Remedial Alternatives Analysis (RAA) Guidance

August 30, 2010 (revised April 2012)

PURPOSE

In accordance with the Navy/Marine Corps Policy on Optimizing Performance and Sustainability of Remedial and Removal Actions at all DON Environmental Restoration (ER) Sites (CNO, 2012), preparing and submitting a Remedial Alternatives Analysis (RAA) is a mandatory requirement for most Feasibility Study (FS), Engineering Evaluation / Cost Analysis (EE/CA), Corrective Measures Study (CMS), or Corrective Action Plan (CAP) phase projects. The RAA is the first part of a two step process designed to optimize the remedy evaluation and selection phase of projects conducted under Naval Facilities Engineering Command's (NAVFAC) ER Program. The second step in optimizing remedy selection involves an independent technical review of the draft remedy evaluation document (FS, EE/CA, CMS, or CAP). This guidance document describes the requirements for RAAs, the procedures for RAA preparation, and the review process for RAAs.

The goal of the RAA review is an early and expedited optimization review of the remediation alternatives that will ultimately be analyzed in the remedy evaluation documents. RAAs provide the opportunity to align the remedial alternatives with Remedial Action Objectives (RAOs) that are consistent with the onsite risk for current and reasonably anticipated future land use. The RAA review also ensures that potentially applicable remedial options are not dropped too early in the selection process and that other appropriate remedies are not overlooked. The development of the RAA will initiate, enhance, and preserve close dialogue between the contractor, the Department of Navy (DON) Remedial Project Manager (RPM), and NAVFAC technical support staff in order to find the most promising alternatives for full analysis in the remedy evaluation and selection process. The RAA process also provides an opportunity for contractors and Navy personnel to share "lessons learned" at other sites and bring this knowledge to the remedy evaluation at the site in question. The RAA optimization effort is applicable for NAVFAC Atlantic (LANT) and Pacific (PAC) areas of responsibility (AOR). Past experience has shown that early optimization review can save time and cost by avoiding the need to back track and re-consider alternatives. Overall, the RAA is expected to reduce the time and effort that goes into remedy evaluation and site closeout.

The attached RAA template is provided to be used as a standardized planning tool in the early stages of the remedy evaluation phase of the ER project. The RAA summarizes the Conceptual Site Model (CSM), the RAOs, the preliminary remediation goals (PRGs), the previously screened alternatives, and the rationale for choosing the remedial alternatives that are retained for detailed comparative analysis. Once completed following the standardized format as outlined in the template, the RAA will be submitted to NAVFAC LANT or PAC for review. The RAA document provides a concise overview of the CSM and the remedial alternatives that will be evaluated in a FS or EE/CA as part of a Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) response, a CMS to support a Resource Conservation and Recovery Act (RCRA) Corrective Action, or a CAP supporting cleanup under the Underground Storage Tank (UST) Program.

While the RAA is a new internal deliverable, it should also be recognized that it is simply a written summary of the information considered in the preliminary screening process that has always been the first step in the development of remedial alternatives. The DON considers this initial screening step to be essential for the selection of the most cost-effective remedy that is protective of human health and the environment.

APPLICABILITY

Requirements for RAA preparation and review apply to all cleanup actions conducted at DON Environmental Restoration Navy (ER,N) and Base Realignment and Closure (BRAC) funded program sites per the NAVFAC Optimization Policy (CNO, 2012). This includes activity funded sites (e.g. Marine Corps) when NAVFAC is overseeing environmental clean-up work conducted by a NAVFAC contractor. Only *de minimis* projects are exempt from the RAA requirement. Examples of *de minimis* projects would be remedy evaluation documents that involve only land use controls (LUCs) or long term monitoring (LTM). RPMs will need to contact their Echelon III point of contact (POC) to confirm whether the RAA requirement can be waived for a particular project.

ROLES & RESPONSIBILITY

Several parties must communicate and work in concert to maximize the effectiveness of the RAA optimization step. The following sections identify these participants and define their roles and responsibilities in the RAA process.

