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Memorandum

To: **Petroleum Restoration Program Stakeholders**

Through: **Natasha Lampkin, Administrator, Petroleum Restoration Program** Natasha Lampkin Digitally signed by Natasha Lampkin Date: 2022.12.06 11:40:24 -05'00'

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Date: **Effective December 6, 2022**

Subject: **Revised Procedures for Implementation of the Natural Attenuation Monitoring in the Petroleum Restoration Program (Supersedes February 1, 2011, Procedures)**

Section 376.3071(5)(c), Florida Statute (F.S.), requires the Department of Environmental Protection (DEP or Department) to utilize natural attenuation monitoring (NAM) or long-term natural attenuation monitoring (LTNAM) strategies.

Natural Attenuation is considered a strategy for site rehabilitation sometimes referred to as passive remediation. The following definitions for attenuation monitoring are provided in 376.301, F.S.:

(23) "Long-term natural attenuation" means natural attenuation approved by the department as a site rehabilitation program task for a period of more than 5 years.

(25) "Natural attenuation" means a verifiable approach to site rehabilitation that allows natural processes to contain the spread of contamination and reduce the concentrations of contaminants in contaminated groundwater and soil. Natural attenuation processes may include the following: sorption, biodegradation, chemical reactions with subsurface materials, diffusion, dispersion, and volatilization.

The governing statute and rule require consideration of source removal prior to commencement of other remedial action or natural attenuation monitoring, where it is warranted and cost-effective. If free product and/or significant areas of contaminated soil exist in the source area(s), cost-effective options for removal and proper treatment or disposal of such source material should be evaluated and considered prior to transitioning the site to NAM or LTNAM. However, it is not the intent of the Department to require that all instances of contaminated soil detected above cleanup target levels (CTLs) be addressed prior to transitioning to NAM or LTNAM. Technical considerations related to evaluation of contaminated soil have been outlined in Appendix A.

Per Section 376.3071(5)(c), F.S., the Department shall use NAM strategies when:

- It is cost-effective;
- The contaminant plume is stable or shrinking and confined to the source property boundaries; and
- The contaminants of concern (COCs) meet the natural attenuation default concentrations (NADCs) in the applicable DEP cleanup rules.

Additional provisions associated with Section 376.3071(5)(c), F.S., include:

- A requirement for the Department to evaluate the cost of NAM or LTNAM.
- Authorization for sites that are not eligible for State restoration funding (non-program sites) to transition to NAM or LTNAM using the same criteria.
- Criteria for initiation or resumption of active remediation during NAM or LTNAM, including an evaluation for significant contaminant reduction after 42 months.
- A statement that nothing in this section of the statute shall preclude a site from pursuing No Further Action (NFA) with conditions.
- A requirement for the Department to evaluate the cost-effectiveness and protectiveness of higher NADCs for NAM or LTNAM, including an evaluation of supporting site-specific characteristics.
- Clarification that if the contaminant plume is beyond the source property boundaries, NAM or LTNAM may be conducted in accordance with Department rule.

Chapter 62-780.690, F.A.C. provides additional information on when NAM and LTNAM may be conducted when the the contaminant plume is beyond the source property boundaries or when levels exceed NADCs.

Specific procedures for implementation of NAM or LTNAM requirements, based on the requirements of both F.S. and F.A.C., are outlined below.

I. NAM or LTNAM Site Qualification Criteria

Following completion of the site assessment and technically feasible and cost-effective source removal activities in accordance with Chapter 62-780, F.A.C., petroleum contamination sites may commence NAM or LTNAM if they meet the following criteria per Chapter 62-780.690(1), F.A.C.:

1. The site does not meet the unconditional NFA criteria of subsection 62-780.680(1), F.A.C. (if it does, the Site Rehabilitation Completion Order should be pursued);
2. Free product (FP) as defined in Chapter 62-780, F.A.C., is not currently present;
3. Contaminated soil is not present in the unsaturated zone (potential exceptions discussed in Appendix A);
4. The available data shows an overall decrease in the contamination;
5. The groundwater contaminant plume is not migrating beyond the temporary points of compliance (TPOCs), which may be the source property boundaries, nor vertically;

