NAVFAC
Naval Facilities Engineering Command

FINAL

TOOLKIT FOR PREPARING FIVE-YEAR REVIEWS

DECEMBER 2013

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INTRODUCTION

Toolkit Tip

This toolkit consists of thirteen exhibits and each contains a "Toolkit Tip" to improve the quality and transparency of data presentation in a Five-Year Review.

This Toolkit provides Remedial Project Managers (RPMs) with a resource to help improve the transparency and clarity of Five-Year Reviews (FYRs) developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The Toolkit presents the use of visual communication methods that can enhance the FYRs overall presentation and emphasize the data, analysis, and rationale used to ensure protection of human health and the environment.

The examples in this document **(Exhibits 1-13)** neither replace existing Navy policy and Environmental Protection Agency (EPA) guidance nor substitute statutory and regulatory requirements for a FYR. It is important during development of a FYR to include the level of detail recommended by EPA's *Comprehensive Five-Year Review Guidance* (OSWER 9355.7-03B-P) (June 2001) and consider the use of streamlining and visualization tools for better data presentation.

The FYR should be a stand-alone document that communicates the remedy's protectiveness in an appropriate level of detail. Sometimes, in attempts to be all inclusive and thorough, a FYR includes an excessive amount of detailed information from previous documents. Copying and pasting historical and extraneous information can make the FYR's key messages unclear. RPMs should summarize the key facts from the Administrative Record and relevant documents from the Site File (e.g., long-term monitoring reports, operation and management reports), then apply the recommendations described herein to enhance the FYRs presentation and provide a more concise and defensible protectiveness statement.

Each exhibit provides recommended tips that suggest how and where to consider including improved visualization tools in a FYR. The exhibits show how to better convey information graphically in embedded summary tables, figures, and conceptual site models. Some of these recommended tools may have previously been created during the development of site-specific documents [e.g., Records of Decision (ROD), Decision Documents, long-term monitoring reports]. Information or graphics from previous documents should be utilized when possible to limit duplicative efforts and provide cost avoidance. Most of the exhibits contain examples from Installation Restoration Program sites; however, many of them also apply to Military Munitions Response Program sites (e.g., land use controls).

This Toolkit is the companion to the ROD Toolkit and the Navy's Management and Monitoring Approach. The streamlining tools presented in these Toolkits and the Management and Monitoring Approach may be adapted to other CERCLA documents. An interactive version of this Toolkit, example FYRs, and other references and guidance are available on the Naval Facilities Engineering Command (NAVFAC) website: www.NAVFAC.navy.mil.

This Toolkit is designed to be viewed electronically. This format allows the reader to zoom into the detail presented in the color graphics. Please note that some reformatting may be required for printing.

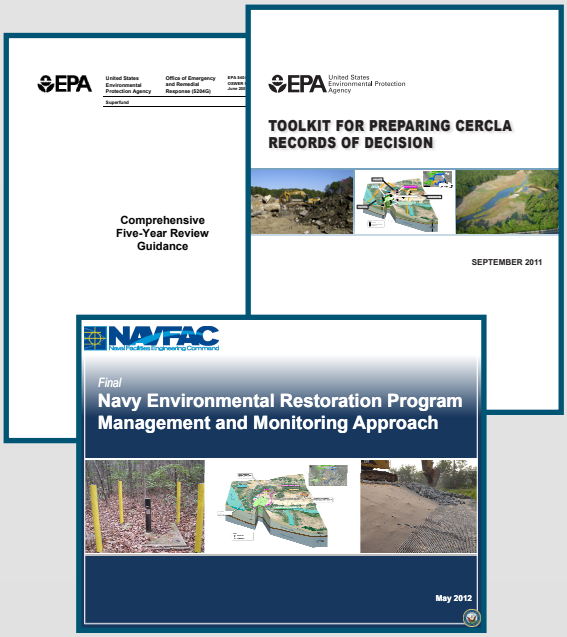


EXHIBIT LIST

Toolkit Tip

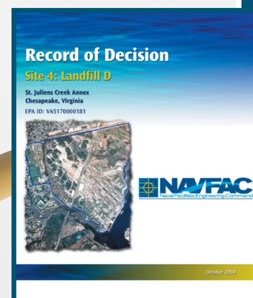
In an attempt to align with Environmental Protection Agency (EPA), the exhibits have been set up in the same order as EPA's *Comprehensive Five-Year Review Guidance.*

EXHIBIT 1	Pathway of the Five-Year Review
EXHIBIT 2	Five-Year Review Timeline
EXHIBIT 3	Site Chronology
EXHIBIT 4	Background
EXHIBIT 5	Remedial Actions
EXHIBIT 6	Progress Since Last Five-Year Review
EXHIBIT 7	Five-Year Review Process
EXHIBIT 8	Technical Assessment
EXHIBIT 9	Issues, Recommendations, and Follow-Up Actions
EXHIBIT 10	Protectiveness Statements
EXHIBIT 11	Community Involvement
EXHIBIT 12	Tracking Milestones
EXHIBIT 13	Executive Summary

Toolkit Tip

This exhibit visually displays the key data and observations that support the evaluation and determination of protectiveness for the Five-Year Review (FYR). Following the hiking trail demonstrates how to evaluate whether the remedy components mitigate risk to achieve the remedial action objectives. The stops along the trail should assist the FYR author with evaluation of remedy performance, identifying any issues, developing clear recommendations, and determining if the remedy is or will be protective of human health and the environment in the long-term.

Required community involvement activities include notification that the FYR will be conducted, notification when the FYR is completed, and providing the results in the Information Repository.



Record of Decision/ Decision Document Signature:

Once the remedy is selected for a site or OU and hazardous substances, pollutants, contaminants, and/or munitions and explosives of concern remain at the site above levels that allow for unlimited use and unrestricted exposure, a FYR is required to determine if the remedy is or will be protective of human health and the environment.

1

Community Notification:

Notify all potentially interested parties that the FYR will be conducted.

NAVFAC
Naval Facilities Engineering Command

PUBLIC NOTICE
CERCLA Five-Year Review
St. Juliens Creek Annex
Chesapeake, Virginia

The Department of the Navy and the US Environmental Protection Agency (EPA) Region 3, with concurrence from the Virginia Department of Environmental Quality (VDEQ), are beginning the first Five-Year Review of the existing Record of Decision (ROD) document and associated ongoing remedial (environmental cleanup) action at St. Juliens Creek Annex, located in Chesapeake, Virginia. A ROD is a public document explaining the selected remedial action for implementation at a site. A Five-Year Review is required by Section 121 of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) for remedial actions which result in any hazardous substances, pollutants, or contaminants remaining at the site and is triggered by the initiation of the remedial action, which was selected in the ROD. The purpose of the review is to ensure that these environmental cleanup actions are adequately protecting human health and the environment. The Navy will submit draft findings of the Five-Year Review to EPA and the VDEQ in November 2009. The final report will be made available to the public in March 2010.

One further action ROD is in place at St. Juliens Creek Annex and will be reviewed during the Five-Year Review. The ROD for Site 4 – Landfill D was signed in September 2004 outlining soil cover, removal of wetland debris, removal of the eastern drainage ditch, and land use controls as the selected remedy. The construction activities to implement this remedial action began March 21, 2005.

The Remedial Action for Site 4 was selected based on findings contained in documents that are part of the Administrative Record for St. Juliens Creek Annex. The Administrative Record provides background information on Site 4, as well as the remedial investigation conducted at the site. Copies of the ROD and all documents that formed the basis for selection of the remedial action are available in the Administrative Record file for St. Juliens Creek Annex through the Publics Affair Office:

Naval Facilities Engineering Command, Atlantic Division
123 Norfolk Avenue
Norfolk, VA 23508-1278
(757) 123-4567

If you have questions or information regarding the effectiveness of the selected remedy, please contact:

Jane Smith
jane.smith@internet.com
(999) 999-9999

2

Technical Assessment:

To determine whether the selected remedy is or will be protective of human health and the environment, consider and respond to the three technical assessment questions. Evaluate site-specific information regarding data collected and the remedy components that were previously developed in the ROD or DD to assess remedy performance. A summary table can be used or developed to evaluate how risk is being mitigated and the progress towards achieving the pre-established RAOs and cleanup levels.

