Petroleum Restoration Program
Florida Department of Environmental Protection

Remedial Action Plan (RAP) or Interim Source Removal Plan (ISRP) Checklist for use by the Petroleum Restoration Program (PRP) Site Managers

Instructions for RAP Checklist

For questions/clarifications, please contact either the PRP Chief or Assistant Chief Engineer.
Do not modify the document.

General Instructions and Purpose:

This RAP Checklist is ***GUIDANCE ONLY.*** It is intended to be used as a tool for PRP Site Managers reviewing RAPs and ISRPs to ensure all appropriate documents have been submitted. It is not intended to change or be a substitute for Chapter 62-780 of the Florida Administrative Code (F.A.C.).

This version of the RAP Checklist may, but is ***NOT REQUIRED*** to, be completed or submitted by the Contractor preparing the RAP instead of the February 3, 2004 version.

Unless otherwise indicated, for this RAP Checklist, RAP shall mean any level RAP/ISRP/RAP-MOD/LSRAP.

RAP = Remedial Action Plan. ISRP = Interim Source Removal Proposal.
LSRAP = Limited Scope RAP. RAP-MOD = RAP Modification.

This checklist may also be helpful for reviewing Pilot Test Plans (PTPs).

In addition to the Checklist - General tab (8 pages), the following tabs provide additional guidance for proposed remedial action(s):

- Excavations for Source Removal or Trenching, and Sheet Piling (3 pages)
- In-Situ Adsorption, Bioremediation, and/or Chemical Oxidation (In-Situ Adsorp/Bio/ChemOx) by Injection or Application to Excavation (4 pages)
- Remediation Systems - General, includes Infiltration Gallery section (4 pages)
- Remediation Systems - Air Sparge, Bioventing, and/or Soil Vapor Extraction (5 pages)
- Remediation Systems - Groundwater Extractions including Dewatering and Treatment/Disposal Options (5 pages)
- Ex-Situ Soil Treatment and Disposal options (1 page)

For example, if RAP proposes an Air Sparge/Soil Vapor Extraction (AS/SVE) System that includes an Infiltration Gallery, the following tabs/sections provide guidance for reviewing the RAP: RAP Checklist - General tab, Remediation Systems - General tab, and the Remediation Systems - Air Sparge, Bioventing, and/or Soil Vapor Extraction tab (applicable sections).

For each tab applicable to the RAP review, a "DEP/LP Review" column is provided for documenting information is included in, missing from, or not applicable to, the RAP.

Per Chapter 62-780, ISRPs prepared under Chapter 62-780.525 sections (4), (5)(c), and/or (5)(f) F.A.C. shall be prepared to the same level of engineering detail as a RAP with applicable sections signed/sealed by a PE.

For convential excavation ISRPs prepared under Chapter 62-780.525(5), to be signed and sealed by a PG, complete the RAP Checklist - General tab and applicable sections of the Excavation tab. Excavations requiring pilings/shoring/anchors or dewatering shall be signed/sealed by a PE.

For short term groundwater recovery ISRPs (e.g., dewatering) prepared under Chapter 62-780.525(3), to be signed and sealed by a PE, complete the RAP Checklist - General tab and applicable sections of the Groundwater Extraction tab.

Per Chapter 62-780.700(5) and (6), RAPs may propose the NAM criteria of Chapter 62-780.690 F.A.C.

Remedial Action Plan (RAP)[(1)] or Interim Source Removal Plan (ISRP)[(2)] Checklist

For all RAPs/ISRPs, use guidance on this tab and tabs for proposed remedial action.

This checklist also applies to convential excavation ISRPs[(3)] prepared under Chapter 62-780.525(5) F.A.C. and to short term groundwater recovery ISRPs (e.g., dewatering)[(4)] prepared under Chapter 62-780.525(3) F.A.C.

RAP/ISRP Date: _____

RAP/ISRP Type: RAP [ ] RAP-MOD [ ] LSRAP [ ]

ISRP under Chapter 62-780.525 F.A.C. with PE certification [ ] or PG certification [ ]

Pilot Test Plan (PTP) [ ]

Remedial Actions: Excavation [ ] Groundwater Recovery [ ] FP Removal [ ]

SVE [ ] AS [ ] NAM[(5)] [ ]

In-Situ Adsorption [ ] In-Situ Bioremediation [ ] In-Situ Chemical Oxidation [ ]

Infiltration Gallery [ ] Ex-Situ Soil Treatment/Disposal [ ] Other [ ]

_____

Site Type: Program [ ] Non-Program [ ] Voluntary [ ] CAP Exhausted [ ]

State Funding (if applicable): EDI [ ] PLRIP [ ] ATRP [ ] PCPP [ ] other [ ]

NOTES:

(1) Unless otherwise indicated herein, for this checklist, RAP shall mean any level RAP/ISRP/RAP-MOD/LSRAP.

(2) Per Chapter 62-780, ISRPs prepared under Chapter 62-780.525 sections (4), (5)(c), and/or (5)(f) F.A.C. shall be prepared to the same level of engineering detail as a RAP with applicable sections signed/sealed by a PE.

(3) For convential excavation ISRPs prepared under Chapter 62-780.525(5), to be signed and sealed by a PG, complete this tab and applicable sections of the excavation tab. Excavations requiring sheet/helical piling or dewatering shall be signed/sealed by a PE.

(4) For short term groundwater recovery ISRPs (e.g., dewatering) prepared under Chapter 62-780.525(3), to be signed and sealed by a PE, complete this tab and applicable sections of the groundwater extraction tab.

(5) Per Chapter 62-780.700(5) and (6), RAPs may propose the NAM criteria of Chapter 62-780.690 F.A.C.

FACILITY INFORMATION	
Facility ID Number: *(9 digit)*	
Facility Name:	
Location:	
Site Manager/ Tech Reviewer:	
Contractor Name:	
Special Circumstances:	

Remedial Action Plan (RAP)[(1)] or Interim Source Removal Plan (ISRP)[(2)] Checklist

DEP/LP Reviewer: Confirm applicable items have been addressed in the RAP/RAP-Mod/ISRP.

DEP/LP Review	ITEM
GENERAL - PRE-RAP	
	Pre-RAP/ISRP meeting was held and documented. The Responsible Party (RP/PRSR) and Property Owner, if different, were invited to attend the Pre-RAP/ISRP meeting, attended meeting and concur with planned remedial strategy, or declined opportunity to provide input.
	The RP/PRSR and Property Owner, if different, were offered to provide input on proposed RAP/ISRP. If requested by the RP/PRSR and/or Property Owner, if different, the RAP/ISRP was provided to RP/PRSR and/or Property Owner prior to or concurrently with submittal to DEP/LP.
GENERAL	
RAPs shall be prepared in accordance with Chapter 62.780.700 F.A.C. and applicable PRP RAP Guidelines (e.g., BPSS-10, etc.).	
ISRPs shall be prepared in accordance with Chapter 62-780.525 F.A.C.; and for ISRPs prepared under Chapter 62-780.525(4), (5)(c), and/or (5)(f) F.A.C., the ISRP shall include the same level of engineering detail as a RAP per Chapter 62-780.700 F.A.C.	
	RAP signed, sealed, and dated by Florida P.E. (per Section 471.025, FS); or, as applicable (select excavations), signed, sealed, and dated by Florida P.G.
	RAP includes Design Drawings that are full-scale depictions {Process Flow Diagrams do not take the place of scaled drawings}. For the RAP submittal, Design Drawings/Figures shall clearly indicate they are Design Drawings and 'Not For Construction.'
	Indication whether proposed RAP is for a discharge eligible for funding, non-program, or a voluntary cleanup.
	As applicable, if RAP is prepared under ~~a~~ Performance-Based Cleanup (PBC), a previous RAP exists, and the Contractor is changing (e.g., equote-PBC), a RAP Modification is submitted to assume applicable professional (PG/PE) responsibility for remedial actions.
	Statement of objectives, e.g., No Further Action (NFA) per Chapter 62-780.680 (1), (2), or (3) F.A.C., or NAM per Chapter 62-780.690 F.A.C., including cleanup target levels (CTLs) for all Contaminants of Concern (COCs) for all media and estimate of time to achieve objectives. For conditional NFA (e.g., RMO II or III), document property owner's acknowledgement of future institutional controls and/or engineering controls at cleanup completion.
	Statement that the RAP addresses cleanup of all COCs and all media (e.g., groundwater, soil, surface water, sediment, etc.). Summary listing technology proposed to address cleanup of each applicable media and category of COCs, e.g., lead. If impacts remain in select media (e.g., soil) but remediation not proposed, provide rationale for NFA or other as applicable.
	For impacted soils, use of SPLP, TRPH fractionation, and/or calculation of site specific SCTLs based on soil properties has been evaluated if applicable.
	If RAP does not address all COCs (e.g., cumene, trimethylbenzenes, etc.) and/or all media (e.g., soils), RAP shall include rationale for "no action" and, as applicable, include proposal to implement institutional and/or engineering controls {Chapter 62-780.700(3)(h) F.A.C.}, alternative CTLs (e.g., organoleptic exemption), and/or local ordinances, etc.
	As applicable, estimate of contaminant mass within vadose zone and/or in groundwater.

