet below land surface and then at 5 foot intervals to the groundwater table, or to a depth of 20

feet below land surface if the water table is not encountered.

Note: If it is anticipated that a very large sampling area will be required and if an alternate soil sampling frequency is requested, a proposal under subsection 62-762.851(1), F.A.C., (Alternative Procedures) can be submitted to the Department for approval under that rule.

b. Groundwater Samples

Groundwater samples must be obtained whenever the depth to the groundwater table is less than 20 feet. If the depth to the groundwater table is greater than 20 feet, a groundwater sample is not required if:

- the screening and laboratory results indicated that contaminated soil was not present; or
- contaminated soil was identified and was left in place requiring the discharge to be reported and a site assessment to be conducted in accordance with Rule 62-780.600, F.A.C.; or
- contaminated soil was identified, excavated and results demonstrated that groundwater should not have been affected based on the:
  - degree of contamination,
  - horizontal and vertical extent of contamination in the excavated soil,
  - type of product believed to have been discharged, and
  - site stratigraphy.

When compliance monitoring wells are present, one sample can be obtained from each compliance monitoring well (if only one tank of 2,000 gallon capacity or less is being closed in place, only two temporary monitoring wells are to be installed, at locations suspected to be downgradient and upgradient from the tank). If it is determined that the construction of the compliance wells is not adequate (that is, if the water table does not intersect the screened interval), temporary monitoring wells are to be installed, as specified below.

If there are no compliance monitoring wells present, four temporary monitoring wells are to be installed around the tank field and sampled (if only one tank of 2,000 gallon capacity or less is being closed in place, only two temporary monitoring wells are to be installed, at

locations suspected to be downgradient and upgradient from the tank). Minimum well construction details for a temporary monitoring well require a sand pack placed around the well screen prior to sampling and that the screened interval intercepts the groundwater table.

2. Used Oil

   a. Soil Samples

   Sample as specified in Section D.1.a. above, with the samples visually inspected to determine if the tank appears to have discharged. If the tank appears to have discharged or if soil staining is documented, a soil sample is to be obtained in accordance with Section B.2.(a) above.

   b. Groundwater Samples

   If the depth to the groundwater table is less than 20 feet, a temporary monitoring well is to be installed in the area that represents the location believed to be most likely to have contamination as determined by the visual observations of the soil samples. If no soil staining is documented, the temporary monitoring well is to be installed next to the tank, as close to the fill port as possible. If the depth to the groundwater table is greater than 20 feet, a groundwater sample is not required if:

   - visual observations or laboratory results indicated that contaminated soil was not present; or
   - contaminated soil was identified and was left in place requiring the discharge to be reported and a site assessment to be conducted in accordance with Rule 62-780.600, F.A.C.; or
   - contaminated soil was identified, excavated and results demonstrated that groundwater should not have been affected based on the:
     - degree of contamination,
     - horizontal and vertical extent of contamination in the excavated soil,
     - type of product believed to have been discharged, and
     - site stratigraphy.

E. Sampling Requirements for Closure of Integral Piping in Contact with Soil

1. Soil Samples

   One soil boring must be placed approximately every 20 feet of product transfer line (piping), with the spacing determined by any evidence of contamination and location of potential sources of leaks, such as fixtures, connections and joints. The boring(s) is/are to be located as close to the transfer line as possible, with the sampling point one foot below the line level, or immediately above the groundwater table, whichever is first encountered.

   Note: If it is anticipated that a very large sampling area will be required and if an alternate soil sampling frequency is requested, a proposal under subsection 62-762.851(1), F.A.C., (Alternative Procedures) can be submitted to the Department for approval under that rule.

2. Groundwater Samples

   A groundwater sample is not required if:

   - the screening and laboratory results indicated that contaminated soil was not present; or
   - contaminated soil was identified and was left in place requiring the discharge to be reported and a site assessment to be conducted in accordance with Rule 62-780.600, F.A.C.; or
   - contaminated soil was identified, excavated and results demonstrated that groundwater should not have been affected based on the:
     - degree of contamination,
     - horizontal and vertical extent of contamination in the excavated soil,
     - type of product believed to have been discharged, and
     - site stratigraphy.