Remedial Project Managers

RPMs are accountable for all aspects of their installation's ER,N Program. The RPM is responsible for ensuring that ER,N projects are conducted in accordance with applicable environmental laws and that DON policies and procedures are followed. To ensure compliance with DON's Optimization Policy, the RPM is responsible for including contractual language outlining the requirements placed on contractors to produce RAA documents into statements of work (SOW) and contract documents. Though the RAA will be reviewed during the remedy evaluation process, it remains an ***internal*** Navy document and it is recommended that as such, it not to be released to parties outside the Navy. Since regulator review and comment is not required for the RAA, distribution of the RAA to non-Navy members may be determined by the RPM on a case-by-case basis. As an internal planning document, it does not become part of the Administrative Record.

RPMs shall schedule and coordinate with their contractors when RAAs will be created and delivered. RPMs are encouraged to review the RAA prior to the LANT or PAC review, if possible, though simultaneous reviews are possible if the RPM prefers. Once technical reviewer comments are received, the RPM is responsible for ensuring that the contractor prepares timely responses to technical reviewer comments. If conference calls are needed to resolve comments or determine if changes are needed in the remedy evaluation document, then it is the RPM's responsibility to coordinate these calls. The decision whether to make changes to the remedy evaluation document based on the outcome of the RAA review is ultimately the responsibility of the RPM.

In addition to these responsibilities, RPMs, organized by their Facility Engineering Command (FEC) ER Manager, will review, update, and validate an overall RAA look-ahead schedule that will list the future remedy evaluation documents in progress. This schedule will be created and maintained by the contractors and is described in later sections.

CLEAN & Other Navy Contractors

Contractors who write remedy evaluation documents will be required to prepare a RAA as a non-regulatory interim deliverable for internal DON use. RAA preparation shall be closely coordinated with the RPM. The contractor will be responsible for submitting the RAA package (including all appropriate figures, tables, and CSM for review in accordance with the procedures outlined below). If directed by the RPM, the contractor shall prepare written response to comments (RTCs) based on reviewer comments and work with the lead technical reviewer and the RPM to determine if any changes will be needed in the remedy evaluation document. The contractor will be responsible for optimizing the draft remedy evaluation document based on the outcome of the RAA process.

All contractors who prepare remedy evaluation documents will identify an internal POC who will provide the internal coordination and management of the reviews from within their firms. This contractor POC will make sure RAAs meet quality standards outlined in this guidance, ensure repetitive common errors or issues are caught early, and ensure lessons-learned are shared among the contractor technical and management staff. On a quarterly basis, all CLEAN and other Navy contractors responsible for writing remedy evaluation documents will review their upcoming contract task orders (CTOs) with their respective RPM and coordinate the prospective schedule for upcoming RAAs based on their list of planned FS, EE/CA, CMS, and CAP deliverables. Once the list is finalized, the contractor's internal RAA POC will submit the look-ahead schedule to the appropriate LANT or PAC POC at the beginning of each quarter.

LANT & PAC Technical Support POCs

The LANT and PAC POCs are responsible for overall coordination of NAVFAC RAA efforts, including decisions to waive the RAA requirement for *de minimis* sites within their AOR. The POC will still enter a RAA TS2 Request to document any *de minimis* waivers for future tracking and reporting, though a RAA review will not take place for *de minimis* projects. The LANT or PAC POC is the sole person responsible for receiving all new RAA review requests from contractors on behalf of RPMs. The LANT or PAC POC is responsible for the timely upload of RAA review requests as new Naval Installation Restoration Information Solution (NIRIS) Technical Support Tracking System (TS2) requests and uploading the RAA and related documents (figures, tables, CSM, etc.). The NIRIS TS2 requests can be viewed on the NAVFAC Portal (https://niris.navfac.navy.mil/TS2/index.jsp).

The LANT or PAC POC will assign technical leads (TLs) and add back-up team members as project or regional complexity dictates. The POCs will monitor the TS2 RAA review progress and will follow-up with RPMs and TLs on RAA reviews to ensure that the RAAs are achieving their intended purpose. The LANT or PAC POC will also follow-up with the TL to ensure that the TS2 request is properly closed.

The RAA POCs at LANT and PAC are responsible for coordinating with all contractors within their respective AORs to monitor the upcoming RAAs for workload management and HQ reporting. The POCs will consolidate all RAA schedules from all participating contractors and

will provide these schedules to their AOR ER managers on a quarterly basis so RPMs in each FEC can verify that the RAA tracking schedule is current.