Remedial Action Plan (RAP)[(1)] or Interim Source Removal Plan (ISRP)[(2)] Checklist

	Per Chapter 62-780.700(3)(b) F.A.C., summarize Site Assessment Report (SAR) and any additional data obtained since its submittal (e.g., SSA, RAGR, RAIR, PARM, NAM, etc.).
	Per Chapter 62-780.700(3)(c) F.A.C., include an evaluation of the known production of breakdown contaminants or by-products resulting from bioremediation, oxidation, or other natural processes, as applicable.
	Summary of all historical groundwater sampling results for all discharge-applicable COCs analyzed and all historical/existing screening/sampling locations with most current results obtained within 270 days prior to submittal of RAP, in accordance with Chapter 62-780.700(3)(c) F.A.C.
	Comprehensive tabulations completed and at least one figure depicts all historical/existing groundwater screening/sampling locations including, but not necessarily limited to, temporary wells, groundwater grab samples, etc.
	Summary of all historical soil screening and analytical sampling results for all discharge-applicable COCs analyzed and all historical/existing screening/sampling locations. It is preferrable in support of a cost-effective RAP that the most current soil sampling results be obtained within five (5) years prior to submittal of RAP, but this is not specifically required by Rule.
	Comprehensive tabulations completed and at least one figure depicts all historical soil screening/sampling locations.
	Summary of all historical surface water and/or sediment sampling analytical results for all discharge-applicable COCs analyzed and all surface water and/or sediment sampling locations.
	Comprehensive tabulations completed and at least one figure depicts all historical surface water and/or sediment sampling locations.
	As applicable, summarize any prior active remediation information/conclusions including dates, treatment area, and details of any source removals (e.g., areal depiction, square footage, and depth, and volume of impacted soils removed) and/or other active remediation (e.g., system type, start-up and shutdown dates, injection materials/volumes/intervals/ROIs and dates, etc).
	As applicable, summarize results from Pilot Testing or bench tests including correlation between results and full-scale design.
	Design Drawings shall clearly depict with isoconcentration lines the delineated extents of plume(s) associated with the discharge(s) for all applicable COCs and all media, including extents of Free Product. Extents of soil impacts should be delineated using both OVA measurements and analytical results. Free Product delineation shall show thickness of Free Product. Design Drawings shall clearly depict areas where trenching may intersect petroleum-impacted soils and groundwater and methodology for excavating, managing, handling, and proper disposal of those soils/groundwater.
	Identification and depiction on site plan of underground utility locations including identification of those which may enhance transport of contaminants or interfere with implementation of RAP.
	Applicable local, state, and federal permits (e.g., NPDES, UIC, Air Permit, ROW permit, building permits, etc.) to be obtained, and conditions stated.

	Methods for proper transportation, treatment, storage, and disposal, as applicable, including, but not limited to, manifesting and "cradle to grave" tracking of contaminated or potentially contaminated wastes of any kind {e.g., source removal (impacted soil and/or groundwater, free product, etc.), investigative derived waste (IDW), hazardous wastes (e.g., ignitable, corrosive, reactive, toxic, or petroleum refining waste, etc.), construction/demolition wastes, etc.)} that may be directly or indirectly generated. Specifies requirements for performance by licensed or certified contractors/subcontractors as applicable.
	Schedule/timeline for implementation of RAP including, as applicable, noticing, construction sequencing, active remediation and monitoring (e.g., system operation and monitoring), post active remediation monitoring, and reporting.
	Proposed schedule for documentation (e.g., photographs) and reporting during RAP implementation including type of reporting (e.g., Record Drawings, Monitoring Reports, etc.).
	Proposed basis for determining when active remediation will be discontinued.
	RAP shall include a preliminary PARM Plan in accordance with Chapter 62-780.750 F.A.C. or, if applicable, NAM Plan in accordance with Chapter 62-780.690 F.A.C., including monitoring points/parameters and frequency. If not included, RAP shall state that a PARM Plan will be submitted when RAP goals or leveling-off criteria have been met.
	As applicable, recent site visit confirmed status of existing monitoring and system wells (e.g., recovery wells, air sparge wells, monitoring wells, injection wells, etc.) and existing system components.
	Does the facility need to upgrade tanks soon?
	Cost estimate for implementation of the RAP through acheivement of closure goals and discussion of cost-effectiveness. Costs for implementation of RAP and evaluation of cost-effectiveness shall be for costs to achieve closure goals (e.g., RMO I, II, or III).
	Statement that signed and sealed as-built (record) drawings will be provided.
	Safety (items applicable to fire, explosion, toxicological and safe handling of chemicals, etc.) may include, but are not necessarily limited to, those listed below:
	Sunshine One Call.
	Safety Data Sheets (formerly MSDSs).
	Observance of National Electrical Code (typically Series 500 articles for Class I, Group D, Division 1 or 2 hazardous area requirements) (for electrical equipment items located in a hazardous area).

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NOTICING	
	Potable water considerations: • method of potable water supply to site and surrounding area • locations of private wells within ¼ mile, public wells within ½ mile radius of site • FDEP district office drinking water program has been notified if groundwater contamination may affect any public or private well. Method of notification, person notified, and date.
	If Temporary Point(s) of Compliance (TPOCs) are proposed beyond the source property boundary, indicate TPOC(s) on site plan.
	If TPOCs are proposed beyond the source property boundary, the TPOCs have been reviewed/approved by DEP/LP and the TPOC Noticing has been, or will be, initiated (Provisional Approval of RAP).
	The TPOCs were reviewed/approved by DEP/LP, and the TPOC Noticing has been completed and documented including associated dates for 30-day comment period. Issue RAP Approval Order following completion of noticing. The RAP Approval Order shall include the paragraph that defines the TPOC wells and sampling schedule.
	As applicable, RAP schedule includes 5-year status update for TPOC noticing.

RATIONALE FOR THE ACTIVE REMEDIATION METHOD(S) SELECTED	
In accordance with Chapter 62-780.700(3)(d) F.A.C., explain rationale for the active remediation method(s) selected, including the following at a minimum:	
	Results from Pilot Testing or bench tests {Chapter 62-780.700(3)(d)1. F.A.C.} with focus on information pertinent to full-scale design.
	In accordance with Chapter 62-780.700(3)(d)2. F.A.C., present results of an evaluation of remedial alternatives, including source removal, and a discussion of why other remedial alternatives considered were rejected, based on the following criteria:
	Long-term and short-term human health and environmental effects.
	Implementability, including but not limited to, ease of construction, site access, permiting.
	Operation and maintenance requirements.
	Reliability.
	Feasibility.
	Estimated time required to achieve closure goals.
	Cost-effectiveness of proposed approach when compared to other site remediation alternatives (e.g., NAM, source removal, etc.) including but not limited to, as applicable, installation, operation, maintenance, monitoring (e.g., PARM, NAM), etc. Cost-effectiveness shall be evaluated for costs to achieve closure goals (e.g., RMO I, II, or III).
	Summary of alternatives discussed and/or alternatives selected during pre-RAP conference.