   If the results cannot demonstrate that groundwater should not have been affected, then a temporary monitoring well is to be installed in the area that represents the location believed to be most likely to have contamination as determined by the soil samples.

F. Sampling Requirements for Closure of Piping Sumps, Hydrant System Sumps, Spill Containment Devices and Dispenser Sumps

1. Soil Samples

   a. One soil boring must be placed next to each submersible pump or fill port. Samples for field screening are to be collected approximately every two feet below land surface until the top of

the storage tank, or the groundwater table, whichever is first encountered.

b. A minimum of one soil boring must be placed directly under each product dispenser or less than three feet from each product dispenser. Samples for field screening are to be obtained approximately every two feet below land surface to a minimum depth of four feet, or to the groundwater table, whichever is first encountered (if the appropriate District or contracted County program determines based on screening results that there is a need to extend any boring below 10 feet, subsequent samples may be collected every five feet). The depth of the soil boring(s) will be dependent upon the hydrocarbon vapors encountered. The ideal location for evaluating soil conditions is directly under the dispenser if the dispenser has been removed and the area is large enough to be accessible.

2. Groundwater Samples

A groundwater sample is not required if:

- the screening and laboratory results indicated that contaminated soil was not present; or
- contaminated soil was identified and was left in place requiring the discharge to be reported and a site assessment to be conducted in accordance with Rule 62-780.600, F.A.C.; or
- contaminated soil was identified, excavated and results demonstrated that groundwater should not have been affected based on the:
  - degree of contamination,
  - horizontal and vertical extent of contamination in the excavated soil,
  - type of product believed to have been discharged, and
  - site stratigraphy.

If the results cannot demonstrate that groundwater should not have been affected, then a temporary monitoring well is to be installed in the area that represents the location believed to be most likely to have contamination as determined by the soil samples.

G. Discharge Reporting Requirements during a Petroleum/Product Tank System Closure

The Department must be notified by the facility owner or operator of the discovery of an unreported discharge on the Discharge Report Form [Department Form 62-762.901(1)] within 24 hours of the discovery or before the close of the Department's next business day. If any one of the following

reporting criteria is met, then the Closure Investigation may be terminated, a Closure Report (prepared according to the guidelines described in Section A – Documentation Requirements, describing the work that was performed at the site and summarizing the data collected at that time) is to be submitted and a formal site assessment initiated in accordance with Chapter 62-780, F.A.C.:

1. Soil contaminated with products classified in the Gasoline Analytical Group or in the Kerosene Analytical Group, that exceeded the default soil CTLs specified in Chapter 62-777, F.A.C., remains on-site; or
2. Soil contaminated with used oil, that exceeded the default soil CTLs specified in Chapter 62-777, F.A.C., remains on-site; or

   Note: For G.1. and G.2. above, a DRF does not need to be submitted when the default soil CTLs are exceeded while level 1 alternative closure options (Fractionation and SPLP) are being evaluated. Once the evaluation is complete, if it is demonstrated that the soil is contaminated, then a DRF must be submitted;
3. Free product or a sheen of petroleum products is detected in a monitoring well or in the tank or tank system components excavation area; or
4. Any of the groundwater CTLs specified in Chapter 62-777, F.A.C., has been exceeded.

