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From: Commander, Naval Facilities Engineering Command (ENV)

Subj: POLICY FOR OPTIMIZING REMEDIAL AND REMOVAL ACTIONS AT ALL Department of Navy (DON) ENVIRONMENTAL RESTORATION PROGRAM SITES

Ref: (a) DOD Manual (DODM) 4715.20, Defense Environmental Restoration Program (DERP) Management, March 2012
(b) DON Environmental Restoration Program (NERP) Manual, August 2006
(c) OUSD Memorandum: Consideration of Green and Sustainable Remediation (GSR) Practices in the Defense Environmental Restoration Program, August 2009
(d) DON Guidance for Planning and Optimizing Monitoring Strategies, November 2010
(e) DON Guidance on GSR, April 2012
(f) DON Tiered Approach for Developing Sampling and Analysis Plans, June 2011
(g) DON Guidance for Optimizing Remedy Evaluation, Selection, and Design, March 2010
(h) DON Guidance for Preparing a Remedial Alternatives Analysis (RAA) Document, August, 2010
(i) DON Management and Monitoring Approach for DON ER Program Post ROD Sites, April 2012
(j) DON Monitoring Report Template, May 2011
(k)DON Guidance for Optimizing Remedial Action Operation (RAO), April 2001
(l) DON Guidance to Documenting the Milestones throughout the Site Closeout Process, March 2006

Encl: (1) DON Policy for Optimizing Performance and Sustainability of Remedial and Removal Actions at All DON Environmental Restoration Program Sites

1. Enclosure (1) supersedes "Navy and Marine Corps Policy for Optimizing Remedial and Removal Actions at all Installation Restoration and Munitions Response Program Sites", dated April 2004.

2. This updated Policy clarifies when Optimization Reviews are necessary and provides effective remedial strategies to meet remedial action objectives. It also mandates the following actions be performed on DON sites: 1) GSR be incorporated into the Optimization process, 2) Perform an RAA to ensure sites have been effectively optimized, and 3) Ensure use of SiteWise™ tool in all GSR actions. Finally, in order to facilitate the documentation of effective monitoring efforts during the optimization process, this Policy also recommends the use of the Management and Monitoring Approach (MMA) for DON sites.

Subj: POLICY FOR OPTIMIZING REMEDIAL AND REMOVAL ACTIONS AT ALL Department of Navy (DON) ENVIRONMENTAL RESTORATION PROGRAM SITES

3. This policy has been coordinated and concurred with by the U.S. Marine Corps.

4. The Headquarters point of contact for this Policy is Ms. Kim P. Brown, (202) 685-0096 or e-mail, kim.brown@navy.mil.

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Department of the Navy (DON) Policy for Optimizing Performance and Sustainability of Remedial and Removal Actions At All DON Environmental Restoration Program Sites April 2012

Ref: (a) DOD Manual (DODM) 4715.20, Defense Environmental Restoration Program (DERP) Management, March 2012

(b) DON Environmental Restoration Program (NERP) Manual, August 2006

(c) OUSD Memorandum: Consideration of Green and Sustainable Remediation Practices in the Defense Environmental Restoration Program, August 2009

(d) DON Guidance for Planning and Optimizing Monitoring Strategies, November 2010

(e) DON Guidance on Green and Sustainable Remediation, April 2012

(f) DON Tiered Approach for Developing Sampling and Analysis Plans, June 2011

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(h) DON Guidance for Preparing a Remedial Alternatives Analysis (RAA) Document, August, 2010

(i) DON Management and Monitoring Approach (MMA) for DON ER Program Post Record of Decision (ROD) Sites, April 2012

(j) DON Monitoring Report Template, May 2011

(k) DON Guidance for Optimizing Remedial Action Operation (RAO), April 2001

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Background

As the DON has progressed through implementation of the Environmental Restoration (ER) Program, many sites have advanced

through the remedy evaluation, selection, design and construction phases and are undergoing Remedial Action Operation (RA-O) and Long Term Management (LTMgt). This has shifted a growing proportion of the available Environmental Restoration Navy (ER,N) and Base Realignment and Closure (BRAC) funds to these long-term site cleanup commitments. The ER Program benefits from remedy optimization efforts by ensuring the most appropriate remedies are screened, evaluated, selected, designed, and properly operated/maintained. Options are available to modify systems to ensure cleanup objectives are met in a timely, cost effective manner while minimizing negative environmental effects.