Technical Leads & Review Teams for RAA Reviews

Technical reviewers are responsible for timely review of RAAs in accordance with the procedures outlined in the sections below. After the review is complete, the assigned TL will send comments directly to the contractor's RAA POC and the RPM. The TL will participate in comment resolution meetings as necessary. The TL is responsible for uploading the comments and RTCs to the TS2 request with the "key findings" to properly close-out the TS2 request.

COST AND CONTRACTING

Contractors will compile information to create the RAA from readily available resources such as the Site Investigation (SI), Remedial Investigation (RI), or other historic site reports. These reports provide a wealth of supporting documentation for the RAA, so contractors are expected to utilize these data to create the brief summary document expeditiously and cost-effectively. RAA preparation should require a level of effort no greater than 24 – 40 hours. A RAA document is expected to be created early in the remedy evaluation document preparation process and will typically cost less than $5,000. RPMs should incorporate any costs related to the preparation of a RAA into NORM as part of the remedy evaluation process (FS, EE/CA, CMS, or CAP). The independent review is not expected to delay the project, as the preparation of sections of the draft remedy evaluation document not directly related to alternatives analysis should continue while the RAA is under review.

For scopes of work or task orders related to remedy evaluation and selection, the RPM should insert language into the SOW and basic contract to ensure the RAA internal deliverable is properly planned and coordinated. Sample language is provided below:

> "A Remedial Alternatives Analysis (RAA) shall be prepared in accordance with the RAA Guidance [Reference (A)] following the standardized format provided in the template. The RAA is an ***internal*** Navy document that is submitted informally for review prior to submittal of the in-progress FS *(replace with EE/CA, CMS, or CAP as appropriate).* Since regulator review and comment is not required for the RAA, distribution of the RAA to non-Navy members may be determined by the RPM on a case-by-case basis."

RAA PREPARATION

The contractor or RPM who creates the RAA should prepare and submit the RAA at an early developmental stage in the remedy evaluation process. The CSM, Contaminants of Concern (COC), and Risk portions of the RAA Template are designed to help focus the RAOs and remedy development process on the factors most likely to impact remedy design and implementation; therefore, DON recommends that these portions of the RAA be populated as the Administrative Record for the site is reviewed. The RAA can then be quickly completed following an initial screening of general response actions to retain the most viable potential remedial alternatives for detailed analysis in the remedy evaluation document. Specifically, this RAA development process would occur according to the following outline:

- Feasibility Study (FS) for CERCLA: The RAA would be developed and submitted after the CSM, RAOs, and PRGs are used to identify and screen potential treatment and disposal technologies based on their technical implementability and effectiveness.
- Corrective Measures Study (CMS) for RCRA: Similar to the FS, the RAA for a CMS will be developed shortly after the Corrective Action Objectives (CAOs) are finalized during the preparation of the CMS. Once the initial identification, screening, and development of the corrective measure alternatives are made, the RAA should be developed.
- Engineering Evaluation/Cost Analysis (EE/CA): The RAA for an EE/CA will be started shortly after the removal action objectives are finalized. Once the identification of the removal action alternatives is complete, the RAA should be developed.
- Corrective Action Plan (CAP) for Petroleum Sites: The CAP is most comparable to the Proposed Plan/Record of Decision (PP/ROD) stage for the CERCLA program though on a significantly smaller scale. The RAA should be developed once the Site Characterization Report (SCR) phase of the Underground Storage Tank/Petroleum, Oils, and Lubricants (UST/POL) investigation process is complete. Of the four remedy evaluation documents, the CAP RAA has the shortest timeline in the remedy evaluation development to provide review of alternatives, so RPMs should be aware of this short availability and plan the RAA development, submittal, and review to match the CAP schedule.

The level of detail will depend on the project complexity, but the RAA is expected to be a short document with a brief appendix of supporting information. The contractor is expected to use existing tables and figures whenever possible in the appendix. For example, supporting information may include a graphic depiction of the CSM, tagged data figures, data tables, or other relevant data retrieved from historic documents to provide reviewer with a better understanding of site conditions or risk. New graphics should be limited to those necessary to understand alternative-specific concepts, such as targeted treatment zones. Cost estimates should not be included in the RAA. Preparers of the RAA document should document and list the alternatives that were considered but not carried forward to the detailed analysis phase and clearly identify these alternatives within the "*Description of Feasibility Study Alternatives*" section of the RAA Template. In this manner, the RAA reviewers will be able to follow the decisional analysis process when evaluating the RAA.