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ACTIVE REMEDIATION MONITORING - PLUME(S) & EFFECTIVENESS OF REMEDIATION	
	Baseline sampling performed/proposed is sufficient to evaluate effectiveness of remedial action.
	Per Chapter 62-780.700(3)(g)2. F.A.C., provide description of the methodology proposed to evaluate the effectiveness and efficiency of the remediation system. Remediation system shall include any form of active remediation including air sparge, soil vapor extraction, multi-phase extraction, injections including direct push, groundwater extraction, etc.
	Per Chapter 62-780.700(3)(g)2. F.A.C., provide active remediation (process/progress) monitoring plan including representative number of monitoring points (all media as applicable), parameters/COCs to be monitored at each point, and frequency.
	If cleanup expected to last greater than (>) two (2) years, groundwater monitoring plan includes quarterly monitoring for first year and may be performed semi-annually thereafter, at a minimum.
	If cleanup expected to last less than (<) two (2) years, monitoring plan includes quarterly monitoring.
	At least one well located at downgradient edge of plume.
	At least one well located in source area or area of maximum contamination or directly adjacent if area inaccessible.
	Per Chapter 62-780.700(3)(g)3. F.A.C., in order to redefine plume and evaluate effectiveness and efficiency of remediation system, the active remediation monitoring plan shall include a representative number of currently and previously contaminated monitoring wells, parameters/COCs to be monitored at each well, and frequency (minimum annually).
	Per Chapter 62-780.700(3)(g)4. F.A.C., active remediation monitoring plan shall include representative number of monitoring points for water-level data during groundwater sampling events. Representative number shall be sufficient to provide groundwater elevation contour map.
	For RAPs including In-Situ Adsorption, Bioremediation, and/or Chemical Oxidation (e.g., injections), active remediation (process/progress) monitoring plan shall include:
	All monitoring in accordance with Underground Injection Control (UIC) Order or Variance for Zone of Discharge (ZOD), as applicable.
	Conditions/criteria for determining active remediation monitoring versus PARM/NAM. See the BPSS-10, Remedial Action Plan Guidelines, In Situ Chemical Additives, most current version; specifically, Paragraph 12 of BPSS-10.
	Monitoring parameters listed in the Regulatory Information enclosure of the Variance for ZOD or ITAP acceptance letter (See In-Situ Adsorp/Bio/ChemOx tab), as applicable.
	Proposed monitoring methodology/points shall be representative of applicable media conditions; maintain appropriate/applicable distance between treatment points and monitoring points (e.g., see Paragraph 11 of BPSS-10). This applies to both air and material/product injections.

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SITE ACCESS	
	Property owners for source property and non-source properties, as applicable, confirmed to match source property and non-source property site access agreements (SAAs).
	Indicate if new/updated source or non-source property SAAs needed.
	Indicate if Right of Way (ROW) permits will be required.
SITE PREPARATION - GENERAL	
	Temporary stormwater controls and discharge including applicable National Pollutant Discharge Elimination System (NPDES) Permit.
	Any demolition and proper transport/disposal/documentation of demolition materials (e.g., asphalt/concrete pavements, etc.).
	Maintenance of Traffic (MOT) Plans (vehicular and pedestrian), Details, Schedules, Ingress/Egress of Construction Vehicles, and Permitting.
	Depicted locations of and means for protection of property owner/tenant and adjacent property owner/tenant property, including Rights-of-Way (ROWs), including, but not limited to, structures, surfaces (e.g., pavements, grass), fencing, all utilities, etc.
	Depicted locations of and means for protection of existing remediation system components and monitoring points (e.g., existing air sparge wells and piping, existing monitoring wells, etc.).
	Erosion and sedimentation control.
	Site access and safety (during construction) including, but not limited to, the following: temporary fencing and gate(s) (minimum 6-foot height), locks; temporary access drives; lighting, if applicable; barricades; security guards, if applicable; etc.
	Fencing of remediation system compound and/or treatment area, as applicable, unless public access is restricted by access, institutional or engineering controls.
NATURAL ATTENUATION MONITORING	
	See PRP Natural Attenuation Monitoring (NAM) Plan Checklist.
LEAD (This section may be adapted to other heavy metals if necessary.)	
	Discussion of area(s) where groundwater Lead concentration exceeds applicable CTL.
	Tabulated Lead concentrations (ppb): unfiltered (____); filtered (____); background (____).
	Proposal for Lead removal by filtration if unfiltered sample is greater than CTL and filtered sample is less than CTL.
	Method of Lead removal, including pertinent design calculations.
	If Lead (or other heavy metals) will not be removed by filtration, then provide details of proposed treatment.

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FREE PRODUCT REMOVAL	
	For free product recovery methods/conditions listed under Chapter 62-780.525(2)(c) F.A.C. {e.g., dewatering or groundwater extractions that may influence the depth to water table, recovery exceeding the petroleum contact water to product ratio (PCW:FP) of 2:1, etc.}, an ISRP is required (or proposed in RAP/RAP-MOD). The ISRP/RAP shall include the results of an evaluation performed to determine the potential for product smearing or spreading and the potential for air emissions. If the PCW:FP ratio of 2:1 will not be met using the proposed methodology, technical justification for proposed methodology compared to other potentially more cost-effective alternatives (e.g., excavation, absorbent pads, skimmer pumps, bailing, etc.) is provided.
	Free product plume delineation.
	Description/design details of free product recovery and temporary storage system including, but not limited to:
	Oil/water product separator sizing calculations and detention time.
	Free product storage tank sizing calculations.
	Proposed high level in product tank and automated product pump shut-down.
	Safety considerations including, but not limited to, static electricity.
	Proposed proper disposal and safe handling of flammable free product.

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Guidance for Excavations for Source Removal or Trenching, and Sheet Piling

If a remediation product will be applied to an excavation, see also In-Situ Adsorp/Bio/ChemOx tab.

If Dewatering, see also Groundwater Extraction tab.

FACILITY INFORMATION	
Facility ID Number: *(9 digit)*	
Facility Name:	

DEP/LP Reviewer: Confirm applicable items have been addressed in the RAP/RAP-Mod/ISRP.

DEP/LP Review	**ITEM**
REMEDIAL ACTION - TECHNOLOGY SPECIFIC DETAILS	
COMPLETE THESE SECTION(S) AS APPLICABLE	
EXCAVATION FOR SOURCE REMOVAL OR TRENCHING - GENERAL	
This section applies to **ALL** exavations of any volume by conventional, Large Diameter Auger (LDA) or other method, for either source removals or trenching for system installations.	
	If remediation product will be applied to the excavation, the In-Situ Adsorp/Bio-ChemOx tab has also been completed.
	If dewatering proposed, the Groundwater Extraction tab has also been completed.
	Method(s) of excavation including method of excavation extending below water table.
	Method(s) for controlling dust and odors.
	Method(s) for minimizing contamination of clean areas and run-off (e.g., excavated soil stockpiled on plastic liner and covered with plastic liner, etc.).
	Scaled depiction of excavation including, as applicable, sloping. As applicable, depict location(s) of any proposed sheet/helical pilings and/or dewatering points. Depiction shall include proposed depth(s) of excavation (e.g., areas of excavation may have varying depths) and proposed maximum depth of excavation. For conventional excavation, define the maximum side-slopes of excavation.
	Design Drawings are scaled depictions of plan view and standard details as applicable, but not limited to, the following: backfill, trenching, pipe bedding, proposed laydown areas (e.g., staging excavation equipment, stockpile excavation soil or roll-offs, stockpile clean backfill, decontamination activities, etc.), and/or paving cross sections. Design Drawings/Figures shall clearly indicate they are Design Drawings and 'Not For Construction.' However, if Source Removal Proposal for conventional excavation includes drawings that will be used to perform the work of conventional excavation only (i.e., separate contruction drawings will not be created), the drawings may be signed/sealed by PG or PE for construction.
	Scaled depiction of asphalt and/or concrete pavement to be removed and replaced.
	Calculations of the following:
	Volume of impacted soil to be excavated (source removals and trenching as applicable).
	Volume of soil to be excavated and used as backfill on site.
	Volumes of backfill from off-site source(s).