H. Other Pollutant and High Viscosity Pollutant Storage Tank Systems

Owners or operators of other pollutant ASTs are required to perform a Closure Investigation. The Closure Report must address the particular regulated substance stored in the storage tank system. Sampling methodology must be submitted to the District or contracted County program for approval 30 days before the storage system closure. If the sampling methodology proposed by the Owner or Operator will accurately detect any discharges that may have occurred, the District or contracted County program will notify the owner or operator of the approval within 14 days of receipt of the sampling methodology. Closure Investigation may be conducted in accordance with existing Department-approved closure evaluation protocols and related corrective action protocols approved under other Department programs [e.g., high viscosity pollutants, such as no. 6 Fuel Oil, the use of *Closure Sampling Protocol for Aboveground Storage Tank Systems (ASTs) Containing High Viscosity Pollutants*, (Appendix A) and *Heavy Fuel Oil Discharge Response Actions*, FDEP May 2016, (Appendix B)].

Appendix A

Closure Sampling Protocol for Aboveground Storage Tank Systems (ASTs) Containing High Viscosity Pollutants

High viscosity pollutants, such as No. 6 fuel oil, are relatively immobile in the environment and any impacts are typically very localized and limited to surficial soils. Based on the characteristics of high viscosity pollutants, facilities have the option of following these procedures for closure sampling and evaluation an AST system that contained a high viscosity pollutant.

1. Conduct a visual inspection around the perimeter of the tank to determine the presence or absence of soil staining or discoloration indicative of a release of high viscosity pollutants.

2. If no visual staining or discoloration is observed, borings/test trenching will be collected at approximately 50 ft. intervals. Borings/test trenching, whenever possible, will be located in proximity to manways, nozzles, other shell penetrations, floor sumps, etc. If the tank has cathodic protection, any samples will be collected in the range of 7.5 to 10 ft. from the edge of the tank. If the tank does not have cathodic protection, any soil samples will be collected immediately adjacent to the apron of the tank. For underground piping, the facility will collect soil samples at 50 ft. intervals for straight piping and additional samples where there are 90 degree bends in the piping. At each soil boring/test trenching location, samples will be collected at one foot depths from ground surface to 4 ft.-below land surface (ft-bls), and visually inspected and documented.

3. If stained or discolored soil is encountered indicating that a release of high viscosity pollutants has occurred, such soil and a one foot lateral and vertical buffer will be excavated. There shall be no limitation on the volume of soil that may be excavated so long as such excavation activity complies with the requirements of Rule 62-780.550, F. A. C. After excavation, up to four side wall and one bottom soil samples will be collected for TRPH analysis and the Polyaromatic Hydrocarbons (PAHs) applicable to Heavy Fuel Oil. Based on the FDEP approved *Heavy Fuel Oil Discharge Response Actions* protocol, these PAH constituents associated with #6 oil are phenanthrene, anthracene, flouranthene, benzo (a) anthracene, benzo (b) flouranthene, benzo (k)

flouranthene, benzo (a) pyrene, chrysene and indeno (1,2,3-cd) pyrene. The location of the excavation and confirmatory samples will be documented and any disposal manifests maintained.

4. In the event that TRPH in soil is detected above the TRPH Soil Cleanup Target Levels specified in Table II of Chapter 62-777, F. A.C., TRPH fractionation using the Florida Working Group method will be performed on the sample. If necessary, SPLP analysis may also be performed.

5. If it is determined that a release of high viscosity pollutants may have come into contact with groundwater, the facility will install a temporary groundwater monitoring well or wells as appropriate and a groundwater sample or samples will be collected for TRPH analysis. Also, if SPLP analysis is performed in accordance with Paragraph 4 and the results indicate that leaching of TRPH is occurring above the TRPH Groundwater Cleanup Target Level specified in Table I of Chapter 62- 777, F.A.C., or exceeds the leachability concentrations of Calculated SCTLs for TRPH Fractions (Table C-5 of the 2 Technical Report: Development of Cleanup Target Levels for Chapter 62-777), the facility will install a temporary groundwater monitoring well and collect and analyze a groundwater sample for TRPH.

6. A Closure Report will be generated for each tank within 60 days of data collection. This Closure Report will include a description of site investigation activities, analytical results, photographs of the individual test trench soil profiles, as well as conclusions and recommendations for future activities, if necessary.

