# Naval Facilities Engineering Command Guidance for Remedial Alternatives Analysis

*7 October* 2020

**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 Feasibility Study (FS), Engineering Evaluation / Cost Analysis (EE/CA), Corrective Measures Study (CMS), or Corrective Action Plan (CAP) phase projects. RAA requirement applies to all sites except for a few *de minimis* sites as stated in the next Applicability section. The RAA is an integral part of document scoping process and provides a first step to optimize the remedy evaluation and selection at a site under Naval Facilities Engineering Command's (NAVFAC) ER Program. This guidance document describes the requirements for RAAs, the procedures for RAA preparation, and the review process for RAAs. This document updates the RAA guidance issued in April 2012. A detailed template for preparing the RAA is attached.

The subsequent steps in optimizing remedy selection following completion of the RAA are to be conducted in accordance with the NAVFAC Quality Document Review (QDR) Directive issued in June 2018 (NAVFAC 2018). The QDR involves an independent technical review of the documents that evaluate, select, or modify remedy at IRP sites, such as, but not limited to, FS, EE/CA, CMS, CAP, proposed plan, and decision document (action memorandum or record of decision).

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. The RAA review allows DON to ensure:

- Remedial Action Objectives (RAOs) are consistent with the onsite risk for current and reasonably anticipated future land use and incorporate measurable progress and response complete strategy
- Reasonable development of remediation goals (RGs), area, and strategy
- Remedial alternatives align with the RAOs - 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 detailed 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.

While the RAA is a standalone deliverable, it should be recognized that it is an integral part of the FS scoping effort and 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 and remediation strategy that are protective of human health and the environment.

The attached RAA template focuses on the Conceptual Site Model (CSM), the RAOs, the RGs, the previously screened alternatives, and the rationale for choosing the remedial alternatives that are retained for detailed comparative analysis in the remedy selection document. 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. The RPMs or designated Contractors are to submit the completed RAA for review using the Naval Installation Restoration Information Solution (NIRIS) Document Review Application Module. The subject matter experts (SMEs) from LANT, PAC, or NAVFAC Engineering and Expeditionary Warfare Center (EXWC) will provide review and collaborate with the RPM for resolving the comments/recommendations.

## 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 & RESPONSIBILITIES

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*

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 SME review. 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. RPM is also responsible for ensuring that the outcome of the RAA review and evaluation is incorporated in the draft remedy selection document, (e.g., Draft FS) that will be submitted for review in accordance with the NAVFAC QDR Directive. 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*

DON Contractors who write remedy evaluation documents will be required to prepare an RAA as a non-regulatory deliverable for internal DON use. RAA preparation shall be closely coordinated with the RPM. The contractor will be responsible for preparing the RAA in accordance with the RAA template, and submitting the RAA package (including all appropriate figures, tables, and CSM for review in accordance with the procedures outlined below). Following review by the SME leads, the contractor shall prepare written response to comments (RTCs) and work with the lead technical reviewer and the RPM to resolve review comments. The contractor will be responsible for incorporating RAA review findings in the draft remedy evaluation document.

All contractors who prepare remedy evaluation documents will identify a POC who will provide the 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 DON 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 confirm the schedule with RPMs and submit the look- ahead schedule to the appropriate LANT or PAC POC at the beginning of each quarter.

*LANT, PAC, and EXWC 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 an RAA review request to document any *de minimis* waivers for future

tracking and reporting, though an 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 using the Naval Installation Restoration Information Solution (NIRIS) Document Review Application and uploading the RAA and related documents (figures, tables, CSM, etc.). The NIRIS Document Review Application can be accessed from the NAVFAC Portal https://niris.navfac.navy.mil/se/nirisportal/index.html, under NIRIS Tools.

The LANT or PAC POC, in conjunction with the EXWC POC, will assign SME leads for RAAs submitted from their respective AORs from among the SMEs) in LANT, PAC, or EXWC and add back-up team members as project or regional complexity dictates. The POCs will monitor the RAA review progress and will follow-up with RPMs and SME leads on RAA reviews to ensure that the RAAs are achieving their intended purpose. The LANT or PAC POC will also follow-up with the SME lead to ensure that the RAA review request is properly closed within the Document Review Application.

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.

*SME 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 SME lead will upload comments to NIRIS (or send to the LANT or PAC POC to upload), and coordinate RTCs and comment resolution. The SME lead (and if required, the LANT or PAC POC) will participate in comment resolution meetings as necessary. The SME lead will coordinate with the LANT and PAC POCs for uploading the comments and RTCs and for providing "key findings" to properly closeout the RAA review request.

## LEVEL-OF-EFFORT AND CONTRACTING

Contractors will compile information to create the RAA from readily available resources such as the Site Inspection (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 RAA expeditiously and cost-effectively. RAA summarizes the thought process as part of the FS, EE/CA, CMS, or CAP Scoping. Since the RAA is a brief summary document, RAA preparation should require a level of effort no greater than 24 – 40 hours. 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 by the SMEs 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.