	Areal square footage of asphalt and/or concrete pavement to be removed and replaced.
	Areal square footage and description of grass/sod to be removed and replaced.
	Tonnage of soil to be transported and disposed.
	Tonnage of soil to be used as backfill.
	Areal square footage of bottom of excavation and areal square footage of top of excavation.
	Method(s) of backfilling and compaction including methods of backfilling extending below water table. For conventional excavation/backfilling, details of backfilling/compaction methods shall include, but not be limited to, the following:
	Lift shall be defined and lift height(s) of loose or compacted lifts specified.
	Methods for compaction (e.g., compaction at maximum dry density, etc.).
	Type(s) of backfill material including flowable fill (e.g., common fill, select fill, sand fill, granular fill, rock, etc.) including, but not limited to, soil classifications, gradation, conditions under which each type of backfill is to be used (e.g., grassy areas, paved areas, roadways, etc); and desired permeability {e.g., match surrounding/native soils, more/less permeable than surrounding/native soils, maximum permeability (e.g., permeable versus impermeable wall), etc.}. Construction debris shall not be used as backfill.
	Methods and frequency of testing backfill materials (e.g., sieve analysis, soil classification, contaminants of concern in accordance with PRP guidance documents, etc.) and the specific requirements that shall be met. Specifications shall include proposed method for addressing areas represented by tests that fail to meet the specified requirements.
	For conventional excavation/backfill, including trenching, methods and frequency of testing compaction and the specific requirements that shall be met (see PRP Standard Specification Details) including, but not limited to, the following:
	Number of tests per lift (e.g., minimum one per lift).
	Method(s) of testing (e.g., ASTM D 1557 Standard Proctor or Modified Standard Proctor).
	Frequency of compaction testing (e.g., not less than one per lift and not less than one per day).
	Compaction requirements to be met (e.g., 95%, 98%, or other percent of maximum dry density). Contractor shall provide documentation supporting specified compaction requirements including documentation of discussion with property owner and developer, as applicable. If property owner/developer does not have compaction requirements, Contractor shall use best practice for specifications.
	Statement that the compaction testing shall be performed by a third-party at random locations.
	Requirement that the approximate locations of compaction testing shall be depicted on a record drawing site plan.
	Proposed method for addressing areas represented by tests that fail to meet the specified requirements.

	For LDA excavation:
	Proposed extents of LDA excavation encompass impacted area/depth delineated by soil screening/sampling at intervals sufficient to reliably delineate edge of excavation where applicable CTLs will be met (i.e., sufficient for closure documentation).
	Flowable fill design/specifications shall include, but not be limited to, mix design including allowable materials, compressive strength, permeability requirements, minimal subsidence and shrinkage requirements, flow consistency requirements, and requirement for certification that materials incorporated do not represent a threat to groundwater quality.
	Methods and frequency of testing flowable fill and the specific requirements that shall be met. Specifications shall include proposed method for addressing areas represented by tests that fail to meet the specified requirements.
	If structural element to LDA excavation, the submittal shall be signed, sealed, and dated by Florida P.E. for which design of structural LDAs is in their area of practice.
	Standard Details - cross sections, as applicable, for Trench/Excavation, Backfill, Pipe Bedding, Pavement, etc.
	As applicable, design/specifications for replacement asphalt and/or concrete pavements including sub-base and base courses. At a minimum, design/specifications shall provide in-kind replacement for, but not limited to, strength requirements and thickness of each applicable layer.
	As applicable, design/specifications for replacement grass/sod including topsoil. At a minimum, design/specifications shall provide in-kind replacement.
EXCAVATIONS - SHEET/HELICAL PILING OR ANCHORS	
As applicable, provide design calculations, drawings (plans and standard details), and specifications for sheet/helical piling/shoring system, including helical anchors as applicable, in accordance with industry standards and regulations for the proposed work.	
	Geotechnical evaluation performed prior to foundation support or excavation support design.
	The submittal for sheet/helical piling/shoring/anchors shall include, but not be limited to, the following:
	Schedule for piling/shoring/anchor activities.
	Proposed locations and depths of piles, shoring, and/or anchors.
	The submittal shall be signed, sealed, and dated by Florida P.E. for which design of pilings/shoring/anchors is in their area of practice.
EXCAVATIONS FOR SOURCE REMOVAL	
	Proposed soil screening and sampling plan including methodology for expanding excavation based on results and methodology for meeting the requirements for confirmation soil sampling for closure. Applies to conventional and LDA excavations.

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Guidance for In-Situ Adsorption, Bioremediation, and/or Chemical Oxidation

Including Application by Injection and to Excavations

FACILITY INFORMATION	
Facility ID Number: *(9 digit)*	
Facility Name:	

DEP/LP Reviewer: Confirm applicable items have been addressed in the RAP/RAP-Mod/ISRP.

DEP/LP Review	ITEM
	REMEDIAL ACTION - TECHNOLOGY SPECIFIC DETAILS
	COMPLETE THESE SECTION(S) AS APPLICABLE
	GENERAL - APPLICATION TO EXCAVATION (OPEN PIT) OR INJECTION (INCLUDING DIRECT PUSH AND LDA).
	As applicable, Chemical Oxidation, Bioremediation, or Adsorption & Bioremediation section completed.
	Volume of remediation product to be used has taken into account potential for elevation of non-discharge related exceedances of CTLs (e.g., TDS, iron, etc.).
	If remediation product formula is proprietary then non-disclosure of the formula to the PE reviewing the RAP for the Department is only acceptable if there is an innovative technology acceptance letter issued by the State of Florida's Innovative Technology Acceptance Program with an attached proprietary voucher of confidential disclosure and it is verified that the proposed application rates (dosage) is limited to the rates specified in the innovative technology acceptance letter. **ITAP acceptance is only valid for ten (10) years from the date of acceptance letter.** The ITAP acceptance letter is attached as applicable.
	Variance for Zone of Discharge (ZOD) attached, if applicable.
	Draft UIC Notification Memorandum attached, if applicable. Information in UIC Notification Memorandum matches information in RAP and ITAP acceptance letter as applicable.
	Scaled depiction of ZOD.
	Monitoring Plan may include, but not necessarily limited to, the following:
	See Section "Active Remediation Monitoring - Plume(S) & Effectiveness Of Remediation" on RAP Checklist General tab.
	Monitor the parameters listed in the Variance for ZOD or Regulatory Information enclosure of the ITAP acceptance letter, as applicable.
	Monitoring of soils and groundwater, as applicable.
	Analyses necessary for any of the following that apply: compliance with the UIC regulations of Chapter 62-528; compliance with Rule 62-522.300(2)(c); and/or, compliance with the terms of a zone of discharge variance.
	Analysis for more than just the reagents may be necessary, depending on the situation. In some cases, if there are environmental or toxicological concerns, it may be necessary to include analysis for intermediate degradation products of the reagents, or intermediate by-products formed by the interaction of those reagents with the petroleum contaminants of concern at a site.

	Other samples and operating parameter measurements for evaluating collodial carbon applications, often applied with electron acceptor blends, may include, but are not necessarily limited to the following: sampling in accordance with the FDEP Sampling Protocol for Cleanup Projects Using In-Situ Activated Carbon Injections.
	Other samples and operating parameter measurements for evaluating bioremediation may include, but are not necessarily limited to the following: pH, DO, ORP, nitrate, sulfate, methane, carbon dioxide, TOC, total/dissolved iron, total/dissolved manganese, sulfide, COD, BOD, microorganism counts.
	Other samples and operating parameter measurements for a chemical oxidation project may include, but are not necessarily limited to the following: pH, DO, ORP, Temperature, and Alkalinity.
GENERAL - APPLICATION TO EXCAVATION	
	Number and depth(s) of excavation(s).
	Scaled layout of all excavation area(s) proposed for product application including depiction of potential area(s) of influence of product (i.e., distance beyond limits of excavations).
	Total amount (e.g., total volume) of product applied to each excavation area.
GENERAL - APPLICATION BY INJECTION (INCLUDING DIRECT PUSH AND LDA)	
	If applicable, Remediation Systems - General tab completed.
	Number and construction details of injection points/wells (e.g., diameter, depth, type-horizontal/vertical, screen interval, etc.).
	Scaled layout of all proposed injection points/wells, and/or excavation area(s) including depiction of radii of influence (ROIs).
	Locations-layout and intervals of injection points/wells and ROIs commensurate with horizontal and vertical extents of contamination for adequate horizontal and vertical coverage.
	Injection pump develops adequate pressure and flow rate for injection, for the site-specific conditions.
	Number of injection events.
	Injection volume per point/well per injection event; and, the total injection volume (i.e. the total for all injection wells, all injection events).
	Concentration of remediation product at point of injection and in aquifer.
	Application method(s) that provide reasonable assurance there will be no undesirable migration of the injected remediation product, by-products, nor petroleum COCs (i.e., no plume migration).
	Sufficient information provided for underground injection control (UIC), as required by Chapter 62-528 F.A.C., for a state or local program reviewer to fill out the UIC notification memorandum titled "Proposed Injection Well(s) for In Situ Aquifer Remediation at a Petroleum Remedial Action Site". This includes, but not limited to, the following information:
	Chemical analysis (composition) of the fluid to be injected. Note: The injected fluid must meet primary and secondary drinking water standards of Chapter 62-550 F.A.C., and the minimum groundwater criteria of Chapters 62-520 and 62-777 F.A.C., otherwise Rule 62-522.300(2)(c) may apply and/or a zone of discharge variance may be necessary.