Appendix B

Heavy Fuel Oil Discharge Response Actions

Heavy Fuel Oil

Discharge Response Actions

Background

Heavy fuel oil is not a petroleum product as defined in Section 376.301, F.S. Heavy fuel oil includes American Society for Testing and Materials (ASTM) grades number 5 and number 6 residual oils, and intermediate fuel oils used for marine bunkering with a viscosity of 30 and higher. No. 6 fuel oil is far more common than no. 5, and is the principal fuel used by oil-fired power plants. Thus "heavy fuel oil" is frequently used as a synonym for no. 6 residual oil. Heavy fuel oil is a highly viscous oil that has a low propensity to flow. When discharged, it usually results in visual staining of the top 3 to 4 inches of soil in the vicinity of the discharge. The response actions proposed by the Florida Electric Power Coordinating Group, Inc. (FCG) and its member electric utilities takes into consideration the fuel's high viscosity, low propensity to flow, and the staining associated with a discharge.

Applicability

The response actions provided below apply to discharges of heavy fuel oil to a pervious surface. It does not apply to discharges of heavy fuel oil being addressed pursuant to the Clean Water Act. Heavy oil discharged onto impervious surfaces will be recovered. Adherence to this protocol, such that the heavy fuel oil discharge is remediated within 30 days, constitutes compliance with the provisions of Rule 62-780.550, F.A.C. In responding to heavy oil discharges, including those into or near waters of the state, FCG member electric utilities will also comply with all other applicable laws and rules, including applicable notification requirements.

Response Actions

Heavy oil discharge response actions include two types of discharge categories: a new discharge and an existing discharge. A new discharge is defined as a discharge that is known to have occurred within the past 48 hours. An existing discharge is any other heavy oil discharge.

Response actions will be completed within 30 days of discovery of a new or existing discharge. To the extent response actions are not completed within that timeframe, the electric utility will contact the local county storage tank program office or Department of Environmental Protection (Department) district office to develop an appropriate discharge response in accordance with Chapter 62-780, F.A.C.

A. New Discharge Response Protocol

1. New Discharge Not Resulting in Contact with Groundwater

The response actions for a new discharge of any quantity where the discharge did not result in contact with groundwater will be initiated within 48 hours after discovery. Once the source of the discharge is abated or otherwise secured, FCG members will initiate response actions, which include immediate measures to control and abate the discharge.

Soil impacted by heavy fuel oil will be excavated through visual delineation of stained soil. This is typically done using shovels, a backhoe, a track hoe or other appropriate equipment. All visible traces of the heavy oil in the soil will be removed; including a one foot lateral and vertical buffer, unless prevented by a physical obstacle such as a storage tank, building, etc. Excavated soil will be stockpiled on Visqueen or other similar impervious material until loaded into 55 gallon drums, roll-off dumpsters or similar containers. Excavated soil will be secured in a manner that prevents human exposure to contaminated soil and prevents soil exposure to precipitation that may cause surface runoff. All excavated soil will be disposed of or treated within 60 days of completion of field activities in accordance with applicable local, state, and federal regulations. Applicable disposal or treatment documents will be obtained.

2. New Discharge Resulting in Contact with Groundwater

The response actions for a new discharge of any quantity that resulted in contact with groundwater will be initiated within 48 hours after discovery. Once the source of the discharge is abated or otherwise secured, FCG members will initiate response actions, which include immediate measures to control and abate the discharge.

In accordance with paragraph C. below, if a new discharge resulted in contact with groundwater confirmatory laboratory analysis will be conducted of the groundwater to ensure that levels of Polycyclic Aromatic Hydrocarbons (PAHs) applicable to heavy fuel oil as provided in Table A are below the corresponding groundwater cleanup target levels for those PAH constituents in Chapter 62-777, F.A.C., or alternative target levels agreed to with the Department.

To the extent such removal cannot be completed within 30 days, the electric utility will contact the relevant Department district office to develop an appropriate discharge response in accordance with Chapter 62-780, F.A.C.