The RPM should insert language into the SOW in CTOs related to remedy evaluation and selection 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). Upon receipt of review comments from the Navy, RTCs shall be prepared for all review comments.* 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. 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:

- FS for CERCLA: The RAA would be developed and submitted after the CSM, RAOs, and RGs are used to identify and screen potential treatment and disposal technologies based on their technical Implementability and effectiveness.
- 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.
- 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.
- 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 not exceeding 8 to 10 pages text with a brief appendix of supporting information including appropriate tables and figures. 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. Since the RAA is prepared during the early stage of the remedy selection process, information related to cost estimates, should not be developed for the RAA. For the remedy alternatives, the RAA should list the alternatives that were considered but would not be carried forward to the detailed analysis phase. For the alternatives selected for the detailed analysis, the RAA should include sufficient detail 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.

**RAA SUBMITTAL**

The RPM or the contractor's RAA POC submits the RAA package (including all appropriate figures, tables) to the NIRIS RAA module, where the appropriate LANT or PAC POC will begin tracking. The LANT or PAC POC will add the SME lead and other reviewers to the NIRIS entry once their availability has been established. The RPM should be copied on all RAA review requests.

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**

LANT and PAC POCs, in conjunction with the EXWC POC, will take the lead in administering the RAA review process, assign reviewers, and will ultimately be responsible for ensuring that reviews occur on time. The RAA reviewers will be NAVFAC technical support personnel at LANT, PAC, EXWC, or technical staff at one of the FECs, selected based on the reviewer's expertise and availability. A single SME lead reviewer will typically review the RAA and depending on the RAA complexity, the SME lead may solicit an additional reviewer to ensure local, regional, or special regulatory knowledge is available and leveraged to ensure comprehensive reviews. The SME lead is responsible for the review, and for working with the LANT or PAC POC, RPM and the contractor until the NIRIS Review Request is closed.

SME leads and review teams will have 14 business days to conduct the 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 SME lead reviewer. At any time during the process, the SME lead 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 SME lead will review and collate comments received from all reviewers and either upload to NIRIS or send the resultant comment package directly to the LANT or PAC POC who will provide the review comments to the RPM and contractor.

**RESPONSE TO COMMENTS AND DOCUMENT REVISIONS**

The RAA review may reveal important data gaps in the CSM or important questions that

should be considered during remedy evaluation and selection. Once RAA comments are received, the RPM will coordinate with their contractors to prepare RTCs and provide them to the LANT or PAC POC and the SME lead within 10 business days. If needed, the LANT or PAC POC, SME lead, or RPM can organize a conference call to resolve any outstanding issues. All review comments are expected to be resolved from the final review within 8 business days. In case there are still unresolved comments, the LANT or PAC POC and the RPM should discuss these with the ER Manager.

The following summarizes schedule for the entire RAA review process:

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| Review Period for SMEs | 14 business days |
| Response to Comments by RPM/Contractor | 10 business days<br>(can allow more if requested) |
| Final Resolution of Comments | 8 business days |

The RPM is responsible for making sure the contractor incorporates all the necessary changes in the draft remedy selection document, in accordance with the final resolution of the RAA comments. A revised RAA is not necessary. 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.

Because the RAA is part of the optimization process, the completion of the SME review of each RAA shall be recorded by the RPM in the NORM Optimization Module so that optimization metrics can be tracked.

**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. 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 RAA review 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 NIRIS Document Review Application and shared across NAVFAC through multiple media (RPM Newsletters, RITS, 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 NIRIS Document Review Application 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 ER,N Program Directive for Quality Document Review (QDR) of DON IRP Sites, June 2018

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 2018

**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)**

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| **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.<br>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.<br>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 |

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| | | 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.<br>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.<br>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 |

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| | | to plants, invertebrates, and wildlife or if they are expected to be minimal at the site.<br>Quantify risk for each COC and exposure pathways. Use tables to summarize potential unacceptable risk results.<br><br>State whether a screening or baseline ERA was performed and whether the background policy was followed. Describe any unusual exposure parameters that<br>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.<br>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:<br><br>• Limit direct exposure to contaminants in surface soil by human and ecological receptors.<br>• Remove contaminant mass in the vadose zone to the degree necessary to prevent further degradation of the underlying groundwater.<br>• Limit human and ecological exposure to contaminated sediments.<br>• Prevent COCs in groundwater from reaching points of compliance (POCs) at concentrations above the clean-up goal.<br>Protect future residential receptors from unacceptable risks associated with inhalation and ingestion of volatile organic compounds (VOCs) in groundwater.<br>• Prevent infiltration of precipitation into landfill |

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| | | waste to minimize leachate.<br>• Prevent direct contact with landfill contents. Use Guidance for Optimizing Remedy Evaluation, Selection, and Design (NAVFAC 2010) and the<br>• Navy/Marine Corps Policy for Optimizing Performance *and Sustainability of Remedial and Removal Actions*<br>• (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.<br>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. |

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| **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.<br>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. Also provide information about any major concerns from stakeholders including regulatory agencies, if relevant for remedy selection at the site. |

**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 |
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| Alternative #1<br>No Action | • No Action Alternative (include for FS only)<br>• Does not include LUCs, monitoring, or cost. |
| Alternative #2 | • Provide remedy information for Alternative #2.<br>• Describe in sufficient detail so reviewer will understand proposed remedial alternative.<br>• 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).<br>• **Describe the exit strategy for each technology or remedy component of the treatment train targeting a particular target treatment zone.**<br>• Describe any land use controls (LUCs).<br>• 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.<br>• 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