Section 4, Paragraph (5)(b)of the DOD Manual 4715.20, Defense Environmental Restoration Program (DERP) Management, Reference (a) and Section 10.5.2 of the Navy Environmental Restoration Program (NERP) Manual, Reference (b) requires the Navy to continually optimize remedies. In addition, the OUSD Memorandum, Reference (c) recommends evaluation of Green and Sustainable Remediation (GSR) opportunities and implementation where and when it makes sense. DON considers GSR to be a part of the overall Optimization program and shall incorporate GSR initiatives into all optimization efforts. This policy clarifies when, where and how to incorporate optimization and GSR considerations into the DON ER Program.

Applicability

This policy applies to all cleanup actions conducted at DON ER,N and BRAC Funded Program Sites.

Policy

Opportunities to improve performance and to evaluate green and sustainable remediation (GSR) practices shall be considered and implemented throughout all phases of remediation regardless of the regulatory framework under which cleanup may occur. The procedures outlined in this policy and the referenced guidance documents are to be used during the following activities:

- Site Characterization,
- Remedy Evaluation and Selection,
- Remedial Design and Construction,
- Remedial Action Operation, and
- Long Term Management.

The concept of GSR emphasizes and promotes consideration of sustainability practices throughout the entire remedial process. The ER Process has different phases where optimization evaluations and GSR analyses can be identified and implemented, which can be included during the following steps: remedial investigation (RI), feasibility study (FS), remedial design (RD), remedial action operations (RA-O) and long-term management (LTMgt) (shown in Figure 1 provided at the end of this Policy). These steps of the remediation process often present opportunities to apply some form of GSR.

Routine optimization efforts such as recommendations from the O&M contractor or remedial project manager should be a regular practice for all projects. Periodically these efforts need to be reviewed by independent senior technical staff. These optimization reviews should include an evaluation of GSR considerations. To ensure an independent review, the review team should include technical experts who are not involved with the design or routine O&M of the remedy. The following options are appropriate for third-party optimization reviews:

- Tiger Teams - Two options, mostly for complex sites

    1. *NAVFAC ESC Tiger Team* - A third party independent optimization review coordinated through NAVFAC ESC drawing upon expertise from industry, academia, other government agencies, and DON. Depending on site specific requirements, this could be mostly a contracted effort.

    2. *Internal Tiger Team* - A third party optimization review primarily by an internal DON team with senior technical staff from DON organizations; e.g., NAVFAC Atlantic, NAVFAC Pacific, Other FECs, NAVFAC ESC, and BRAC PMO. Relatively minor contract support may be acquired to support this effort.

- Contracted Team - using contractors not involved with the site remedy being evaluated

- Project Team - with participation from senior technical staff from the FEC and/or other Navy resources from Echelon III.

For sites with minor remediation and little opportunity for optimization, de minimis sites (e.g., less than 100 cubic yards soil excavation) formal optimization reviews may not be

necessary. For de minimis sites, the RPM should consult senior technical staff from the FEC and/or other Navy resources from Echelon III, to determine if an optimization review is necessary.

1. Site Characterization - Optimization and GSR considerations during the initial ER project phases include systematic planning, defining and implementing data quality objectives, and identifying and implementing improved strategies for site characterization. The NERP Manual, Reference (b), the DON Guidance for Planning and Optimizing Monitoring Strategies, Reference (d),the DON Guidance for Green and Sustainable Remediation, Reference (e), and the DON Tiered Approach for Developing Sampling and Analysis Plans, Reference (f) shall be followed during this stage of the project.

2. Remedy Evaluation and Selection - It is anticipated that the greatest opportunities to improve performance and reduce the footprint of the Navy ER Program are associated with the remedy selection process. Therefore, special emphasis is placed on addressing optimization and sustainability during remedy selection. The approaches outlined in the Navy Guidance for Optimizing Remedy Evaluation, Selection and Design, Reference (g), and Reference (e) shall be followed. Following these guidance documents will ensure that the most appropriate response actions are screened, evaluated, and selected for each Navy/Marine Corps ER Site.