An approved RAA template is provided at the end of this guidance; its use is highly recommended to facilitate RAA preparation and review. Microsoft Word is the preferred format for RAAs, but *.pdf documents will also be acceptable.

RAA SUBMITTAL

Since the RAA is expected to be a short document, it can normally be submitted to the LANT or PAC POC by email. The RPM should be copied on all RAA review requests. If the RAA package is >10MB in size and too large for email, then there are several alternate modes of delivery: 1) the RPM can upload the files to NAVFAC's NFTS site (https://portal.navfac.navy.mil/portal/page/portal/NFTS/), 2) the contractor can load it to their corporate FTP site, or 3) either the RPM or contractor can load it to any other available file transfer sites (e.g., the AMRDEC Safe Access File Exchange [SAFE] at https://safe.amrdec.army.mil/safe2/). As stated above, the RAA can be created either by the

Navy RPM or the contractor. If the RPM developed the document, the RPM will submit the RAA. If the contractor coordinated the development and initial review of the RAA with the RPM, the contractor's RAA POC can submit the RAA package (including all appropriate figures, tables, and CSM) to the appropriate LANT or PAC POC.

Once the RAA review package is received, the LANT or PAC POC will enter a TS2 Support Request in NIRIS for tracking and documentation of the RAA review. They will also upload any additional supporting documents received to the TS2 Support Request as a means of transferring large files should the TL request more information during the review.

The RAA is intended to be an ***internal*** Navy tool for planning and enhanced communication among Navy personnel as the remedy evaluation document is being developed. Since regulator review and comment is not required for the RAA, distribution of the RAA to non-Navy members may be determined by the RPM on a case-by-case basis. The RAA package is not intended to be submitted to regulatory agencies for formal review as this may create unintended schedule delays.

RAA REVIEW

NAVFAC LANT and PAC will take the lead in administering the RAA review process. Within their AORs, the LANT or PAC POCs will assign reviewers as the documents are received and will ultimately be responsible for ensuring that reviews occur on time.

The RAA reviewers will be NAVFAC technical support personnel at LANT, PAC, ESC, or technical staff at one of the FECs based on the reviewer's expertise and availability. A single TL reviewer will typically review RAA documents and depending on the RAA complexity, the TL may solicit an additional reviewer be added as a team member in the TS2 request. When practical, a regional reviewer will be part of the review team to ensure local, regional, or special regulatory knowledge is available and leveraged to ensure comprehensive reviews. A single reviewer will always be designated as the TL responsible for working with the contractor and RPM until the TS2 request is closed.

TLs and review teams will have ten business days (approximately 2 weeks) to conduct a RAA review and submit comments. Typically, the RPM will have already reviewed the RAA or may elect to review it at the same time as the TL reviewer. At any time during the process, the TL may request a conference call to facilitate a better understanding of the site to improve the overall RAA review. After the review is complete, the assigned TL will review and collate comments received from all reviewers and send the resultant comment package directly to the contractor's RAA POC and the RPM.

RESPONSE TO COMMENTS AND DOCUMENT REVISIONS

Using the RAA, the project team led by the RPM, will discuss whether to add or delete remediation alternatives for detailed consideration in the final remedy evaluation document. In addition, the RAA review may reveal important data gaps in the CSM or important questions that should be considered during remedy evaluation and selection. As always, the RPM is responsible for the final decision regarding the addition or deletion of alternatives. Ideally the RAA review should take place early in the process, so that changes can be made without affecting the cost or schedule of the final remedy evaluation document.

Once RAA comments are received, RPMs will coordinate with their contractors to prepare RTCs and will provide the RTCs to the TL reviewers within 10 business days. The RTCs shall not be incorporated into a revised RAA; if the RPM determines optimization recommendations will benefit the DON, then any necessary adjustments to the remedial alternatives considered will be made in the draft remedy evaluation document.