Risk	Media	COC Requiring Action	Basis for Action	RAO	Remedy Component	Exit Strategy	Performance Metric / Cleanup Level	Expected Outcome
Human Health and Ecological	Waste and Soil	Inorganics and 1,4-trichlorobenzene	Non-cancer hazard index of 1.4 HI>1	Prevent or minimize direct contact of human and ecological receptors with landfill contents.	Soil Cover and LUCs	Maintain current land use	Inspect and maintain soil cover and LUCs	Maintain current land use (landfill)
Human Health	Groundwater	1,4-trichlorobenzene	Cancer risk $>10^{-4}$	Prevent contact with and restore groundwater beyond the landfill boundaries to MCLs	LTM and LUCs	Conduct groundwater LTM and maintain LUCs until 1,4-trichlorobenzene is below MCL for four consecutive rounds	70 µg/L	Return aquifer to beneficial use (unlimited use/unrestricted exposure)

3.5 Technical Assessment

The technical assessment of a remedy is based on the following three questions, which provide a framework for organizing and evaluating data and information and ensure that all relevant issues are considered when determining the protectiveness of the remedy.

Question A: Is the remedy functioning as intended by the decision document?

Based on the review of documents, applicable or relevant and appropriate requirements, risk assumptions, inspections, and voluntary groundwater performance monitoring results, the Site 4 remedy is functioning as intended by the ROD and ROD amendment. Installation of the soil cover over the landfill waste and contaminated soil achieved the remedial objectives. Inspections conducted at the site have confirmed that the soil cover is intact; preventing or minimizing direct contact of human health and ecological receptors with landfill contents. The as-built survey confirmed that the minimum 2 percent slope, which was designed to reduce infiltration and resulting leaching of contaminants from the landfill into groundwater, was achieved. Additionally, the inspections, which did not identify any sign of erosion or sediment buildup within the upland drainage ditches, and the as-built survey, have confirmed that overland flow entering the site is being prevented and surface water run-off and erosion are being controlled.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy selection still valid?

Changes in Exposure Pathways No changes in the site conditions that would affect exposure pathways have been identified. No new contaminants, sources, or routes of exposure have been identified. There is no indication that hydrologic or hydrogeologic conditions have changed in a way to affect the protectiveness of the remedy.

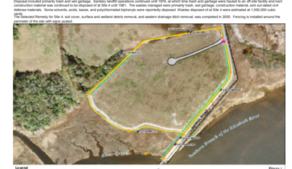
Changes in Toxicity and Other Contaminant Characteristics Although there have been some changes in toxicity values, regulatory levels, and risk characteristics of some constituents detected in Site 4, these changes would not affect the protectiveness of the selected remedy as it would not substantially change the results of the risk assessment.

Changes in Risk Assessment Methodologies Although there have been some procedural changes to how risk assessments are conducted, none of these changes affect the protectiveness of the remedy. The elimination of risk from exposure to waste and COCs in soil occurred through the direct elimination of exposure pathways. Elimination of risk to mercury in sediment occurred through removal of the contaminated sediment to background levels; therefore, risk assessment methodology changes would not change the cleanup level for mercury. No additional COCs have been identified and there is no clear increasing trend of constituents analyzed for as part of the voluntary groundwater performance monitoring.

Question C: Has any other information come to light that could question the protectiveness of the remedy?

No new risks were identified during the Five-Year Review. No weather-related events have affected the protectiveness of the remedy. There is no other information that calls into question the protectiveness of the remedy.

Site 4 - Landfill D
St. Juliens Creek Annex, Chesapeake, Virginia



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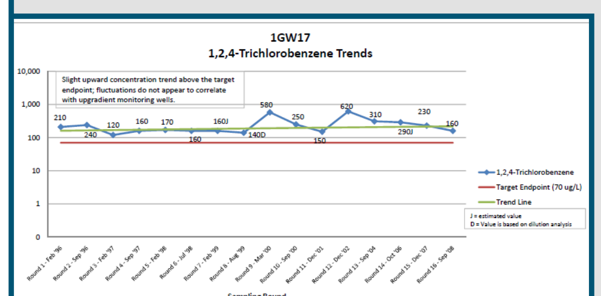

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Issues, Recommendations, Follow-Up Actions:

After responding to the technical assessment questions, identify any issues that effect the current or future protectiveness of the remedy and any follow-up actions needed.

3.6 Issues and Associated Recommendations, and Follow-up Actions

Based on this Five-Year Review, the following issues have been identified:

Issue	Recommendations and Follow-up Actions	Party Responsible	Milestone Date	Affects Protectiveness Current	Affects Protectiveness Future
State regulatory standards have been updated since the ROD	Update COCs and cleanup levels for LTM	Navy	Nov. 2012	No	Yes
LTM program was optimized and identified extraneous well locations	Evaluate LTM monitoring well networks and recommend wells for abandonment	Navy	Nov. 2014	No	No

3.7 Protectiveness Statement

The remedy at Site 4 is protective of human health and the environment. All threats at the site have been addressed through installation of a soil cover over the contaminated soil and waste and LTM is ongoing to monitor 1,4-trichlorobenzene in groundwater and potential migration. LUCs are in-place to prevent exposure to soil and waste within the landfill and prohibit groundwater intrusive activities and aquifer use until the MCLs is achieved.

3.8 Next Review

In accordance with Navy policy, the next Five-Year Review should be signed no later than five-years after the signature date of this report.

4

Protectiveness Statement:

Develop a protectiveness statement for each site or OU using the EPA's FYR Guidance (June 2001) Exhibits 4-6 and 4-7.

4.5.1 How do I formulate protectiveness statements?

You should develop a protectiveness statement for each OU at which a remedial actio[n] has been initiated. For sites that have reached construction completion and have more than o[ne] OU, you should develop an additional comprehensive site-wide protectiveness statement covering all of the remedies at the site. You should not include this additional protectiveness statement until construction completion because, until then, all remedies at the site may not necessarily have been selected and constructed.

In order to promote consistency, you are strongly encouraged to model your protectiveness statements on the sample protectiveness statements provided in Exhibits 4-6 a[nd] 4-7. Your Five-Year Review report should present the protectiveness statements at the begin[ning] of a discussion that should explain and provide the supporting rationale of the protectiveness determination.

Exhibit 4-6: Protectiveness Statements

If the remedial action at the OU is:	then use this statement ...
under construction and...	
protective or will be protective	"The remedy at OU X is expected to be protective of human healt[h] and the environment upon completion, and in the interim, exposur[e] pathways that could result in unacceptable risks are being controll[ed]."
not protective	"The remedy at OU X is not protective because of the following issue(s) (describe each issue). The following actions need to be taken (describe the actions needed) to ensure protectiveness."
protectiveness deferred	" A protectiveness determination of the remedy at OU X cannot be made at this time until further information is obtained. Further information will be obtained by taking the following actions (describ[e] the actions). It is expected that these actions will take approximat[ely] (insert time frame) to complete, at which time a protectiveness determination will be made."

Exhibit 4-6: Protectiveness Statements

If the remedial action at the OU is:	then use this statement ...
operating or completed and...	
protective	"The remedy at OU X is expected to be protective upon completion or is protective of human health and the environment, and in the interim, exposure pathways that could result in unacceptable risks are being controlled."
protective in the short-term	"The remedy at OU X currently protects human health and the environment because (describe the elements of the remedy that protect human health and the environment in the short term). However, in order for the remedy to be protective in the long-term, the following actions need to be taken (describe the actions needed) to ensure long-term protectiveness."
not protective	"The remedy at OU X is not protective because of the following issue(s) (describe each issue). The following actions need to be taken (describe the actions needed) to ensure protectiveness."
protectiveness deferred	" A protectiveness determination of the remedy at OU X cannot be made at this time until further information is obtained. Further information will be obtained by taking the following actions (describe the actions). It is expected that these actions will take approximately (insert time frame) to complete, at which time a protectiveness determination will be made."

Exhibit 4-7: Comprehensive Protectiveness Statements for Sites That Have Reached Construction Completion

If the remedy(ies) is/are ...	then use this statement:
protective	"Because the remedial actions at all OUs are protective, the site is protective of human health and the environment."
not protective	"The remedial actions at OUs X and Y are protective. However, because the remedial action at OU Z is not protective, the site is not protective of human health and the environment at this time. The remedial action at OU Z is not protective because of the following issue(s) (describe each issue). The following actions need to be taken (describe the actions needed) to ensure protectiveness."

5

Five-Year Review Signature

6

Community Notification:

Notify all potentially interested parties that the FYR has been completed and where it is available.

PUBLIC NOTICE
Completion of Five-Year Review of Remedial Actions at Marine Corps Base Camp Lejeune, North Carolina

The Navy, Marine Corps, US Environmental Protection Agency (EPA) Region 4, and North Carolina Department of Environment and Natural Resources (NCDENR) completed a five-year review of ongoing remedial actions (environmental cleanup) at 16 Operable Units on Marine Corps Base Camp Lejeune. This is the Base's third five-year review.