As the ER program has matured, there are several remedial strategies which have proven to be effective in meeting remedial action objectives. Multiple remediation technologies are typically implemented sequentially as a "treatment train" for each target treatment zone (TTZ) to achieve cost-effective remediation at a site. In situ treatment (e.g. in situ chemical oxidation, enhanced bioremediation) and/or removal actions (e.g. excavation) are typically focused on highly-contaminated source zones.

Following treatment of the source area, passive in situ technologies, such as natural attenuation or enhanced bioremediation, are typically implemented to further reduce contaminant mass and achieve ultimate remediation goals. For sites where contaminated groundwater has reached an active installation property boundary or is threatening to migrate off-site, in situ passive barriers or containment technologies (e.g.

zero-valent iron permeable reactive barrier, biobarrier) are often used to intercept and treat contaminated groundwater and prevent or minimize off-site plume migration.

For BRAC sites undergoing soil and groundwater cleanup, property transfer and reuse factors should also be considered during remedy selection and design. Land use controls (LUCs) are typically implemented as part of treatment trains to prevent exposure to site contamination and to prevent unacceptable land use during remedy implementation and RA-O/LTMgt. These types of remediation strategies and optimization efforts should be considered, when practicable, in remedy selection to achieve the greatest return on investment.

A two phase approach shall be used for remedy evaluation/selection documents (i.e., FS, Engineering Evaluation/Cost Analysis [EE/CA], Corrective Measures Study [CMS] or Corrective Action Plan [CAP]). Phase 1 is an initial optimization step called the Remedial Alternatives Analysis (RAA), and Phase 2 includes remedy optimization and a GSR analysis of each of the alternatives evaluated in the remedy selection document.

2a. Remedy Evaluation and Selection Phase 1- Remedial Alternatives Analysis: For the initial optimization step, a brief RAA document shall be prepared for internal review prior to developing the draft remedy evaluation/selection document. The RAA shall be prepared and reviewed in accordance with Reference (h) for DON sites. The goal of the RAA review is early and quick optimization of the remediation alternatives that will ultimately be considered in the remedy evaluation document. This step ensures that all appropriate alternatives have been identified and that the alternative screening process has not eliminated appropriate alternatives prematurely. These alternatives are typically carried forward into the remedy evaluation document for further analysis.

2b. Remedy Evaluation and Selection Phase 2 - Remedy Optimization and GSR Analysis: Each alternative carried forward into the draft remedy evaluation document shall be optimized in accordance with Reference (g).

Reference (g) provides details on the optimization concepts that should be incorporated in the remedy evaluation process and documented in the remedy evaluation and decision documents. These include development of a

conceptual site model, realistic remedial action objectives, performance objectives, and identifying treatment zones and exit strategies.

As part of this step, remedy footprint analysis using the SiteWise™ tool shall be conducted in accordance with Reference (e). Other tools, such as the AFCEE Sustainable Remediation Tool (SRT™) or similar GSR tools can also be used; but they can only be used in conjunction with or after an analysis using the SiteWise tool has first been performed. The GSR metrics used for this analysis may include green house gas (GHG) emissions, energy consumption, air pollutants, water impacts, ecological impacts, resources consumption, worker safety and community impacts.

The GSR metrics shall be incorporated into the review of the CERCLA Nine-Criteria as described in Reference (e). While it must be emphasized that meeting the traditional requirements of remediation (e.g., protection of human health and the environment and compliance with applicable or relevant and appropriate requirements) is still of primary importance, there may be significant differences in the environmental footprint among alternatives that meet these requirements, and those remedies with the lesser footprint should be viewed more favorably.

2c. Special Technical Issue- Remedy Selection Optimization for new pump and treat Systems: Since 1998, the Navy and other DoD Components have been conducting evaluations of the effectiveness of "pump and treat" systems to address groundwater contamination. Consensus of all parties is that pump and treat systems are rarely the optimal alternative for groundwater response actions. Therefore, any plans to install new pump and treat systems on Navy and Marine Corps installations requires approval from the Naval Facilities Engineering Command Headquarters (NAVFAC HQ). This requirement applies to all "pump and treat" systems (remedial and removal actions) where groundwater is removed from the sub-surface by pumping or other means, treated above ground in any way, and discharged in any way (i.e. off-site disposal, sewer systems, re-injected, etc.). In order to receive NAVFAC HQ approval, the ER Manager shall forward:

- a summary of the site background,
- the conceptual site model (CSM),

- the remedial action objectives (RAO),
- a listing of the technologies screened for the site,
- a summary of the alternatives analysis,
- a statement of why "pump and treat" is the most appropriate technology to be used at the site,
- a life cycle cost analysis (net present value and total site cost), and
- an exit strategy.