B. Existing Discharge Response Protocol

The response actions for an existing discharge will be initiated as soon as possible after discovery, but no later than 7 days after discovery.

If the discharge is 25 gallons or less and did not result in contact with groundwater, the response protocol for new discharges in paragraph A. I. will be followed.

If the discharge is 25 gallons or less and resulted in contact with groundwater, the response protocol for new discharges will be followed. Also, in accordance with paragraph C. below, potential groundwater impacts will be addressed.

If the discharge is greater than 25 gallons, or resulted in contact with groundwater (see paragraph C. below), all visible traces of the heavy fuel oil in the soil will be recovered including a one foot lateral and vertical buffer as provided in Section A above and confirmatory laboratory analysis of one composite sample of soil from the bottom of the excavation (unless the bottom is below the water table) and the walls or perimeter of the excavation will be conducted to ensure that all impacted soil has been removed. Also, where the existing discharge resulted in contact with groundwater, the provisions of paragraph C. shall be followed.

Verification cleanup of the soil will be confirmed by ensuring that levels of PAHs applicable to heavy fuel oil as provided in Table A are less than the lower of the direct exposure or leachability soil cleanup target levels for those PAH constituents, or other alternative target levels agreed to with the Department. Removal will continue until applicable PAH constituent levels are below the aforementioned concentrations, unless prevented by a physical obstacle as previously mentioned.

To the extent such removal cannot be completed within 30 days, the electric utility will contact the relevant Department district office to develop an appropriate discharge response in accordance with Chapter 62-780, F.A.C.

C. Groundwater Contact

Heavy fuel oil removal activities in groundwater may include but are not be limited to the use of:

a. Absorbent pads or booms;

b. Pumps (skimmer, diaphragm, centrifugal, etc.) with mechanical, electrical or hand- bailed purging operations;

c. Hand or mechanical bailing;

d. Fluid vacuum techniques; or

e. Other applicable techniques or technologies.

Recovered heavy fuel oil will either be burned for energy recovery or disposed of or treated in accordance with applicable local, state, and federal regulations.

If a new or existing discharge resulted in contact with groundwater, after heavy fuel oil removal activities in groundwater have been completed, confirmatory laboratory analysis will be conducted to ensure that PAH levels applicable to heavy fuel oil as provided in Table A are below the applicable groundwater cleanup target levels for PAH constituents in Chapter 62-777, F.A.C., or alternative target levels agreed to with the Department.

D. Documentation

The attached form will be completed by electric utilities for each discharge of heavy fuel oil on a pervious surface and kept on file for a period of five years and made available to the Department upon request.

Table A - PAH Constituents Applicable to Heavy Fuel Oil

Phenanthrene
Anthracene
Fluoranthene
Benz(a)anthracene
Benzo(b)fluoranthene
Benzo(k)fluoranthene
Benzo(a)pyrene
Chrysene
Indeno(1, 2, 3 - cd)pyrene

Summary Document for Heavy Fuel Oil Discharge (on a pervious surface)

Question	Answer
Location(s) of Spill (street address of discharge, if known, facility name and narrative description or illustration indicating where discharge occurred)	
Date of Spill	
Type of Product Discharged	
Volume of Product Discharged (in gallons)	
Volume of Free Product Recovered (in gallons)	
Volume of contaminated soil excavated (tons or cubic yards)	
Disposal or recycling methods for free product	
Disposal or recycling methods for excavated soil	
Disposal methods for other contaminated media or investigative related waste	
A site map or sketch showing locations(s) of free product recovered and the area of soil removed	
Narrative description or illustrations of the approximate dimensions of the excavation - length, width and depth. (All dimensions to be provided in feet)	
Documentation confirming the proper treatment and/or disposal of the free product or contaminated soil. (Attach manifests to report)	
Narrative description or illustration of where samples were taken, screening methods used and analytical results. (Attach to report)	
Other applicable information such as a description of any physical obstacles, if any, preventing complete removal	