Remedial Action Plan (RAP) or Interim Source Removal Plan (ISRP) Checklist

Guidance for In-Situ Adsorption, Bioremediation, and/or Chemical Oxidation

IN SITU ADSORPTION & BIOREMEDIATION (e.g., COLLOIDAL CARBON AND ELECTRON ACCEPTORS)	
	Application method identified (e.g., injection, addition to excavation, etc.).
	Aerobic or anaerobic.
	Enhanced bioremediation by addition of electron acceptors (e.g., nitrate, sulfate, etc.).
	Evaluation of potential need for concurrent injection of stabilizing product to positionally stablize colloidal carbon (e.g., sandy aquifers).
	Dosage (of colloidal carbon and of electron acceptors, per pound of hydrocarbon contaminants to be biodegraded). (Some products may express dosage as a required amount per cubic yard of contaminated media.)
	Anticipated schedule of injection events for colloidal carbon and/or electron acceptors (i.e., the timing and frequency of injections over the life of the project) including supplemental injections of electron acceptors.
	Provide additional oxygen, if necessary, if the bioremediation is aerobic and site's groundwater is lacking in dissolved oxygen. If applicable, specify method by which additional oxygen will be delivered. If method of delivery is mechanical (e.g., air sparge, O2 injection, iSOC, etc.), see applicable section(s) of checklist. If oxygen is supplied chemically (e.g., magnesium peroxide, calcium peroxide, hydrogen peroxide, etc.) see applicable section(s) of checklist.
	Clear flush of monitoring wells is not allowed/proposed.
IN SITU BIOREMEDIATION	
	Application method identified (e.g., direct-injection; recirculating/re-injection type system; addition to excavation pit).
	Aerobic or anaerobic.
	Stimulation of indigenous microorganisms or addition of microorganisms.
	Dosage (of nutrients and/or microorganisms, per pound of hydrocarbon contaminants to be biodegraded). (Some bioremediation products may express dosage as a required amount per cubic yard of contaminated media.)
	Anticipated schedule of injection events for nutrients and/or microorganisms (i.e., the timing and frequency of injections over the life of the project).
	Provide additional oxygen, if necessary, if the bioremediation is aerobic and site's groundwater is lacking in dissolved oxygen. If applicable, specify method by which additional oxygen will be delivered. If method of delivery is mechanical (e.g., air sparge, O2 injection, iSOC, etc.), see applicable section(s) of checklist. If oxygen is supplied chemically (e.g., magnesium peroxide, calcium peroxide, hydrogen peroxide, etc.) see applicable section(s) of checklist.

Remedial Action Plan (RAP) or Interim Source Removal Plan (ISRP) Checklist

Guidance for In-Situ Adsorption, Bioremediation, and/or Chemical Oxidation

IN SITU CHEMICAL OXIDATION	
	Application method identified (e.g., direct-injection; recirculating/re-injection type system; addition to excavation pit).
	Anticipated flow rates, by interval/zone as applicable; temperatures; pressures; pH; etc.
	Amount of reagents required per pound of hydrocarbons to be destroyed (theoretical amount, actual amount).
	Anticipated schedule of injection events for reagents (i.e., the timing and frequency of injections over the life of the project).
	Safety (items applicable to fire, explosion, toxicological and safe handling of chemicals) may include, but are not necessarily limited to those listed below:
	Safety data sheets (formerly MSDSs), toxicity, or other information pertinent to the chemicals and catalysts involved.
	Safe handling of chemicals: avoidance of mixing, premature mixing, or improper storage of incompatible chemicals.
	Lower Explosive Level (LEL) considerations.
	Potential for vapor migration, either passively or by convection, or driven by air or other gases used, or generated by the heat of exothermic chemical reactions or the vaporization of free product by such heat.
	The minimum tolerable distance between underground storage tanks and product piping and any in situ heat-generating process.
	The need to replace the flammable contents of petroleum storage tanks and their associated piping with non-flammable inerts such as nitrogen or carbon dioxide, to reduce risk of fire and explosion.
	Observance of National Electrical Code (typically Series 500 articles for Class I, Group D, Division 1 or 2 hazardous area requirements) (for electrical equipment items located in a hazardous area).
	Appropriate chemical-resistant and/or spark-resistant materials of construction for equipment items.
	Personal protection of workers.
	Safety considerations regarding neighbors and passersby.

Petroleum Restoration Program

Remedial Action Plan (RAP) or Interim Source Removal Plan (ISRP) Checklist

Guidance for Remediation Systems - General

This tab also includes Infiltration Gallery Section

FACILITY INFORMATION	
Facility ID Number: *(9 digit)*	
Facility Name:	

DEP/LP Reviewer: Confirm applicable items have been addressed in the RAP/RAP-Mod/ISRP.

DEP/LP Review	ITEM
	REMEDIAL ACTION - TECHNOLOGY SPECIFIC DETAILS
	COMPLETE THESE SECTION(S) AS APPLICABLE
	REMEDIATION SYSTEMS - GENERAL
	This section applies to **ALL** remediation systems (e.g., AS/biosparge systems, SVE systems, MPE systems, injection systems, groundwater recovery systems, etc.) including method/system for controlling air emissions.
	Adequate power confirmed to be available. Type of available power versus specified power requirements evaluated and addressed as applicable (e.g., single-phase, 3-phase, none, etc.).
	Ability to obtain applicable power hook-up confirmed and estimated cost.
	Basis of design provided/summarized for all elements including, but not limited to:
	Equipment/systems for control of air emissions.
	All system component/equipment sizing calculations.
	Design and operating parameters and ranges for system and all equipment (e.g., pumps, blowers, carbon vessels, etc.) and instrumentation (e.g., flow meters, pressure/vacuum gauges, etc.).
	Units of all gauges specified.
	All proposed system components (e.g., piping, tanks/vessels, treatment wells, electrical, instrumentation, mechanical/equipment, concrete pads, supports for piping/equipment, etc.) designed/specified, sized, and connected appropriately for the efficient operation of the remedial system.
	Proposed system equipment/metering includes, but not limited to, hour meters, flow meters, sample ports, pressure gauges, and vacuum gauges for all critical components, including individual wells if necessary for optimization of system efficiency.
	Design Drawings are scaled depictions (plan view layout and standard details including cross-sections, typical well detail, etc.) of the full system layout including, but not necessarily limited to:
	All treatment points (e.g., bioventing wells, air sparge wells, soil vapor extraction wells, injection points/wells, etc.) including the depths, quantity, footage, borehole and well diameters, seal and sandpack materials, above/below grade, screen intervals, target zones/intervals, etc.
	All system piping, including electrical conduit, cleanouts, manways, stub-ups (capped as applicable), and header assemblies.