The purpose of the five-year review is to ensure that remedial actions are providing adequate protection of human health and the environment. The findings of the five-year review were finalized in 2010. All ongoing remedial actions were determined to be protective of human health and the environment.

The Five-Year Review Report and a Fact Sheet are available for public review in the Navy's Administrative Record at the following website and location: http://go.usa.gov/jZi .

Onslow Public Library
58 Doris Avenue East
Jacksonville, NC 28540
(910) 455-7350

Members of the public who have questions regarding the five-year review are encouraged to contact the Navy Remedial Project Manager.

Jane Smith
jane.smith@internet.com
(999) 999-9999

The next five-year review for ongoing remedial actions at Marine Corps Base Camp Lejeune is scheduled for 2015.

Tracking Milestones:

After finalization of the FYR, track the progress and completion of recommendations and follow-up actions. A simple table can be used to ensure issues and recommendations are tracked, monitored, and implemented so that the milestones are achieved.

Issues	Recommendations and Follow-up Actions	Milestone Date	Current Status
State regulatory standards have been updated since the ROD	Update COCs and cleanup levels for LTM	Nov. 2012	Completed as part of FY2012 LTM
LTM program was optimized and identified extraneous well locations	Evaluate LTM monitoring well networks and recommend wells for abandonment	Nov. 2014	Will be completed as part of FY2013 UFP-SAP

EXHIBIT 2. FIVE-YEAR REVIEW TIMELINE

Toolkit Tip

Constructing a timeline for your Five-Year Review (FYR) can aid Remedial Project Managers (RPMs) in completing and obtaining signatures within the required timeframe. Coordination with stakeholders is recommended to identify any additional activities and determine the signature process. By clearly developing the signature process early, missing the FYR deadline can be avoided. FYR signature is required within five years of the initial triggering action. Subsequent FYR signatures are required within five years of previous FYR signature dates.

To ensure the FYR schedule can be met, the FYR process should commence within a minimum of twelve months before the signature due date, as shown in this exhibit. When nearing the completion of the current FYR, begin planning for the next FYR and revise your timeline as needed based on how long the current FYR took and incorporate time for evaluation of any new sites added.

The Navy, as the lead agent is responsible for enforcing the FYR dates. NORM has a module that allows RPMs to track these dates.

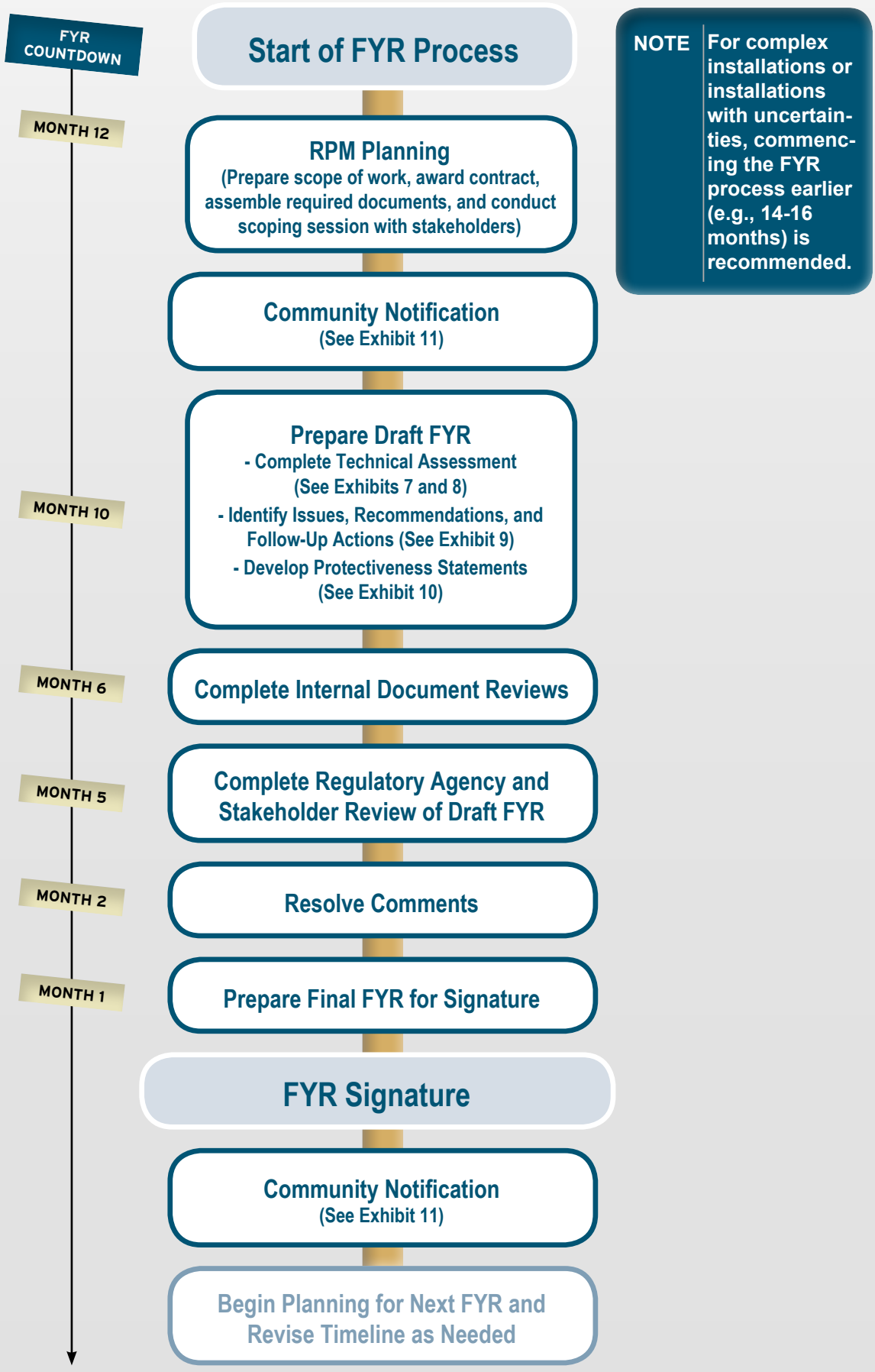


EXHIBIT 3. SITE CHRONOLOGY

Toolkit Tip

List the major site events and relevant dates. Consider using time lines highlighting key milestones for investigations and actions including:

- Initial discovery of problem or contamination
- Addition to National Priorities List (NPL)
- Federal Facilities Agreement signature
- Removal actions
- Remedial Investigations/ Feasibility Studies
- Record of Decision (ROD) signature
- ROD Amendments/ Explanation of Significant Differences
- Remedial Action start and complete
- Final Construction Completion Report
- Previous Five-Year Reviews

SECTION 7

7 Site 12 - Barracks Road Landfill

7.1 Site Chronology

1925-1960s	Wastes (incinerator ash, refuse, scrap wood, explosives-contaminated packaging, and possibly solvents) were reportedly disposed of at this landfill.
1984	IAS
1986-1988	Confirmation Studies Round I and II
1991-1996	RI – Rounds One and Two
1996	FS
1996	PP
April 16, 1997	ROD for soil signed
January 29, 1998	Completed Remedial Actions for demolition of incinerator facilit installation of clay cover, re-grading and erosion control
2012	Draft 2012 LUC RD

NOTE For key milestone dates (e.g., ROD signature, site-wide construction complete, previous Five-Year Reviews) consider including an exact date (e.g., April 16, 1997).

7.2 Background

Site 12, the Barracks Road landfill, is located in the eastern portion of WPNSTA Yorktown (Figure 1-1). Site 12 consists of three former disposal areas: Area A, Area B/C, and the Wood/Debris Disposal Area (Figure 7-1).

SECTION 4

Site 11—Plating Shop

4.1 Site Background and Chronology

Site 11 is located in the eastern portion of the base, near the intersection of Seventh and E Streets (Figure 4-1). The School of Music (Building 3602) and a storage building (Building 3651, formerly the plating shop) are located within the site boundary. Site 11 consisted of the plating shop, an in-ground concrete tank used to neutralize plating solutions, and its associated piping. Between 1964 and 1974, plating baths, acids, and lacquer strippers were disposed of in the plating shop sink that drained to the neutralization tank and eventually into the storm sewer system (Ebasco, 1991). The neutralization tank, piping, and surrounding soil were excavated in 1996. Following excavation, the area was backfilled with clean fill (ITC, 1996).