6. The COCs and their transformation products are conducive to natural attenuation; and,
7. One of the following sets of additional criteria are met:
   i. Additional "Level 1" criteria as follows:
      - Site is anticipated to meet closure goals as a result of natural attenuation;
      - Background concentrations or applicable CTLs are not exceeded at the TPOCs; and,
      - COCs are at, or below, the NADCs referenced in Table V of Chapter 62-777, F.A.C.; or,
   ii. Demonstrate the appropriateness of NAM or LTNAM by the following "Level 2" criteria:
      - A technical evaluation verifies that the COCs have the capacity to degrade under site-specific conditions;
      - Preparation of a scientific evaluation of plume migration relative to TPOCs; an estimation of expected annual reductions in COCs in monitoring wells; and an estimation of the time required to meet closure goals; and,
      - A life-cycle cost analysis of remedial alternatives.

II. Implementation of NAM or LTNAM

A. Frequency of Monitoring Events & Reporting

The specific monitoring wells, contaminants to be analyzed for, action levels for all applicable COCs and associated monitoring wells, frequency of sampling during monitoring, expected annual reductions, along with respective estimation of timeframe for achieving closure goals, should all be outlined in a NAM Plan and submitted to the Department for review and approval. Proposed revisions to NAM Plans (e.g., technically justified cost-effective sampling plan reductions) may be submitted to the Department for review and approval.

The default sampling frequency should be quarterly during the first year to confirm that qualifying conditions are maintained, regardless of whether a site is entering NAM or LTNAM after site assessment or transitioning to NAM or LTNAM after operation of an active remediation system. If deemed appropriate, sampling may then taper off to longer intervals of four to six months, and, for site-specific instances (e.g., funding constraints), annually. Seasonal changes in groundwater elevation should be evaluated when establishing the specific monitoring schedule to include months that historically had the highest COC concentrations.

If significant prior monitoring data exist for a particular site, including but not limited to, sites that have completed 12 months (i.e., four quarters) of Post Active Remediation Monitoring (PARM), the monitoring frequency may be reduced based on professional judgment with written approval from the Department.

Following each monitoring event, the site conditions should be compared to the NAM or LTNAM criteria to confirm the site still meets the criteria for NAM or LTNAM as a remedial strategy.

B. Compliance Monitoring following Injections

Sites entering NAM or LTNAM that are subject to post-biological or post-chemical application/ injection compliance verification monitoring as required by the Underground Injection Control (UIC) or other program must incorporate the applicable monitoring requirements into the NAM Plan, as applicable. Please see the BPSS-10, Remedial Action Plan Guidelines, In Situ Chemical Additives, most current version; specifically, Paragraph 12 of BPSS-10 provides guidance on the initiation of NAM and LTNAM following application of remediation products with respect to injections and Active Remedial Action Monitoring.

C. TPOC Noticing

If TPOCs beyond the source property boundaries are used for NAM or LTNAM, the notification requirements for TPOCs apply.

III. NAM or LTNAM Evaluation & Suspension Criteria

A. Failure to Meet NAM or LTNAM Qualification Criteria & Confirmation Steps

At any time during the implementation of NAM or LTNAM, if the site fails to meet the applicable NAM or LTNAM qualification criteria outlined in Chapter 62-780.690(1), F.A.C., appropriate actions should be undertaken. However, if the site experiences an exceedance of Action Level(s) due to one set of analytical data or free product measurement, then subject to professional judgement and with concurrence from the Department in writing, a confirmation sampling or measurement event may be conducted within 30 days. In these cases, confirmation data would be considered prior to making any decisions to stop or suspend NAM or LTNAM and pursue other actions.

B. Evaluation of Site Rehabilitation Progress During NAM or LTNAM

Where prior PARM or NAM data do not exist, it is important to perform a detailed evaluation of the site after the first two quarters of NAM or LTNAM to determine if the contaminant plume has significantly rebounded above Action Levels or is beginning to migrate beyond the TPOC(s). After the first two quarters of NAM or LTNAM, and at a minimum annually thereafter, data should be extrapolated to confirm the following NAM Plan goals: 1) the cleanup objectives for the first 42 months of NAM or LTNAM will be achieved; and 2) the closure goals will be achieved within the estimated timeframe for achieving closure. If it appears that these goals may not be achieved within the applicable timeframes, evaluate if the site still meets the criteria for NAM or LTNAM.