SHARING LESSONS LEARNED

One of the goals of the RAA preparation and review process is to encourage a collaborative exchange among the contractor, the RPM, and technical support staffs in order to ensure the most promising remedial alternatives are considered during the remedy evaluation and selection process. The process also provides an opportunity for contractors and Navy personnel to share lessons learned at other sites across regions and AORs. The goal of the technical support staff reviewing the RAA is to be cooperative and helpful, such that the process moves quickly and smoothly. In order to promote consistency, trends in reviewer comments and lessons learned will periodically be compiled through the use of TS2 and shared across NAVFAC through multiple media (RPM Newsletters, RITS, TIPS, ER manager meetings, ER conference, etc). Because the RAA is considered to be a form of optimization, the completion of the independent review of each RAA shall be recorded by the RPM in the NORM Optimization Module so that optimization metrics can be tracked. Finally, the TS2 system will be a repository of all RAAs so future RPMs or technical staff can use the keyword search query to find similar contaminant issues and use that information to support future cleanup activities.

REFERENCES

NAVFAC (a): *Guidance for Optimizing Remedy Evaluation, Selection, and Design* (2010)

NAVFAC (b): *Guidance for Planning and Optimizing Monitoring Strategies* (2010)

CNO Optimization Policy 2012

Management Guidance for the Defense Environmental Restoration Program [DERP], September 2001

Department of Navy Environmental Restoration Program (NERP) Manual, August 2006

Site # – INSERT PROJECT NAME, SITE #, SWMU, ETC. HERE
BASE NAME, CITY, STATE

Indicate which remedy evaluation document this RAA supports.
Check one: ☐ FS ☐ EE/CA ☐ CMS ☐ CAP (LUST)

Conceptual Site Model (CSM)	CSM - General	Describe the CSM as indicated in the blocks below using a combination of narrative and related CSM figures as appropriate. Complexity of the information and graphics to be provided is dependent on the site complexity. 3-D CSM diagram is preferred but not necessary for less complex sites where 2-D cross section and plan view can communicate the CSM adequately. Use *Guidance for Optimizing Remedy Evaluation, Selection, and Design* (NAVFAC 2010) and the NAVFAC CSM Web Tool (http://www.ert2.org/csm) when developing conceptual site models and related remedial action objectives, remedial alternatives, technology performance objectives, and exit strategies. Use *Guidance for Planning and Optimizing Monitoring Strategies* (NAVFAC 2010) for developing and optimizing related monitoring plans.
	Previous Site Use	Provide sufficient information on site use and site history to understand sources of contamination.
	Size	Describe dimensions of the site relevant to the remedial actions being evaluated. For example, list dimensions of source area, dissolved-phase plume, soil hot spot, etc. being evaluated as part of remedy selection (approximate area in XX,XXX square feet or XXX acres).
	Previous Investigations and Remedial Actions	Briefly describe or include in a table previous investigations and remedial actions.
	Current and Potential Future Land and Resource (e.g. Groundwater) Uses	Identify all current and potential future land and resource use. Include on-site and adjacent land/resource uses, including recreational use of adjacent surface waters and the groundwater current use and classification for potential future use, to ensure appropriate RAOs are identified for the potential receptors. If the groundwater classification is based on State criteria, indicate if the State has an approved Comprehensive Groundwater Protection Plan in place. Include specific descriptors for land use – industrial, residential, recreational, mixed use, other.
	Affected Media	Describe affected media (e.g. soil, groundwater, sediment, indoor air, surface water). For soil media, describe soil types, depths of soil contamination, and other relevant information. For groundwater media, include description of TDS, redox conditions, unusual geochemistry or characteristics that impact remedy selection. For sediment/surface water, include description of surface water/sediment environment (i.e. wetland, lake,