1984 • IAS
1986 • RFA
1991 • Interim RA
1994 • RI/FS
1999 • NPL
2000 • ERA
2002 • Pilot Test
2006 • SRI/FS
2006 • PRAP
2007 • ROD

Degreasing solvents such as TCE and 1,1,1-trichloroethane (TCA) have historically been associated with operations at plating shops, and samples collected at the site indicated a direct release of chlorinated VOCs to subsurface soil and groundwater had occurred.

The ground surface in the vicinity of Site 11 is generally level, approximately 10 ft above msl, and includes a landscaped lawn, an asphalt parking lot, and a concrete drive behind Building 3602. The majority of precipitation is lost through infiltration or evaporation; however some stormwater runoff is collected by man-made stormwater drainage ditches and discharged to the stormwater sewer system.

Geology and Hydrogeology

The surface geology at Site 11 consists of the 20 to 25 ft thick Columbia Formation, which contains the 15 to 20 ft thick unconfined Columbia Aquifer. The Columbia Formation

NOTE In the site chronology be sure to include new pathways (e.g., vapor intrusion) or new contaminants that have been or are being investigated.

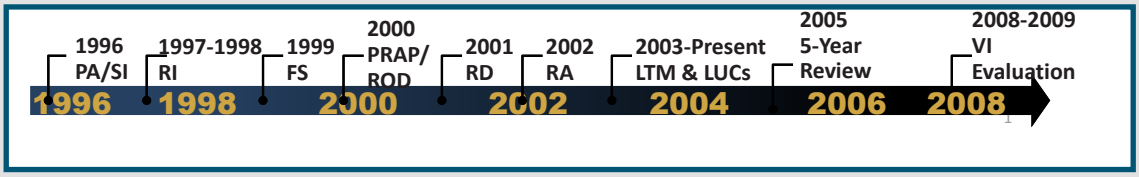


EXHIBIT 4. BACKGROUND

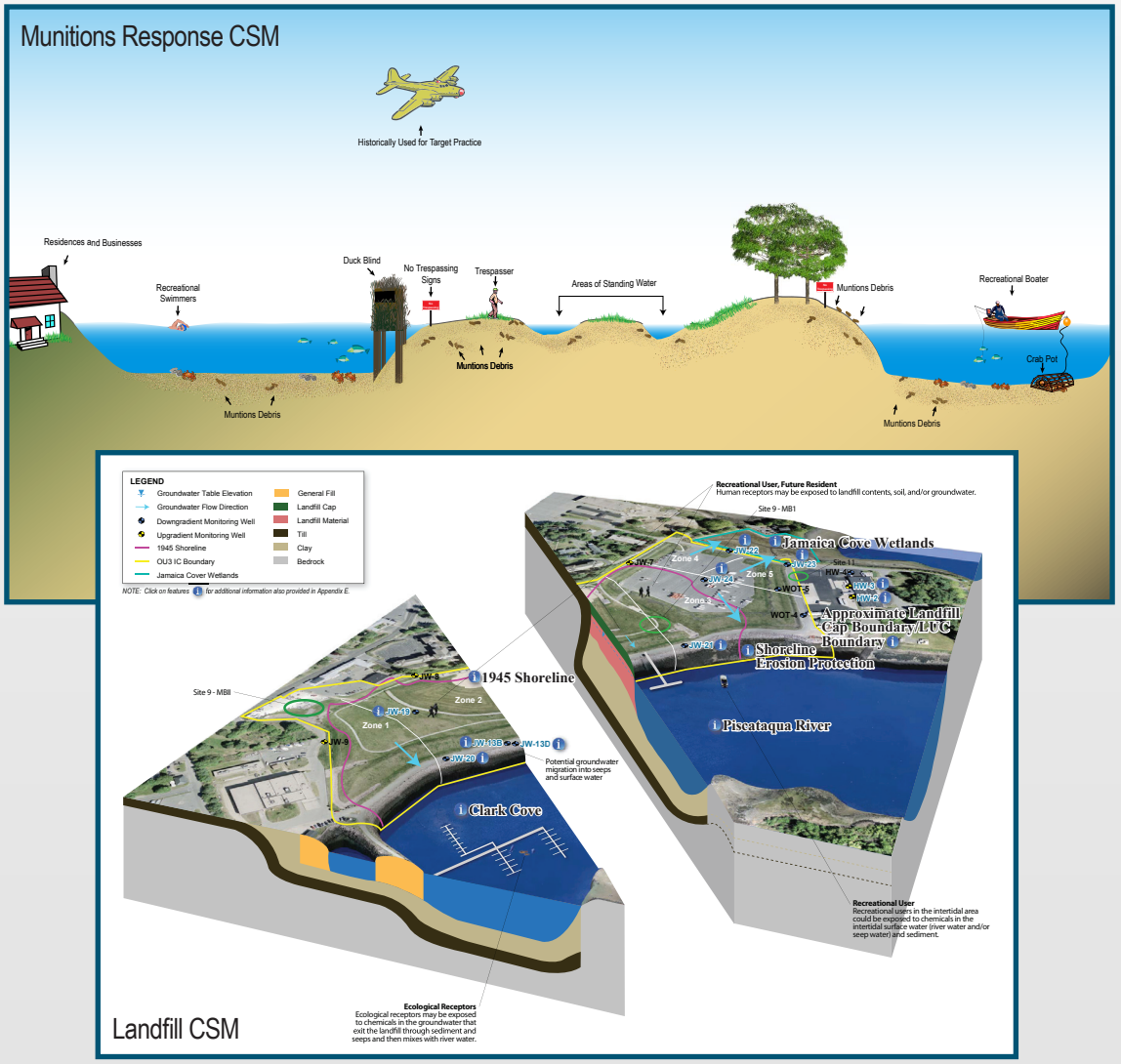
Toolkit Tip

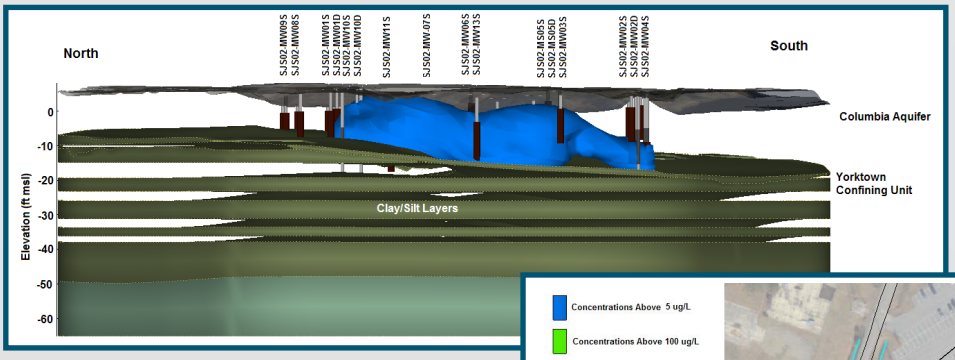
A comprehensive conceptual site model (CSM) can help illustrate the site characteristics at the time of the Record of Decision (ROD) including:

- Site layout and hydrogeologic setting
- Land and resource use
- Source area and contaminated media
- Fate and transport mechanisms
- Potential receptors and exposure pathways

Use the CSM to evaluate whether the remedy is protective of human health and the environment as intended by the ROD.

References or bookmarks that will link you to an appendix with supporting information can be provided if warranted (e.g., boring logs, membrane interface probe data, relevant photos).





Horizontal and Vertical Extent of Groundwater Plume

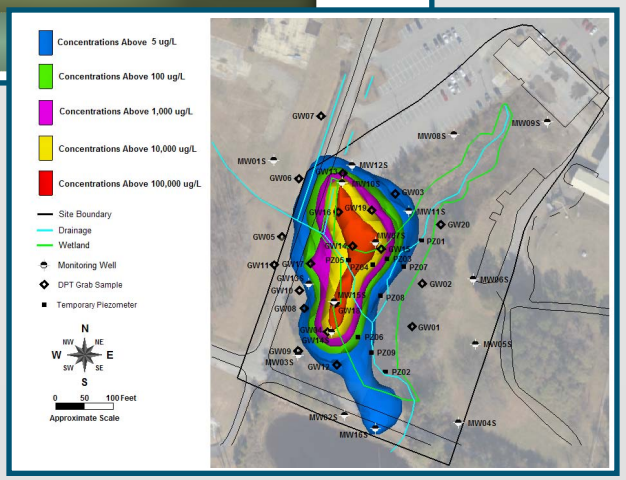


EXHIBIT 5. REMEDIAL ACTIONS

Toolkit Tip

Concisely present relevant site activities from Record of Decision signature to present. Explain the remedy implementation, operation and maintenance actions, and any changes/problems with remedial components. Provide bookmarks to supporting information such as design drawings, survey plats, and photos of the remedial action (RA).