NAVFAC HQ will provide a written approval/disapproval response to the ER Manager based on review of this submittal.

3. ***Design and Construction*** - The guidance outlined in References (e) and (g) shall be followed during Remedial Design, to the extent practicable. These guidance documents could also be referenced during the Remedial and/or Removal Action Construction phase; applicability during this phase will likely be due to changed conditions found during construction.

Following this guidance while designing and constructing the remedy will ensure that the most appropriate response actions are implemented for each DON ER Site.

4. Operation - For sites where the remedial action objectives are not achieved at the completion of the remedial action construction phase, operation of the remedial/removal system commences. The performance of these systems should be evaluated at least annually to measure progress toward the remedial action objectives and identify possible opportunities for optimization. The Management and Monitoring Approach (MMA), Reference (i), may be used to develop well-written annual monitoring reports; this approach is particularly applicable for annual monitoring reports where significant amounts of data may be included. The MMA builds upon the NAVFAC Monitoring Report Template, Reference (j) which was developed to provide a consistent format for RPMs to document the long term management process. This type of documentation will facilitate future optimization efforts and Five-Year Reviews. A more rigorous optimization review shall be conducted if the annual evaluation reveals poor or erratic remedial performance, excessive operating costs, frequent equipment breakdowns, or high monitoring costs. The DON Guidance for Optimizing Remedial Action Operation (RA-O), Reference (k), along with Reference (e), shall be followed for optimizing the RA-O phase of the process. SiteWise™ may be used to quantify GSR metrics of the existing system and evaluate the impact of potential optimization options. These metrics may also be

useful to support decisions to transition from one phase of remedial operation to another. Reference (d), shall be followed to optimize any monitoring program(s) associated with the remedy.

Following these guidance documents during the RA-O phase will ensure that the remedy is operating efficiently and as designed, with minimal negative impacts to the environment. Spatial and temporal trend analysis of data will help assess system performance and its ability to effectively treat the target area contaminants. Data analysis shall be used to determine 1) when each technology has reached its limit of effective use, 2) when it is time to transition a remedy to a sequential phase, 3) whether a remedy needs to be modified or replaced with a more effective system, and 4) when remedial objectives have been met. If the ROD is not sufficiently flexible to allow implementation of the optimization recommendations, then it may be necessary to prepare an ESD or ROD amendment. Check with your counsel before implementing significant remedy changes.

5. Long Term Management (LTMgt) - When the remedial action objectives have been met and the Response Complete (RC) milestone has been reached, there may be a need for further LTMgt to ensure the remedy remains protective if the cleanup levels achieved do not allow for unrestricted use of the property. Reference (d) and Reference (e) shall be followed. As was mentioned in Paragraph 4, Operation, the NAVFAC MMA, Reference (i), may also be used for LTMgt to develop well-written monitoring reports. Following these guidance documents will ensure that the LTMgt requirements are achieved in a cost effective manner.

6. Tracking and Reporting - An optimization module is located in the Navy's NORM database where RPMs shall update and track optimization efforts through all phases of the cleanup process on a semi-annual basis. The Navy will use this data to report on our efforts to continuously optimize and improve the sustainability of our remedies. Specific guidance for inputting data into NORM shall be provided in future NAVFAC HQ Budget Guidance documents. GSR metrics are also included in the NORM optimization module.

7. Response Complete and Site Closeout Documentation - There are a growing number of DON sites approaching Response Complete (RC) and Site Closeout (SC) milestones, and achieving these milestones in an efficient manner is important to the DON. Optimization actions in accordance with DON guidance documents

are essential to achieving these milestones efficiently and cost effectively. The RC milestone signifies that DON has achieved remedial action objectives at a site (e.g., MCLs). SC is a milestone that signifies DON has completed active management and monitoring at a remediation site, the site has achieved unlimited use unrestricted exposure (UU/UE), and no additional funds are expected to be expended at the site. However, there are some sites that will achieve RC while never achieving the SC milestone, because achieving RC does not equate to UU/UE for all sites (e.g., landfills). Both of these situations are important milestones in the Environmental Restoration Program that must be documented. To help obtain efficient documentation of RC and SC milestones, DON has issued the Guidance to Documenting the Milestones throughout the Site Closeout Process, March 2006 Reference (1).