	All system valving and instrumentation (e.g., flow meters, gauges, valves, controls, sample ports, etc.). Specifications include and scaled Design Drawings clearly depict the measurements for straight lengths of pipe provided before and after instrumentation as recommended by manufacturer.
	All potential obstructions to system design have been considered {e.g., trees, buildings, swales, below- and above-ground utilities, facilities (existing USTs/dispensers/etc.)}.
	Specifies construction materials for all treatment points/wells as all new materials and unused.
	Specifications for installation and testing of all components (e.g., piping, equipment, etc.) in accordance with manufacturer's recommendations.
	Scaled depictions and calculation of total footage of trenching.
	Piping schedule/tabulation to include, but not necessarily limited to, use (e.g., air, effluent water), material type, footage, and inside/outside diameter.
	Depicted location(s), type, and capacity of the off-gas and recovered groundwater treatment trains and disposal.
	Finishing details and specifications including schedule for all remediation system appurtanences not already covered elsewhere (e.g., manhole covers, stick-ups, concrete pads, clean-outs, etc.).
	Capacities of all major equipment to include blowers, compressors, pumps, etc. (describe minimum flow, vacuum/pressure, 100% duty cycle, etc.).
	Scaled depictions (plan views and standard details) and specifications for equipment compound, enclosure(s), stairs, fencing/gates (minimum 6-foot height), locks, equipment leveling, and all supports/anchoring/tie-downs for equipment enclosures, piping, vessels/tanks, etc. Equipment shall be covered and/or enclosed (i.e., equipment trailer). Specifications for the equipment enclosures shall include as applicable, but not be limited to, the following:
	Noise attenuation to levels below municipal ordinances and 70 decibels (A- weighted) maximum at ten (10) feet. Include documentation of and concurrence with applicable local sound ordinance;
	Interior electrical lighting;
	Ventilation fan with on/off switch and sound attenuating hood;
	Large capacity passive vent louvers with sound attenuating hood;
	A thirty (30) pound ABC fire extinguisher or minimum to meet local fire code; include documentation of local fire code.
	An emergency stop button.
	Nuisance noise and odor to neighbors avoided by careful location of equipment and exhaust stacks or other mitigating measures.
	Specifications for the following signs to attach to the security fence near the compound entrance: Danger High Voltage, Danger Flammable Gas, and No Smoking and Emergency Contractor 24-Hour Contact Information.

	Proposed system components (e.g., electrical, instrumentation, mechanical/equipment/piping, etc.) are designed and specified abiding by all applicable laws, codes, standards, regulations, ordinances, and rules of the State, territory, or political subdivision thereof, wherein work will be done, or any other duly constituted public authority, including, but not limited to, the following: Florida Building Code (FBC); National Fire Protection Association (NFPA); National Electric Code (NEC); American Society for Testing and Materials (ASTM); American National Standards Institute (ANSI); American Society of Mechanical Engineers (ASME); Institute of Electrical and Electronics Engineers (IEEE); Manual Of Uniform Minimum Standards For Design, Construction And Maintenance For Streets And Highways, and Standard Plans for Road Construction – Maintenance of Traffic, etc., State of Florida Department of Transportation (FDOT); and, International Organization for Standardization (ISO). All applicable laws, codes, standards, regulations, ordinances, and rules are referenced in each applicable section of the RAP.
	Standard Details and Technical specifications shall include, but not necessarily limited to, materials, installation and testing methods and criteria, and operational conditions/range/criteria, in accordance with industry standards and all applicable laws, codes, regulations, ordinances, and rules of the State, territory, or political subdivision thereof, wherein work is done, or any other duly constituted public authority, for proposed work related to the following:
	All piping, fittings, valves, fixtures, gauges, regulators, metallic tape, etc.
	All vessels/Tanks (e.g., activated carbon vessels, etc.).
	Telemetry.
	Concrete equipment pads (e.g., equipment enclosure/trailer, piping/tank supports, etc.).
	All major equipment (e.g., pumps, motors, blowers, compressors, etc.) and all minor equipment (e.g., flow meters, pressure indicators, regulators, etc.).
	All electrical conduit, wiring, fittings, equipment, control panel(s) including lightning protection, appurtenances (e.g., disconnects, starters, buried electrical line tape, fuses, etc.), as required for efficient system operation including, but not limited to, electrical connection from the remedial system to the temporary power pole/electric meter.
	Any other required equipment/appurtenance/etc. not specifically identified herein but none-the-less required to conduct and construct, as well as start-up (as applicable), the remedial action facilities in their entirety as intended per the Design Drawings & Technical Specifications.
	Standard Details - cross sections for pipe/conduit bedding/backfill.
	Preventative Maintenance checklist(s).
	Start-Up Test Plan in accordance with equipment/materials/etc. manufacturer's recommendations and system design goals.
	Start-Up and Operations & Maintainance (O&M) monitoring plans including system (e.g., influent/effluent screening and analyses for COCs, flows, pressures/vacuums, etc.) and influence (e.g., ROI) monitoring; specify/tabulate monitoring points/parameters/schedule.

Remedial Action Plan (RAP) or Interim Source Removal Plan (ISRP) Checklist

Guidance for Remediation Systems - General

INFILTRATION GALLERY	
	Recap of field percolation test results (preferably with double-ring infiltrometer).
	Infiltration gallery construction details and location (upgradient location if site layout allows).
	Gallery calculations/assumptions with mounding analysis.
	Piezometer and cleanout pipe in gallery.
	Geotextile filter fabric to be installed around and above gallery.
	Discussion or modeling of gallery for effect on plume migration.

Petroleum Restoration Program

Remedial Action Plan (RAP) or Interim Source Removal Plan (ISRP) Checklist

Guidance for Remediation Systems - Air Sparge, Bioventing, and/or Soil Vapor Extraction including vapor treatment

FACILITY INFORMATION	
Facility ID Number: *(9 digit)*	
Facility Name:	

DEP/LP Reviewer: Confirm applicable items have been addressed in the RAP/RAP-Mod/ISRP.

DEP/LP Review	ITEM
REMEDIAL ACTION - TECHNOLOGY SPECIFIC DETAILS	
COMPLETE THESE SECTION(S) AS APPLICABLE	
GENERAL	
	Remediation Systems - General tab completed.
IN SITU AIR SPARGING (AS), INCLUDING BIOSPARGING, OF GROUNDWATER	
	Draft UIC Notification Memorandum attached. Information in UIC Notification Memorandum matches information in RAP as applicable.
	The following prerequisites demonstrated:
	No or little free product which could spread via sparge turbulence, or prolong sparging.
	Volatile (C3-C10) petroleum fractions with Henry's Constant ≥ 0.00001 atm*m3/mol (approx. rule of thumb, unless biosparging is proposed).
	No high concentrations of metals (iron, magnesium) to form oxides which plug aquifer or well screens, or high concentrations of dissolved calcium, which could react with CO2 in air to clog aquifer w/calcium carbonate.
	Location, number, and construction details (diameter, depth, type-horizontal/vertical, screen interval, etc.) of all system (AS) wells.
	Scaled layout of AS wells including depiction of radii of influence (ROIs). Adequate coverage by overlapping radii of influence if multiple well system.
	Design **and** operational parameters/ranges for AS system/components including, but not limited to:
	Type: positive displacement blower, rotary claw/screw compressor, rotary vane blower, other.
	Positive air pressure equipment size including sizing calculations; and, cfm at psig.
	Manufacturer, model, motor hp, rpm, performance curves, etc.
	Motor (hp) based on system losses plus required pressure at wellheads. Provide piping system friction loss calculations.
	As applicable: air filter at compressor inlet; oil trap or oil-free compressor to avoid introducing more contamination to aquifer.
	Explosion-proof motor.