Summary tables can be used to:

- Spotlight unacceptable risks
- List chemicals of concern
- Demonstrate how the key components of the RA mitigate the risks
- Demonstrate achievement of RA objectives
- Measure the progress towards meeting performance metrics and cleanup levels

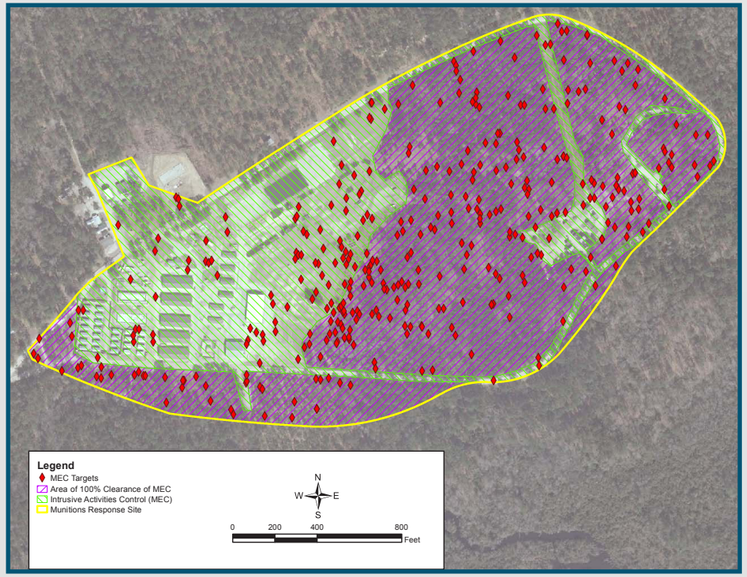
Use graphics of groundwater plumes, land use control boundaries, and trends over time to better demonstrate remedy performance.

OU	Site	Media	Reasonably Anticipated Land Use	COC Requiring Action	Basis for Action	RAO	Remedy Component	Site Closeout Strategy	Performance Metric / Cleanup Level
1	1	Subsurface soil	Residential	Benzene	Potential human health risks from exposure to benzene in subsurface soil	Reduce concentrations of benzene in subsurface soil to below the cleanup level	Excavation	Excavate subsurface soil exceeding cleanup level	0.0073 mg/kg
		Groundwater	Current or potential drinking water resource	Benzene	Potential human health risks from exposure to VOCs in groundwater	Prevent exposure to contaminated groundwater; Prevent future potential use of groundwater until concentrations allow for UU/UE; and Monitor natural attenuation of COCs in groundwater	LTM for MNA and LUCs	Conduct LTM and enforce LUCs until each groundwater COC is at or below its respective cleanup level for four consecutive LTM sampling events	5 µg/L
				TCE					5 µg/L
				cis-1,2-DCE					70 µg/L
				Vinyl chloride					2 µg/L
	7	Surface and subsurface	Industrial and vacant	2.36-inch rockets	Potential explosive hazards	Prevent human exposure to potential explosive hazards	Surface clearance and LUCs to prohibit intrusive activities	Conduct 100% surface clearance and dispose of all MEC or munitions debris and enforce LUCs	Confirmatory visual and geophysical survey identifying no surface anomalies

NOTE **This type of table is useful in assessing remedial progress, evaluating the protectiveness of RAs, and identifying whether additional actions are needed to reach or expedite the intended exit strategy.**

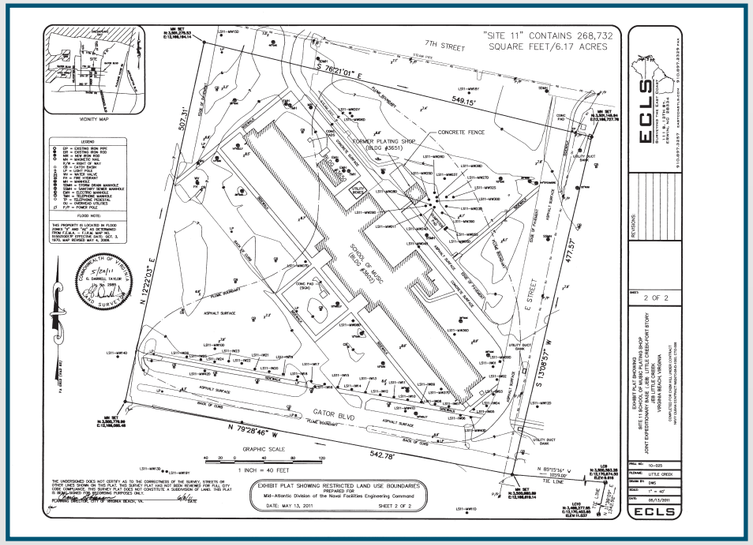
Munitions and Explosives of Concern (MEC)

Controlled Detonation



Location of Munitions and Explosives of Concern (MEC)

Performance monitoring data over time



Land Use Control Survey Plat

Injection Photo

EXHIBIT 6. PROGRESS SINCE LAST FIVE-YEAR REVIEW

Toolkit Tip

Describe the progress toward accomplishing the recommendations and follow-up actions from the last Five-Year Review (FYR). Use a table to highlight the issues, recommendations, follow-up actions, and date of completion. Provide a summary of the results of the implemented actions.

A brief summary of optimization efforts since the last FYR should be documented. This summary should be limited to optimizations that effected the protectiveness of the remedy, significantly impacted the performance, or changed the timeframe for completion.

Consider opportunities for future use of green and sustainable solutions to reduce the environmental footprint and consider the overall net environmental benefit consistent with the Navy's green and sustainable remediation initiatives.

SECTION 6

Progress Since Last Five-Year Review

6.1 Follow-Up Actions Since Last Five-Year Review

The previous Five-Year Review (Tetra Tech, 2007) concluded that the remedy was not functioning as intended by the ROD and required follow up actions to correct significant erosion of the landfill cap system. Additionally, although no current pathway of concern for vapor intrusion has been identified on-site, if buildings are planned for construction in the vicinity of the VOC groundwater plume, the potential for a vapor intrusion pathway will be evaluated and mitigated if needed.

Issue	Recommendation	Follow-Up	Status	Date Completed
Erosion Damage to Cap System	Repair Cap System	Finalized work plan for cap system repair	Completed	March 15, 2008
		Conducted repairs to the cap system	Completed	April 28, 2008
	Update LUC Inspection Program	Updated LUC inspection program (increased to quarterly inspections as opposed to annually)	Completed	June 23, 2008
		Designated site-specific inspection staff to ensure proper inspections are completed	Considered, but not implemented*	Not applicable
Potential for Future Vapor Intrusion Pathway	Evaluate and mitigate vapor intrusion pathway during construction planning	Implemented biannual Base GIS updates to reflect current VOC groundwater plume data for Base Master Planning. All proposed construction projects on-Base go through environmental review.	Re-evaluate during next Five-Year Review	January 15, 2009

*Site-specific inspection lists updated to be more specific and thorough to better communicate required objectives

6.2 Results of Implemented Actions

Semi-annual groundwater LTM is on-going to assess potential migration of the VOC plume. LTM includes groundwater VOC and NAIP sampling from six shallow and deep point-of-compliance downgradient monitoring wells. Three VOCs, (1,1,2,2-PCA, TCE, and VC) have consistently been detected above their respective groundwater standards in wells screened between 30 and 36 ft bgs. Overall, detected VOC concentrations have remained consistent and have not been detected in the deep groundwater samples.

The Site 1 ROD requires annual predictive groundwater modeling to document the likelihood the groundwater plume is impacting Johnson Creek. In order to estimate the concentrations likely to enter Johnson Creek, an analytical model, BIOCHLOR (Aziz et al., 2002) is used as a tool for this prediction. The 2009 BIOCHLOR modeling effort indicates that MNA remains protective of Johnson Creek and that contamination at the site will have naturally attenuated by 2022.