Appendix 1

No. 6 Fuel Oil-PAH Analysis and Spill Response Recommendations

PAHs are ubiquitous in the environment, forming whenever organic substances are exposed to high temperatures. They can be broadly separated into three categories: biogenic (formed from natural biological processes including diagenesis); petrogenic (primarily associated with crude oil and natural oil seeps); and pyrogenic (formed in high heat or combustion processes, including incomplete combustion of fuels). PAHs derived from all three categories are likely to be found as contaminants in soils, particularly in urban or industrial areas, but also, for examp1e, in areas where wood-burning stoves (biogenic) and high-volume vehicular traffic (pyrogenic) are present.

Petrogenic PAHs are characterized by low molecular weight compounds with 2 or 3 aromatic rings (i.e., six-carbon fused benzene rings) with a predominance of alkyl substitution (predominantly methyl groups attached to the ring structures). Conversely, pyrogenic PAHs are characterized by high molecular weight compounds typically with 4 to 7 aromatic rings, and much less alkyl substitution. An important toxicological distinction between the two categories is that all known carcinogenic PAHs fall into the high molecular weight, or pyrogenic, category. Atmospheric transport from point sources and the ever-increasing volume of mobile sources ensures the presence of pyrogenic PAHs in nearly all soils in the U.S. and elsewhere in the developed world.

Number (No.) 6 fuel oil, also known as Bunker C fuel, is a refinery by-product, principally the residue of processes in which light and medium crude oils are fractionally distilled and processed to produce gasoline, diesel fuel, and other products. Although derived from a predominately petrogenic source, No. 6 fuel oil may be substantially enriched in 3 to 5-ring PAHs formed in a number of high-temperature petroleum refining processes including catalytic and steam cracking, vacuum distillation, hydrodesulfurization, etc. PAHs in the high-viscosity residuum of the refining process are primarily petrogenic in origin; however, when necessary, low-viscosity blending stocks from the refining operations are blended with residuum to reduce viscosity and improve flowability. This occasional practice has the potential to introduce high-molecular weight pyrogenic PAHs in quantities that are both unpredictable and batch-specific, although the actual concentrations are low. This, along with the petrogenic PAH variability in parent crudes, are why PAH fingerprinting can be used to identify specific sources of fuel oil spills.

To develop a coherent approach to assessing risk from PAHs associated with a spill of residual fuel oil, as well as recommended cleanup criteria, all regulated PAH compounds have been compiled in Table 1. Those not found to be present in No. 6 fuel oil are shaded and all are compared with regulatory endpoints for cleanup action. Composition data for No. 6 fuel oil was compiled by the Total Petroleum Hydrocarbon Criteria Working Group (Potter and Simmons 1998). Data are presented as weight percentages for all fuel constituents reported from a comprehensive search of the literature, and from government, military and oil industry sources.

It is reasonable to assume that any PAHs with maximum reported levels less than 0.02 wt% in No. 6 fuel oil are unlikely to be present at detectable levels in soil or groundwater samples following a fuel spill. That is to say, if these PAHs are detected they would either be at a de minimis level or derived from a

source other than a heavy fuel oil spill, given the plethora of potential PAH sources described above. If this assumption is accepted, only the following PAHs found in soils subjected to a No. 6 fuel oil spill should be considered to be derived from that spill:

Phenanthrene
Anthracene
Fluoranthene
Benz(a)anthracene
Chrysene
Benzo(b)fluoranthene
Benzo(k)fluoranthene

The threshold of 0.02 wt% eliminates inclusion of naphthalene; the remainder of PAHs reported to be present in fuel oil No. 6 (see Table 1) are less abundant in fuel oil #6 than naphthalene. [Some, like benzo(a)pyrene (reported only once in fuel oil No. 6), are an order of magnitude less abundant than naphthalene.] Naphthalene is the most soluble of binuclear aromatics, and orders of magnitude more soluble than PAHs with 3 or 4 aromatic rings. This is further justification for not including naphthalene in the above list since solubility is a major factor in determining the rate of biodegradation.