This guidance outlines a consistent approach for Navy RPMs to follow in recognizing and documenting specific milestones for achieving RC and SC. It identifies the particular documents that are needed at appropriate stages of the ER process to record agreements and concurrence of regulators. These documents include interim remedial action completion report (I-RACR), remedial action completion report (RACR), Final RACR for NPL sites, and RACR Amendment. This guidance also addresses documentation requirements for varied regulatory frameworks - the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the Resource Conservation and Recovery Act (RCRA), and the Underground Storage Tanks (UST) Programs. The RC and SC documentation described in this guide shall be prepared to document these milestones and obtain regulatory concurrence.

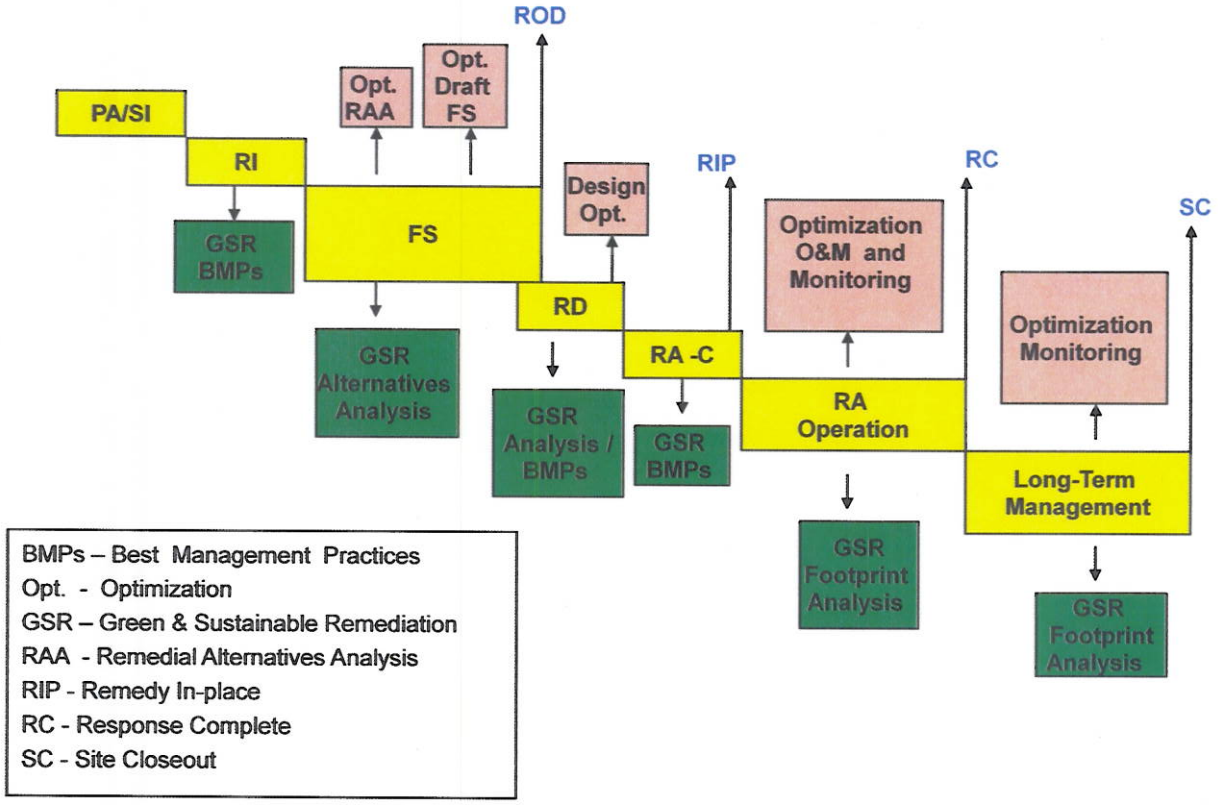

Figure 1. ER Process phases with Optimization Evaluations and GSR Analysis.