6.3 Optimization

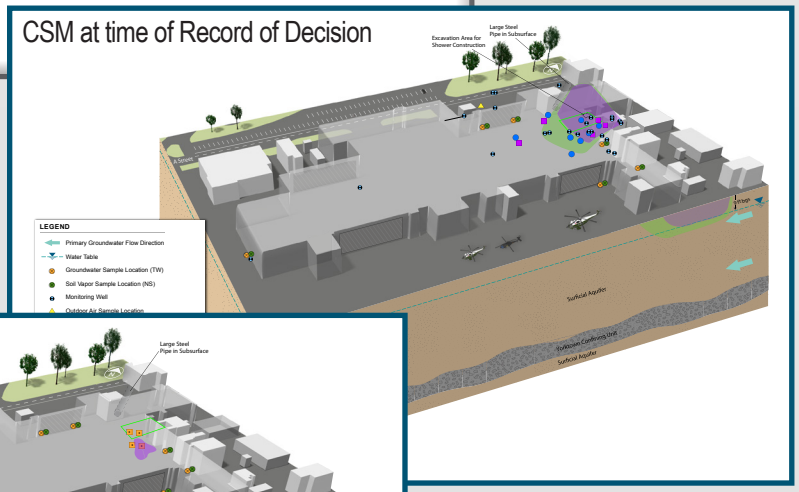
Initial LTM at Site 1 consisted of 12 monitoring wells samples collected twice a year for analysis of VOCs and NAIPs. In September 2008, an LTM Optimization Report (CH2M HILL, 2009) was completed to identify potential efficiencies for the LTM Program. The recommendations included the following:

- Removal of two redundant monitoring wells from the program.
- Reduce sampling frequency to an annual basis.

The LTM plan (CH2MHILL, 2010) has been revised to incorporate these recommendations.

NOTE **Be sure to capture new pathway investigations and outcomes (e.g., vapor intrusion).**

CSM at time of Record of Decision



CSM at time of FYR

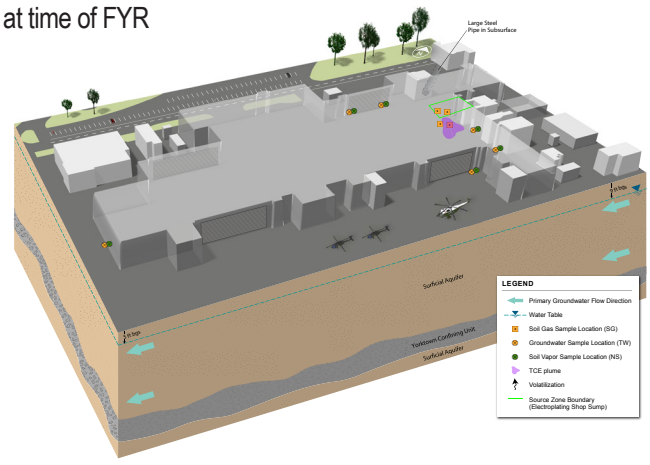


EXHIBIT 7. FIVE-YEAR REVIEW PROCESS

Toolkit Tip

Explain the Five-Year Review (FYR) process, how remedy protectiveness is evaluated, and identify community involvement activities. If a similar process is used for each site, consider consolidating this information into one section and present early in the document. Incorporate bookmarks to key supporting information.

Per *Navy Policy for Conducting FYRs* (June 2011), for ease of tracking and to ensure compliance, conduct your next FYR within five years of the Navy's signature of the previous FYR. The Navy typically conducts installation-wide FYRs on a five year basis, incorporating sites that have implemented a Remedial Action since the last FYR. Based on an installation-wide approach, discussion of the schedule for the next FYR may be applicable in this section, or may be included as a separate section at the end of the report.

SECTION 2

Five-Year Review Process

The Five-Year Review for MCB CamLej was conducted in accordance with the *Comprehensive Five-Year Review Guidance* (USEPA, 2001). Remedy protectiveness for the 16 OUs at MCB CamLej was evaluated through document reviews, site inspections, and community involvement activities as described in the subsections below.

2.1 Document Review

The Five-Year Review consisted of a review of site-specific documentation for each OU. First, the ROD for each OU was reviewed to identify the potential risks to human health and the environment, RAOs, selected remedy, and ARARs. The RD was then reviewed to evaluate the design components for the remedy, monitoring requirements, and LUC boundaries. To confirm that the remedies were operational and functional in accordance with the RAOs and RD, and IRACRs were reviewed. Follow-up monitoring reports were also reviewed to assess remedy performance and continued protection of human health and the environment. **Table ES-1** summarizes the data and documents reviewed for each OU.

2.2 Site Inspections

MCB CamLej conducts quarterly site inspections to verify that LUCs such as fencing and signs are still in-place and ensure there are no issues with the Base planning process. The most recent LUC inspection form is included in **Appendix A**. CH2M HILL conducted an inspection of the Five-Year Review sites on September 3 and 4, 2008 (**Appendix B**). On October 21, 2008, representatives of the Navy, MCB CamLej, USEPA, and NCDENR conducted an inspection of the Five-Year Review sites. No issues concerning the protectiveness of remedies were noted.

2.3 Community Involvement

The Base has taken a proactive approach to site cleanup by reaching out to the local community through the RAB. The RAB was created in 1995 and is made up of members of the community, civic and business organizations, and civilian employees. The RAB meets quarterly, and provides tours, onsite demonstrations of new technologies, and informative talks. The IRP hosts a public web site where information is posted to enhance information exchange between the Base and community: http://go.usa.gov/jZi. Access to the website is available at the Onslow County Library. Community relations activities are documented in the AR, maintained by a NAVFAC Atlantic, 6506 Hampton Boulevard, Norfolk, Virginia 23508-1278, (757) 322-8005.

Activities to involve the community in the Five-Year Review process were initiated with a notification published in October 2008 in local newspapers (*Roto Vue, The Globe,* and *The Jacksonville Daily News*) that announced that the Five-Year Review process was occurring at MCB CamLej. The community was also informed of the initiation of the Five-Year Review at a RAB meeting on October 21, 2008. When the Five-Year Review Report has been finalized, a notice will be sent to these newspapers indicating the results and that the report is available to the public.

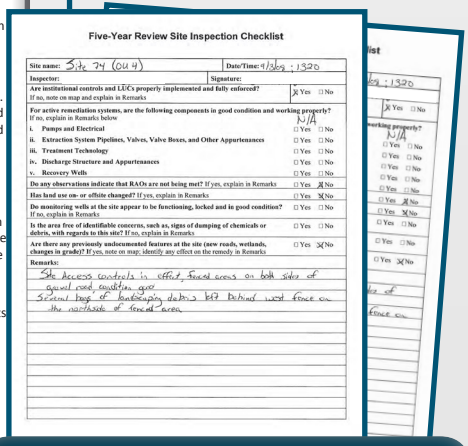
As MCB CamLej's mission grew, the Base identified the need to encourage community input and solicited requests for new members. As a result, five new members have joined the RAB. The Base also planned a site tour with the RAB and is updating the CIP.

2.4 Interviews

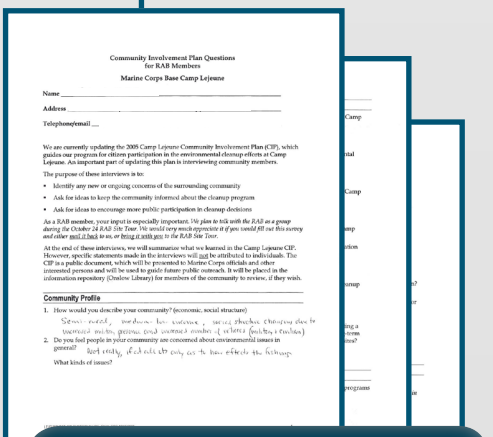
Concurrent with the Five-Year Review, an update to the CIP was initiated. Questionnaires (**Appendix C**) were mailed to the RAB for input and available at a site tour in October 2009. In-person interviews were conducted with community members in December 2009 and the results will be documented in the CIP in 2010. In general, the overall impression of IRP and remedial actions at MCB CamLej is positive.

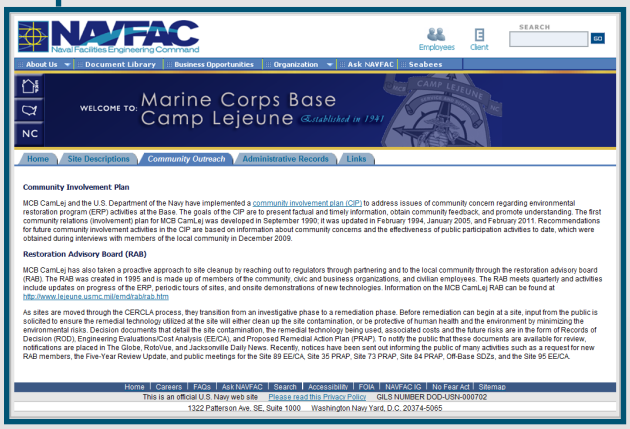
2.5 Next Five-Year Review

The next Five-Year Review for MCB CamLej is due in 2015.