		river/stream, harbor, etc.).
	Geology/Hydrogeology	Describe site geological and hydrogeological features that impact remedy selection and performance. Include cross-sectional figures depicting relevant soil/aquifer layers, depth to water, potentiometric head, and contaminant distribution if these features are relevant to remedy selection.
	Nature and Extent of Contamination	Describe the nature and extent of the release, including source area or plume, age of contamination; contaminant type (e.g. chlorinated solvents, petroleum hydrocarbons, munitions, heavy metals), fate and transport mechanisms, etc. If available, include figures depicting the relationship between the contamination, surface/subsurface features, hydrogeology, etc. (e.g. 3-D or 2-D plume maps, detailed cross-sections of contaminant distribution, site stratigraphy, etc.) depicting the relationship between the contaminant release, surface/subsurface features, hydrogeology, nature and extent, fate and transport mechanisms, current and potential future land/resource uses, and potential exposure pathways/receptors.
	Receptors/Exposure Pathway	Describe the course a chemical or physical agent takes from a source to a human or ecological receptor. Each exposure pathway includes a source or release from a source, an exposure point, and an exposure route. If the exposure point differs from the source, a transport/exposure medium (e.g., air, groundwater) or media (in cases of intermedia transfer) also is included.
	Other Site Constraints	Highlight site features (e.g. topography, accessibility, weather, presence of site utilities, disposal restrictions, on-site power limitations, infiltrating storm sewers or other preferential pathways influencing contaminant migration, etc.) that may impact remedy performance and selection.
Risk Summary	Human Health Risk	Identify the current and potential human receptors evaluated in the HHRA. Describe results of the HHRA and indicate, based on the various receptor scenarios what risks DO exist/DO NOT exist. Identify the COCs that drive risk. Quantify risk for each COC and any cumulative risk from multiple COCs and exposure pathways. Use tables to summarize potential unacceptable risk results. Some states may have more stringent criteria for specific environmental media. For example, if more stringent state criteria apply at this site, please identify these requirements. State whether a screening or baseline HHRA was performed and whether the background policy was followed. Describe any unusual exposure parameters that were used or anything else that may cause more than usual level of uncertainty in risk estimation.
	Ecological Risk	Describe results of the ERA and/or phased eco-risk screening, and indicate, based on spatial coverage and hazard quotients, what risks DO exist/DO NOT exist to

		plants, invertebrates, and wildlife or if they are expected to be minimal at the site. Quantify risk for each COC and exposure pathways. Use tables to summarize potential unacceptable risk results. State whether a screening or baseline ERA was performed and whether the background policy was followed. Describe any unusual exposure parameters that were used or anything else that may cause more than usual level of uncertainty in risk estimation.
COCs	Surface Soil	Define depth interval considered to represent surface soil zone of concern. List or include all COCs in a table (average and maximum concentrations)
	Subsurface Soil	Define depth interval considered to represent subsurface soil. List or include all COCs in a table (average and maximum concentrations).
	Groundwater	List or include all COCs in a table (average and maximum concentrations).
	Sediment	Define depth interval considered to represent sediment zone of concern (e.g. bioturbation layer, dredge depth, etc.). List or include all COCs in a table (average and maximum concentrations).
	Surface Water	List or include all COCs in a table (average and maximum concentrations).
	Indoor Air	List or include all COCs in a table (average and maximum concentrations).
RAOs	Remedial Action Objectives	Describe the RAOs for each affected medium. RAOs are medium-specific (e.g. soil or groundwater specific) goals for protecting human health and the environment. RAOs should provide a clear and concise description of what the remedial action should accomplish at a given site. Some sample RAOs for soil, sediment, groundwater, and landfill sites are as follows: • Limit direct exposure to contaminants in surface soil by human and ecological receptors. • Remove contaminant mass in the vadose zone to the degree necessary to prevent further degradation of the underlying groundwater. • Limit human and ecological exposure to contaminated sediments. • Prevent COCs in groundwater from reaching points of compliance (POCs) at concentrations above the clean-up goal. • Protect future residential receptors from unacceptable risks associated with inhalation and ingestion of