For decisions on remediation of PAHs in the environment it is also important to consider bioavailability. PAH bioavailability will not be discussed further here, but considerable literature information is available (e.g., National Research Council 2003, Stroo et al., 2005).

Recommendations

For response activities related to a No. 6 fuel oil spill to soil and/or groundwater, it is recommended, with respect to PAHs, to compare only the following PAHs and their respective regulatory criteria.

Phenanthrene
Anthracene
Fluoranthene
Benz(a)anthracene
Chrysene
Benzo(b)fluoranthene
Benzo(k)fluoranthene

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Table 1. Compilation of Regulated PAHs, Occurrence in No. 6 Fuel Oil, and Regulatory Characterization and Limits for Spills to Soil in Florida

Priority Pollutants PAHs[1] (# of aromatic rings)	Reported wt% in No. 6 Fuel Oil[2] (avg and range)	USEPA Carcinogenic Potential[3]	Florida Groundwater CTLs (ug/L)	Florida Soil CTLs – Res/CI (mg/kg)[4]
Naphthalene[5] (2)	4.2E-3 2.1E-4 – 1.5E-2	N/C	14	55/300
1-Methylnaphthalene (2)	N/R[6]	N/A	28	200/1800
2-Methylnaphthalene (2)	N/R	N/C	28	210/2100
Acenaphthylene (2)	N/R	N/C	210	1800/20,000
Acenaphthene (2)	N/R	N/A	20	2400/20,000
Fluorene (2)	N/R	N/A	280	2600/33,000
Phenanthrene (3)	2.1E-2 2.1E-3 – 4.8E-2	N/C	210	2200/36,000
Anthracene (3)	5.0E-3	N/C	2100	21,000/300,000
Fluoranthene (3)	2.4E-2	N/C	280	3200/59,000
Pyrene (4)	2.3E-3	N/C	210	2400/45,000
Benz(a)anthracene (4)	5.5E-2 2.9E-3 – 1.5E-1	B2	0.05	Calculate based on TEF of 0.1[7]
Chrysene (4)	6.9E-2 2.9E-3 – 3.1E-1	B2	4.8	Calculate based on TEF of 0.001
Benzo(b)fluoranthene (4)	4.4E-2	B2	0.05	Calculate based on TEF of 0.1
Benzo(k)fluoranthene (4)	4.4E-2	B2	0.5	Calculate based on TEF of 0.01
Benzo(a)pyrene (5)	4.4E-3	B2	0.2	0.1/0.7 (TEF of 1)
Dibenz(a,h)anthracene (5)	N/R	B2	0.005	Calculate based on TEF of 1.0
Benzo(g,h,i)perylene (6)	N/R	N/A	210	2500/52,000
Indeno(1,2,3-cd)pyrene (5)	1.0E-2	B2	0.05	Calculate based on TEF of 0.1

1. Includes all reported constituents of No. 6 fuel oil (unshaded) that also are listed in Chapter 62-777 SCTLs.
2. Total Petroleum Hydrocarbon Criteria Working Group. Vol. 2, Composition of Petroleum Mixtures.
3. B2-probable human carcinogen; N/C- not classifiable; N/A- not available.
4. Chapter 62-777, F.A.C. Contaminant Cleanup Target Levels, Risk Impact Statement Section 120.81(6), Florida Statutes (F. S.). Residential and Commercial Industrial CTLs presented.
5. Naphthalene, although included in the Priority Pollutant list, is a di-aromatic and generally not considered in the same group as polynuclear aromatic hydrocarbons.
6. N/R (shaded) = Not reported in literature as occurring in No. 6 Fuel Oil.
7. For applicable PAHs, benz(a)pyrene equivalent concentrations are calculated as the sum of the individual PAH concentration times its toxic equivalency factor (TEF). This concentration should then be compared with the benz(a)pyrene SCTL.