C. Initiation or Resumption of Active Remediation

Per Section 376.3071(5)(c) F.S., if COCs are not significantly reduced after 42 months of monitoring, active remediation shall be resumed as necessary. And, per Chapter 62-780.690(1)(f) F.A.C., the natural attenuation criteria include confirmation that the site is anticipated to meet applicable closure criteria because of natural attenuation. Therefore, if the site no longer meets NAM or LTNAM criteria following confirmation sampling, or if it is determined that the site is not making significant site rehabilitation progress, then active remediation shall be resumed if necessary.

APPENDIX A

Soil Considerations for Natural Attenuation Monitoring in the Petroleum Restoration Program

A proper characterization and evaluation of soil contaminant concentrations and distribution is warranted prior to the implementation of NAM in accordance with Section 376.3071(5)(c), F.S. and Chapter 62-780.690(1)(b). Generally, the Level I Risk Management Option (RMO I) outlined in Chapter 62-780.680(1)(b), F.A.C. may be used as a guideline in determination of eligibility for NAM or LTNAM. This Appendix A is only applicable to sites which have had documented soil contamination that exceeds the applicable Soil Cleanup Target Levels (SCTLs) referenced in Table II of Chapter 62-777, F.A.C. and have not yet been determined to meet those SCTLs through additional soil sampling. Historically for circumstances in which the site assessment concluded with a determination that soil as well as groundwater contamination exist, investigation of the applicability of RMO I may have been deferred to the active remediation phase. However, if during the site assessment it is determined that the site meets the criteria for NAM or LTNAM for groundwater, the following supplemental considerations may be considered prior to approving the site assessment so that the site assessment can conclude with a recommendation regarding NAM, LTNAM, or active remediation.

I. Exceptions for Allowance of Initiation of NAM or LTNAM When Soil Contamination is Present

A. If the soil contamination is not accessible at this time for remediation (i.e., it is adjacent to or under tanks, a building or other structure) but will be at some point in the future, the site may implement NAM or LTNAM as an interim procedure until soil remediation may occur.

B. If the petroleum contaminants exceed the leachability SCTLs and do not pass SPLP, or exceed the calculated site-specific SCTLs based on soil properties, but the concentrations are at a level where the soil does not constitute a continuing source of contamination to the groundwater at concentrations that pose a threat to human health, public safety, and the environment, and it is demonstrated that the rate of natural attenuation of contaminants in the groundwater exceeds the rate at which contaminants are leaching from the soil, then case-by-case judgment can be used to begin NAM or LTNAM. This determination must be agreed upon by the consultant's Professional, the site manager representing DEP and the Professional representing DEP.

C. If soil contamination (exceedances of leachability-based SCTLs only) is only present onsite and in the smear zone, the viability of NAM or LTNAM should be determined on a case-by-case basis considering the probable effect the contamination will have on groundwater concentrations. Historical evidence of leaching during periods of groundwater depth fluctuations should be evaluated, and if little or no evidence of leaching is observed, the site may initiate NAM or LTNAM. If it is evident the contamination present in the smear zone has a direct effect on the groundwater concentrations, appropriate measures to remediate the smear zone contamination should be taken prior to NAM or LTNAM. If the smear zone (wholly or partially) is considered vadose zone at the time achievement of closure goals are documented, this condition may require soil sampling (see next paragraph).

APPENDIX A

D. If soil contamination (exceedances of direct exposure and/or leachability-based SCTLs) is present onsite in the vadose zone at concentrations anticipated to naturally attenuate, the viability of NAM or LTNAM could be determined on a case-by-case basis considering the probable effect the contamination will have on groundwater concentrations and on the probability that all SCTLs will be achieved by natural attenuation in the same timeframe anticipated for natural attenuation of the groundwater. This scenario requires soil sampling prior to closure.