		volatile organic compounds (VOCs) in groundwater. • Prevent infiltration of precipitation into landfill waste to minimize leachate. • Prevent direct contact with landfill contents. Use *Guidance for Optimizing Remedy Evaluation, Selection, and Design* (NAVFAC 2010) and the *Navy/Marine Corps Policy for Optimizing Performance and Sustainability of Remedial and Removal Actions* (CNO 2011) when developing RAOs.
Remediation Goals	Preliminary/Final Remediation Goals	Describe the remediation goals proposed to meet each RAO for this site (and the risk scenario or ARAR driving the RG). Quantify site-specific cleanup levels for each medium based on unacceptable risk. Provide justification if remediation goals (cleanup standards) are based on non-promulgated screening levels (e.g., EPA RSLs, BTAG screening values, SSLs, or state screening levels).
TTZs	Target Treatment Zones	A target treatment zone (TTZ) is the volume or area at which the remedial action (or treatment component in a treatment train) is determined to best apply. Describe the target treatment zone(s) (TTZ) for the site. A figure may also be used to depict the location of TTZ(s). A TTZ is defined by the CSM and RAOs, considering risk reduction, exposure routes, and the nature and extent of contamination. For soil or sediment sites, the target treatment zone may be limited to hot spots with elevated contaminant concentrations or may extend over the entire impacted area. For groundwater sites, the target treatment zone may encompass the source zone, the dissolved plume, localized areas with elevated concentrations within the plume, and/or the downgradient boundary or discharge point of the dissolved plume. A site may have multiple TTZs. Remediation goals are established for each TTZ. Use *Guidance for Optimizing Remedy Evaluation, Selection, and Design* (NAVFAC 2010) when developing TTZs.
Remedy Status	Interim or Final Remedy	Indicate if this is the interim or final selected remedy for the site. If Interim, explain how the interim remedy will impact or compliment the final remedy or potentially result in no further action (NFA).
Unrestricted Land Use	Was an UU/UE Remedial Alternative Evaluated?	Indicate if a remedial alternative that would result in unrestricted future land use (unrestricted use/unrestricted exposure [UU/UE]) was evaluated.
Data Gaps	Identify Any Remaining Data Gaps	Describe any known data gaps that may impact risk management decisions, remedy selection, and/or remedial design. For example, indicate if additional site characterization, source zone delineation, etc. may be required to ensure proper remedy selection and/or design.

Applicable Documents	Reference applicable supporting documents, such as the Remedial Investigation Report, RCRA Facility Investigation Report, Site Assessment Report (LUST), etc. Make these documents available to reviewers upon request. Provide NIRIS web link for downloading the RI, RFI, or other relevant site investigation document. For documents not stored in NIRIS, provide FTP, RMFT, or other file transfer web link where the reviewer can download the document if needed for additional information.
Additional Comments	Provide additional comments relevant to the RAA and indicate if CSM figures, data tables, and plume maps are attached.

Site # – INSERT PROJECT NAME, SITE #, SWMU, ETC. HERE
BASE NAME, CITY, STATE

Description of Feasibility Study Alternatives

(Only include alternatives that have been screened and retained for detailed analysis in the remedy selection document. Include alternatives for all impacted media – e.g. soil, groundwater, sediment)

Alternative Number	Alternative Description
Alternative #1 No Action	• No Action Alternative (include for FS only) • Does not include LUCs, monitoring, or cost.
Alternative #2	• Provide remedy information for Alternative #2. • Describe in sufficient detail so reviewer will understand proposed remedial alternative. • Describe all technologies or remedy components that may be included in treatment trains used in 1) a phased approach over time (e.g., in-situ chemical oxidation to reduce source area COC concentrations followed by MNA to remediate residual concentrations), and/or 2) to address multiple target treatment zones (e.g., enhanced bioremediation followed by MNA in the source area, MNA in the downgradient plume, and a permeable reactive barrier (PRB) in the interim to prevent COCs from discharging to surface water). • **Describe the exit strategy for each technology or remedy component of the treatment train targeting a particular target treatment zone.** • Describe any land use controls (LUCs). • Describe all long-term monitoring requirements associated with each alternative, including an estimate of the monitoring timeframe and exit strategy for optimizing and reducing the monitoring frequency, locations, etc over time. • Do not include cost information.
Alternative #3	• Describe each alternative considered as per Alternative #2 above.
Other Alternatives Considered	• Include a list of significant technologies considered during the initial screening of remedial alternatives and a brief explanation (1-3 sentences) of why these technologies were not retained for detailed analysis in the remedy selection document.

INCLUDE APPROPRIATE NOTES HERE.
FS = Feasibility Study
PRGs = Preliminary Remediation Goals (site specific goal as defined in the FS; similar to the CG in an FSA).
LUCs = Land Use Controls