NOTE Include inspection checklists in an appendix to the FYR.





NOTE Include community interviews in an appendix in the FYR.

NOTE To consolidate the site interview and community involvement activities, consider conducting your Community Involvement Plan update at the same time as your FYR.

EXHIBIT 8. TECHNICAL ASSESSMENT

Toolkit Tip

The technical assessment should provide support in preparation for choosing a protectiveness statement. The remedial action objectives (RAOs) link the risk drivers with the remedial action; therefore, it is important to relate back to the RAOs when answering the technical assessment questions.

The answers to each of the three questions will be the basis for your protectiveness statement. Consider using tables, maps, and diagrams to better depict this information, for example:

- Changes in parent and daughter product concentrations over time
- Concentration trends over time and estimated time to achieve RAOs
- Lines of evidence for natural attenuation
- Land use control inspection and interview results
- Comparison to expected operations and maintenance (O&M) costs
- Changes in assumptions (e.g., toxicity data, cleanup levels, new pathways, remedial time frames, etc.) made during the decision making process

SECTION 7

Technical Assessment

A. Is the remedy functioning as intended by the decision document? Yes. Based on the review of documents, MNA results, ARARs, risk assumptions, site inspections, and O&M costs it is concluded the Site 1 remedy is functioning as designed. The results from the 2012 Annual LTM Report (CH2M HILL, 2012) indicate that parent VOC concentrations (PCE and TCE) are decreasing (**Table 7-1** and **Figure 7-1**) while daughter compounds (cis-1,2-DCE and VC) are increasing (**Table 7-1**). NAIP data is available on **Table 7-2** and suggests groundwater is characterized by reducing conditions suitable for anaerobic biodegradation of VOCs. O&M costs have been comparable to those estimated in the ROD. LUCs are in-place to restrict land and aquifer use and prohibit intrusive activities below the water table (**Figure 7-2**).

TABLE 7-1. BASELINE AND CURRENT COC CONCENTRATIONS

VOCs (µg/L)	Baseline (06/14/06)	Current (01/12/12)	Cleanup Level (MCLs)
PCE	650	17	5
TCE	300	50	5
Cis-1,2-DCE	270	430	70
Vinyl chloride	10	22	2
1,1-DCE	11	20	7

FIGURE 7-1. PCE AND TCE CONCENTRATIONS AT MW12

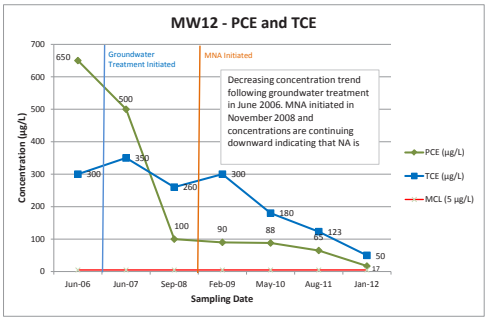
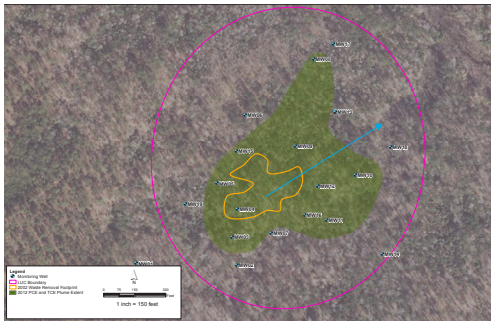


FIGURE 7-2. GROUNDWATER VOC PLUME AND LUCS



B. Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy selection still valid? No. Cleanup levels are the federal MCLs and have been revised since signature of the ROD (**Table 7-2**).

C. Has any other information come to light that could call into question the protectiveness of the remedy? No additional information has been obtained that would affect the protectiveness of the remedy.

7-1

NOTE Use graphics to demonstrate remedial action progress and effectiveness of LUCs.

NOTE A summary of O&M costs should be provided to identify whether O&M is proceeding as planned within the last five years. If historical cost information is not available, either rough order of magnitude estimates and/or a footnote explanation should be included. Tracking long-term costs is useful for identifying potential remedy problems and the need for additional optimization efforts. Any optimization efforts evaluated and/or implemented should be captured in the Navy's Normalization of Data (NORM) database.

EXHIBIT 9. ISSUES, RECOMMENDATIONS, AND FOLLOW-UP ACTIONS

Toolkit Tip

Identify any issues, recommendations, and follow-up actions that affect current or future protectiveness.

General operations and maintenance activities that do not affect protectiveness should not be included.

Tables and figures, with photographic support, can be useful tools in consolidating information.

When presenting issues and recommendations specify:

- Whether current and/or future protectiveness is affected
- Responsible party
- Oversight agency
- Milestone dates

When developing milestones, communicate with stakeholders to ensure reasonable and obtainable milestones are set.

Issues	Affects Protectiveness (Y/N)		Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date
	Current	Future				
Sinkhole identified in soil cover	N	Y	Repair soil cover and revisit the operations and maintenance plan for cover inspections.	Navy	EPA/State	May 2012
LUCs do not encompass extent of groundwater contamination	Y	Y	Revise the LUC boundary to encompass extent of contaminated groundwater.	Navy	EPA/State	September 2013
Cleanup levels have changed since the ROD	N	Y	Update groundwater COCs and cleanup levels to reflect recent standards.	Navy	EPA/State	September 2012
Perimeter fence damaged by fallen tree	Y	Y	Repair fence.	Navy/Base	EPA/State	May 2012
Potential for vapor intrusion pathway	N	Y	Evaluate and mitigate vapor intrusion pathway during construction planning.	Navy/Base	EPA/State	Ongoing