	Cubic feet per minute (cfm) of each well and total cfm for the system. Specify if standard or actual cfm and provide conversion calculations.
	Air pressure at each wellheads.
	Avoidance of long screen allowing air to diffuse at top portion only, where air flow resistance is least (typ screen is 1 to 3 ft long).
	Well depths (or depth of sparge tip) and screened intervals are appropriate with respect to depth of contamination.
	Vapor extraction well(s) in conjunction w/sparging situated properly to recover volatiles and prevent their release to atmosphere:
	Vapor extraction air flow rate should be at least 50% greater than the air sparging flow rate, per paragraph 62-780.700(4)(c), F.A.C. Therefore, injection cfm of air should be at or below 50% of vapor extraction cfm.
	Automatic shutdown of air injection upon loss of, or low, vapor extraction system vacuum, or failure of vacuum pump motor, to prevent air emissions.
	Adequate and cost-effective treatment of vapor extraction system off-gas proposed to prevent air emissions.
	SVE may not be needed for biosparging applications.
	Safety including, but not limited to, pressure relief valve at discharge of compressor and/or high pressure switch for automatic shutdown.
	Pressure indicating gauges at each sparging well.
	Air flow control: shutoff/throttling valve at each well; other flow control device or method.
IN-SITU BIOVENTING OF SOIL	
	Draft UIC Notification Memorandum attached. Information in UIC Notification Memorandum matches information in RAP as applicable.
	Location, number, and construction details (diameter, depth, type-horizontal/vertical, screen interval, etc.) of all system (sparge/bioventing/extraction) wells.
	Scaled layout of system wells including depiction of radii of influence (ROIs); consideration given to ROI and overlapping ROIs.
	Location of air injection and air extraction with respect to contaminated soil plume location and depth and/or as applicable for fugitive vapor control.
	Location and depth of soil gas monitoring probes with respect to contaminated soil plume and the air injection and extraction wells.
	Monitoring plan includes bioventing specific parameters such as carbon dioxide (CO_2) and pertinent bioremediation parameters.
	Demonstration that primary mechanism of remediation will be bioremediation and volatilization. Air flow rates will be limited based on oxygen demand for bioremediation as demonstrated by pilot study results (i.e., proposed operational flows are in line with bioventing).
	Evaluation of methods and proposed method for off-gas treatment if pilot test indicated that a significant amount of hydrocarbon volatilization will occur.

Remedial Action Plan (RAP) or Interim Source Removal Plan (ISRP) Checklist

Guidance for Remediation Systems - Air Sparge, Bioventing, and/or Soil Vapor Extraction including vapor treatment

SOIL VAPOR EXTRACTION (SVE)	
	The following prerequisites demonstrated:
	Relatively permeable soil.
	Depth to groundwater > 3ft.
	Relatively volatile contaminants.
	Location, number, and construction details (diameter, depth, type-horizontal/vertical, screen interval, etc.) of all system (SVE) wells.
	Scaled layout of SVE wells including depiction of radii of influence (ROIs); consideration given to ROI and overlapping ROIs.
	Design **and** operational parameters/ranges for SVE system/components including, but not limited to:
	Vacuum equipment (blower/pump) cfm at inches of water.
	Cubic feet per minute (cfm) of each well and total cfm for the system. Specify if standard or actual cfm and provide conversion calculations.
	Vacuum at each wellhead (inches of water).
	Pump motor (hp) based on system losses plus required vacuum at wellhead. Provide piping system friction loss calculations.
	Vacuum source specifications and details including, but not limited to:
	Type: regenerative blower, positive displacement vacuum pump, or other.
	Manufacturer, model, motor hp, rpm, performance curves, etc.
	Nonferrous material of construction and/or assembly to minimize potential for sparking and friction.
	Explosion-proof motor.
	Moisture separator/condensation trap ("knock out pot") prior to inlet of vacuum pump.
	Surface sealing provided for vacuum extraction, or existing concrete or asphalt adequate.
	Safety considerations including, but not limited to, the system operation at approximately 25% of Lower Explosive Limit (LEL); and, bleed valve provided to control flammable vapor concentrations.
	Air emissions control (general) - method of off-gas treatment to be provided during first month of system operation (provide details for carbon adsorption or themal oxidation of off-gas, or provide details of an alternative method).
	Acknowledge that air emission controls must be provided for at least first 30 days, but may have to be continued longer until petroleum hydrocarbon emissions to the atmosphere are less than 13.7 lbs/day.

	System monitoring to include, but not limited to:
	Sample and analyze air emissions for total petroleum hydrocarbons, daily for the first three days of the first week of Start-Up. At a minimum, the air samples collected during first three days of start-up shall be expedited on a 24-hour turn-around-time to ensure compliance with the 13.7 lbs per day threshold.
	Sample and analyze air emissions for total petroleum hydrocarbons, weekly for the first month, monthly for the next two months, quarterly thereafter.
	Vacuum measurement locations (suggestion: use monitor wells at various radial distances from extraction wells).
VAPOR-PHASE CARBON ADSORPTION (for control air emissions)	
	Cost-effectiveness evaluation in comparison to other alternatives for control of air emissions.
	Carbon vessel sizing calculations and pressure loss calculations.
	Specifications and details for carbon and carbon vessel.
	Procedure/protocol for carbon replacement/change-out and disposal.
	Safety considerations including, but not limited to, Operation of system below LEL for type of vapors being handled.
THERMAL/CATALYTIC OXIDATION (for control air emissions)	
	Cost-effectiveness evaluation in comparison to other alternatives for control of air emissions.
	Specifications and details for thermal oxidizer system including vent stack and equipment sizing calculations.
	Type and specifications for process media (e.g., carbon, ceramic, etc.).
	Instrumentation, controls, gauges, and valves. [Schematic or mobile unit manufacturer's drawings indicating instrumentation, controls, gauges, and valves for all process streams (contaminant-laden influent, fuel gas, and combustion air)].
	Safety considerations including, but not limited to:
	Bleed valve or dilution control valve to maintain influent flammable vapor concentration at 25% of the LEL.
	Air purge prior to re-ignition.
	Observance of appropriate requirements in Series 500 articles of the National Electrical Code - equipment shall meet either Class 1, Group D, Division 1 or Class 1, Group D, Division 2 hazardous area requirements, whichever is applicable, when located in a hazardous area as defined by the code.

	Use of thermal or catalytic oxidizers which meet appropriate fire codes for handling natural or propane gas and prevention of furnace explosions – National Fire Protection Association, Industrial Risk Insurer's, Factory Mutual, etc. Some of the most important safety shutdowns for gas-fired burners occur upon: high gas pressure; low gas pressure; loss of combustion supply air; loss or failure to establish flame; loss of control system actuating energy; power failure.

Remedial Action Plan (RAP) or Interim Source Removal Plan (ISRP) Checklist

Guidance for Remediation Systems - Groundwater Extraction including Dewatering {Chapter 62-780.525(3)} and treatment or disposal options

FACILITY INFORMATION	
Facility ID Number: *(9 digit)*	
Facility Name:	

DEP/LP Reviewer: Confirm applicable items have been addressed in the RAP/RAP-Mod/ISRP.

DEP/LP Review	ITEM
	REMEDIAL ACTION - TECHNOLOGY SPECIFIC DETAILS
	COMPLETE THESE SECTION(S) AS APPLICABLE
	GENERAL
	Remediation Systems - General tab completed.
	NPDES or other permit requirements identified. If applicable, consumptive use permit obtained from Water Management District.
	GROUNDWATER EXTRACTION
	Feasibility of using existing on-site wells for groundwater extraction considered. If existing wells used, include discussion regarding limitations of their future use as monitoring wells.
	Location, number, and construction details (diameter, depth, type-horizontal/vertical, screen interval, grout, etc.) of all system (recovery) wells and/or trenches.
	Scaled layout of recovery wells including depiction of radii of influence (ROIs); consideration given to ROI and overlapping ROIs.
	Flow rate calculations.
	Proposed treatment/disposal/discharge system/facility confirmed to meet total flow and flow rate requirements.
	Groundwater recovery pump specifications and details including, but not limited to:
	Type/description and performance requirements.
	Manufacturer, model, motor hp, rpm, performance curves or information provided (flow rate vs. pressure), etc.
	Hydraulic design considerations (friction losses and suction lift).
	Predicted horizontal and vertical area of influence provided relative to impacted groundwater. Scaled depiction of areal influence.
	Expected drawdown in recovery well or trench.
	Consideration of multiple well configuration to minimize drawdown.
	Automated well level controls provided for stopping/starting groundwater pump(s).
	Totalizing flowmeter installed on influent line from each groundwater recovery pump.
	Check valve provided on pump discharge piping if not integral to pump.

	Safety including, but not limited to, pressure relief valve at discharge of pump and/or high pressure switch for automatic shutdown.
	Shutoff/throttling valve provided on pump discharge piping.
DEWATERING FOR EXCAVATIONS	
	Chapter 62.780.525(3) F.A.C. applies to short-term groundwater recovery (e.g., dewatering) where the groundwater recovery will not exceed 30 days and the groundwater plume is less than 1/4-acre and confined to shallow aquifer wells with screened intervals that intercept the water table.
	As applicable, provide design calculations, scaled drawings (plans and standard details), and specifications for dewatering system in accordance with industry standards and regulations for the proposed work.
	Flow rate calculations.
	Proposed treatment/disposal/discharge system/facility confirmed to meet total flow and flow rate requirements.
	If excavation is proposed to extend beyond the water table, dewatering shall be proposed unless a professional opinion with supporting documentation is accepted.
	The submittal for dewatering shall include, but not be limited to, the following:
	Schedule for dewatering activities.
	Temporary groundwater treatment and disposal facilities including schedule/parameters for influent/effluent monitoring/documenting of flows and sampling for laboratory analyses.
	Documentation of all required permitting.
	The number and location of dewatering points.
	The number of feet below the maximum depth of the excavation that the dewatering shall depress and maintain the water table in the area of the excavation and throughout the excavation activities.
	The submittal shall be signed, sealed, and dated by Florida P.E. for which design of dewatering systems is in their area of practice.

Remedial Action Plan (RAP) or Interim Source Removal Plan (ISRP) Checklist

Guidance for Remediation Systems - Groundwater Extraction including Dewatering {Chapter 62-780.525(3)} and treatment or disposal options

GROUNDWATER TREATMENT SYSTEM (ON-SITE; ABOVE GROUND) - GENERAL	
	Influent concentrations for each contaminant of concern, for design of treatment system, based on either actual dynamic pump test sample, weighted averaging procedure, or other reasonable assumption.
	Feasibility & cost-effectiveness of direct discharge of recovered contaminated groundwater to sewer treatment plant, instead of onsite treatment.
	Specifications and details for groundwater treatment system including equipment sizing calculations. If applicable, schematic or mobile unit manufacturer's drawings indicating instrumentation, controls, gauges, and valves for all process streams (influent, effluent, etc.).
	Type and specifications for process media (e.g., carbon, cartridge, etc.). If carbon, see liquid-phase carbon adsorption section.
	Treatment system influent and effluent sampling ports provided.
	Fouling & scaling considerations:
	Whether control of iron fouling is necessary, either by filtration of influent to remove particulate-bound iron, and/or by removal or sequestering of dissolved iron to prevent precipitation in process equipment items.
	Whether pretreatment or other measures necessary to prevent precipitation of calcium carbonate (Langelier Index).
	Whether pretreatment or scheduled O&M measures will be needed for control of biofouling.
	System monitoring to include, but not limited to:
	Sampling of influent from recovery well(s); daily first 3 days, monthly next 2 months, quarterly thereafter.
	Sampling of system effluent, daily for first 3 days, monthly next 2 months, quarterly thereafter.
LIQUID-PHASE CARBON ADSORPTION	
	Indication whether adsorption is for primary treatment of groundwater or polishing of effluent.
	Carbon specifications.
	Carbon unit(s) sizing calculations (i.e., flows, pressures, carbon usage rate, contact time, pressure losses, etc.) including basis for design assumptions.
	Carbon unit(s) specifications (e.g., pressure rating, flow rating, material, access ports, inlet/outlet port sizes, etc.).
	TOC in groundwater determined and effect on carbon usage considered.
	Need for sand filter or cartridge unit prior to carbon unit considered. If needed, specified.
	Pressure gauge(s) and pressure relief valve(s) specified and provided on carbon (and sand/cartridge) filter.
	Procedure/protocol for carbon replacement/change-out and disposal.

	Series configuration of carbon units considered to allow for maximum carbon utilization and prevention of contaminant breakthrough to system effluent.
	Automated recovery well shutdown if primary carbon unit pressure too high.
	Schedule (e.g., parameters and frequency) for sampling between and after carbon adsorption units.
AIR STRIPPING TREATMENT PROCESS	
	Design **and** operational parameters/ranges for air stripping system/components including, but not limited to:
	Packed tower type, size including sizing calculations, and surface area of packing.
	Mechanical details for packed tower including, but not necessarily limited to, tower height; packing type, height, surface area; air/water ratio; pressure drop; blower type, model, hp; mist eliminator; etc.
	Diffused aerator tank type and size including sizing calculations.
	Mechanical details of diffused aerator including, but not limited to, tank volume; contact time; air flow rate; pressure drop; removal efficiency of contaminants of concern; blower type, model, hp; etc.
	Low profile air stripper size including sizing calculations.
	Mechanical details for low profile air stripper including, but not limited to, number of trays; water flow rate; air flow rate; air/water ratio; pressure drop; blower type, model, hp; mist eliminator.
	Automated recovery well shutdown when blower failure occurs.
	Air emissions calculations; emissions stack height. Equipment description if emissions treatment necessary.
	System monitoring to include, but not limited to:
	Sampling of system effluent, daily for first 3 days, monthly next 2 months, quarterly thereafter.
INJECTION WELL (FOR EFFLUENT DISPOSAL)	
	Discussion of injection zone and relevant lithology information.
	Injection well location and construction details.
	Screened interval appropriate.
	Effluent discharge pump adequately sized for required injection flow rate and pressure.
	Carbon polishing unit (or equivalent). See liquid-carbon adsorption section.
	Air release valve at highest point of effluent discharge piping.
	Injection rate (well hydraulics) calculations.

	Underground Injection Control (UIC) inventory information provided. Sufficient information/detail provided for a technical reviewer to complete the UIC effluent injection notification.
	Scaled depiction of Zone of Discharge (ZOD).
	Evaluation of injection well's effect on potable wells and plume migration.
ALTERNATIVE EFFLUENT DISPOSAL METHODS	
	Cost-effectiveness comparison of alternatives (include general permit yearly fee in the cost estimate for NPDES disposal, if it is one of the alternatives being compared).
	For surface water discharge: conditions for NPDES general permit met; and, indication that notice of intent for NPDES permit will be submitted after RAP approval.
	If applicable consumptive use permit obtained from Water Management District.
	Approval from municipality for sewer discharge, and conditions and effluent standards to be met.
	Applicable permits for stormwater discharge.

Petroleum Restoration Program

Remedial Action Plan (RAP) or Interim Source Removal Plan (ISRP) Checklist

Guidance for Ex Situ or Off Site Soil Treatment or Disposal Options

FACILITY INFORMATION	
Facility ID Number: *(9 digit)*	
Facility Name:	

DEP/LP Reviewer: Confirm applicable items have been addressed in the RAP/RAP-Mod/ISRP.

DEP/LP Review	ITEM
	REMEDIAL ACTION - TECHNOLOGY SPECIFIC DETAILS
	COMPLETE THESE SECTION(S) AS APPLICABLE
	LANDFILLING OF SOIL
	Landfill lined and permitted by FDEP.
	Name and location of landfill provided along with conditions of acceptance.
	For out-of-state landfill disposal. Evidence provided that petroleum contaminated soil disposal in the landfill complies with the landfill regulations of the other state.
	SOIL THERMAL TREATMENT / COMMERCIAL BIOREMEDIATION OF SOIL
	Name and location of thermal treatment or bioremediation facility provided.
	Facility is permitted for thermal treatment or bioremediation of petroleum contaminated soil.
	Pretreatment soil sample analyses.
	LAND FARMING OF SOIL
	Adequate surface area available (_____sq ft) to spread soil 6 to 12 inches thick.
	Location of land farming operation.
	Land farming area is flat (less than 5% slope).
	Impermeable base provided. Type: _____
	Surface water runoff controls provided.
	Groundwater monitoring plan proposed if land farm is outside immediate contamination area.
	Frequency of tilling provided.
	Frequency and details of nutrient application or other enhancements provided (if proposed).
	Soil sampling frequency and sampling methods provided.
	Potential for land farming causing nuisance conditions evaluated.
	Underlying soil and groundwater monitoring procedures provided and acceptable.
	Land farming will be continued until the contaminants of concern meet soil cleanup target levels.
	Ultimate disposition of soil discussed.
	Need to fence land farm area considered.