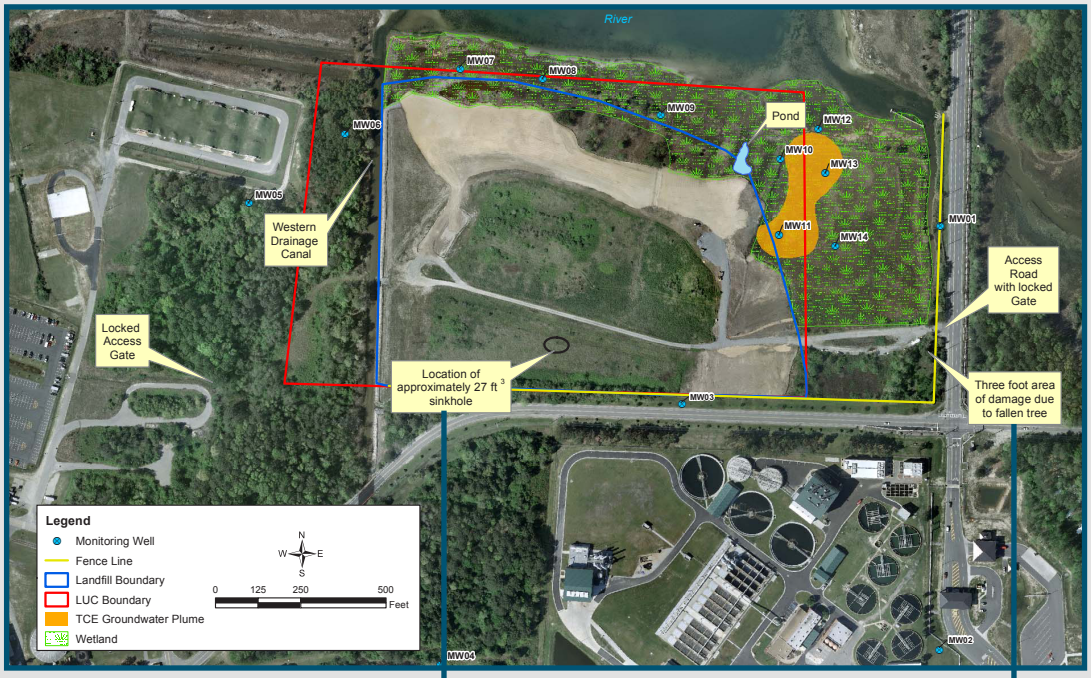


EXHIBIT 10. PROTECTIVENESS STATEMENTS

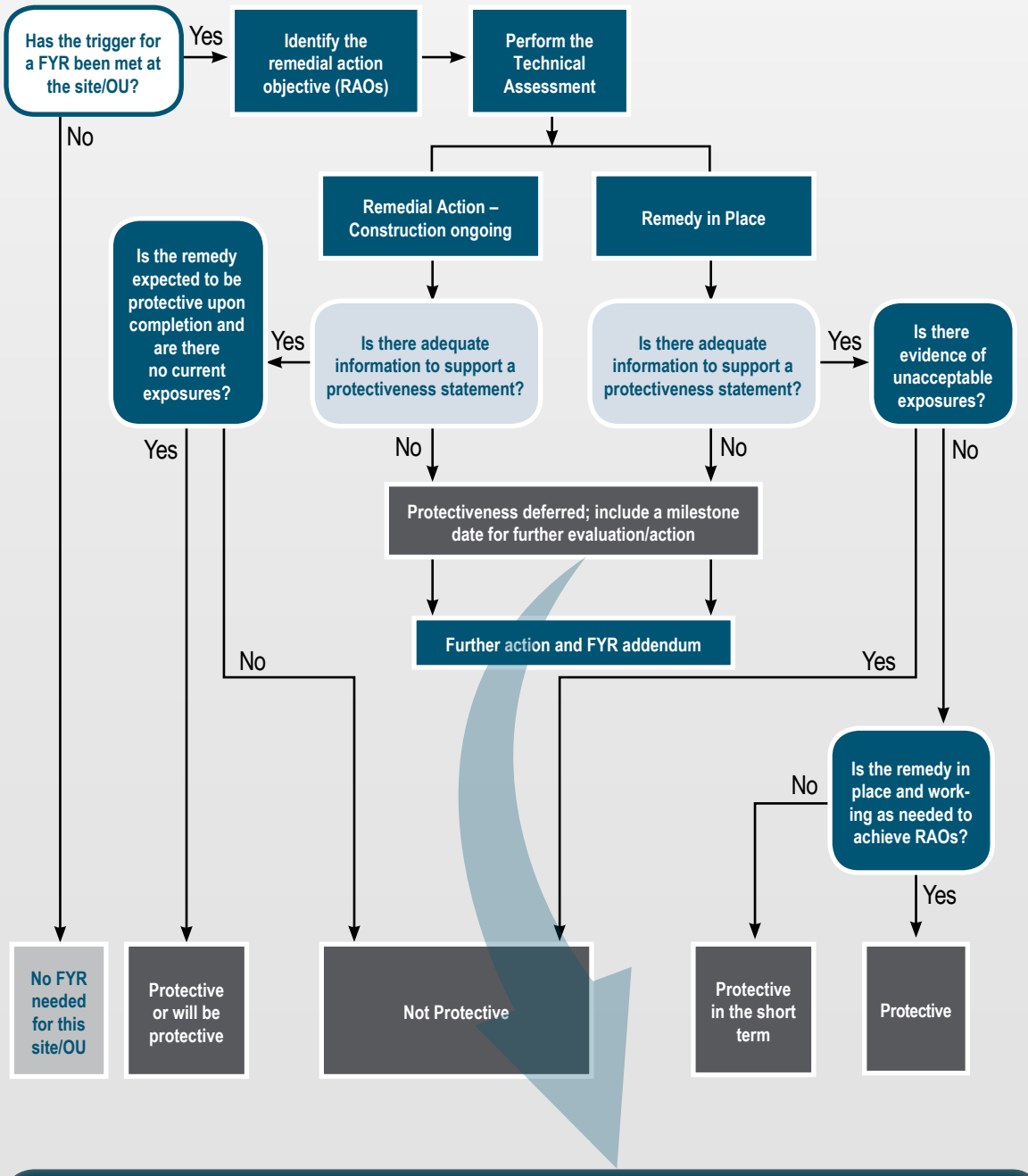
Toolkit Tip

Include a protectiveness statement for each Site/Operable Unit (OU) at which a Record of Decision is in-place, the site is not available for unlimited use and unrestricted exposure, and the remedial action (RA) has been initiated.

For installations where construction is complete, also issue one installation-wide protectiveness statement covering all remedies that do not allow for unlimited use and unrestricted exposure.

Model your protectiveness statements on the examples provided in Tables 4-6 and 4-7 of the Environmental Protection Agency's (EPA's) *Comprehensive Five-Year Review (FYR) Guidance* (June 2001).

Use the graphic flowchart in this exhibit to help determine the type of protectiveness statement to issue.



NOTE There are some cases where protectiveness may need to be deferred. For example, a deferred protectiveness statement may be required if a volatile organic compound plume is located immediately beneath a building above screening criteria, there is clear evidence the vapor intrusion pathway is complete (e.g., floor cracks, low air exchange rate, negative building pressure), and the risks associated with vapor intrusion have not been evaluated. If protectiveness is deferred, include a milestone date to complete the further evaluation and FYR addendum. Per Navy Policy, the addendum must be completed within one year, unless an alternate timeline is approved by NAVFAC Headquarters.

EXHIBIT 11. COMMUNITY INVOLVEMENT

Toolkit Tip

Community involvement is a key aspect of the Five-Year Review (FYR) process and includes:

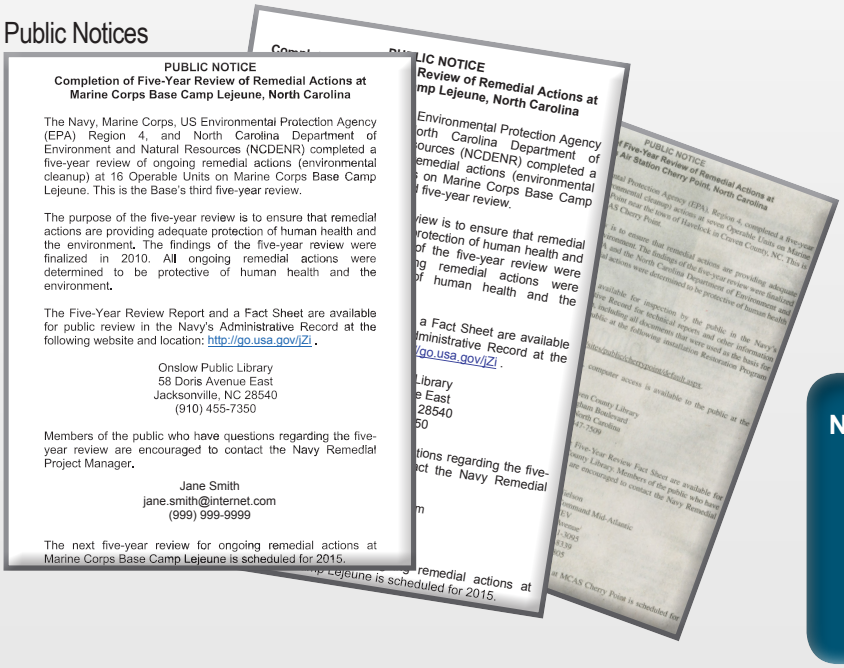
- Notifying the community the FYR will be conducted and when it has been initiated and completed
- Conducting interviews with community stakeholders
- Providing the results in the information repository

Community notification requirements during the FYR are described in Exhibit 3-2 of Environmental Protection Agency's (EPA's) *Comprehensive FYR Guidance* (June 2001).

Where land use controls are involved, interviews with local implementing organizations, land owners, and governments may be required to evaluate protectiveness. Where interviews indicate an issue that potentially effects protectiveness, the FYR should discuss and resolve them.

For higher profile sites or installations with significant public interest, consider developing a communication strategy. Consult EPA's *Superfund Community Involvement Handbook and Toolkit* (April 2005). Risk communication assistance is also available from the Navy and Marine Corps Public Health Center. EPA and DoD are developing training materials and fact sheet templates for conducting Five-Year Reviews. Go to http://www.epa.gov/fedfac/fyr.htm for additional information.

Public Notices



PUBLIC NOTICE
Completion of Five-Year Review of Remedial Actions at Marine Corps Base Camp Lejeune, North Carolina

The Navy, Marine Corps, US Environmental Protection Agency (EPA) Region 4, and North Carolina Department of Environment and Natural Resources (NCDENR) completed a five-year review of ongoing remedial actions (environmental cleanup) at 16 Operable Units on Marine Corps Base Camp Lejeune. This is the Base's third five-year review.

The purpose of the five-year review is to ensure that remedial actions are providing adequate protection of human health and the environment. The findings of the five-year review were finalized in 2010. All ongoing remedial actions were determined to be protective of human health and the environment.

The Five-Year Review Report and a Fact Sheet are available for public review in the Navy's Administrative Record at the following website and location: http://go.usa.gov/jZi .

Onslow Public Library
58 Doris Avenue East
Jacksonville, NC 28540
(910) 455-7350

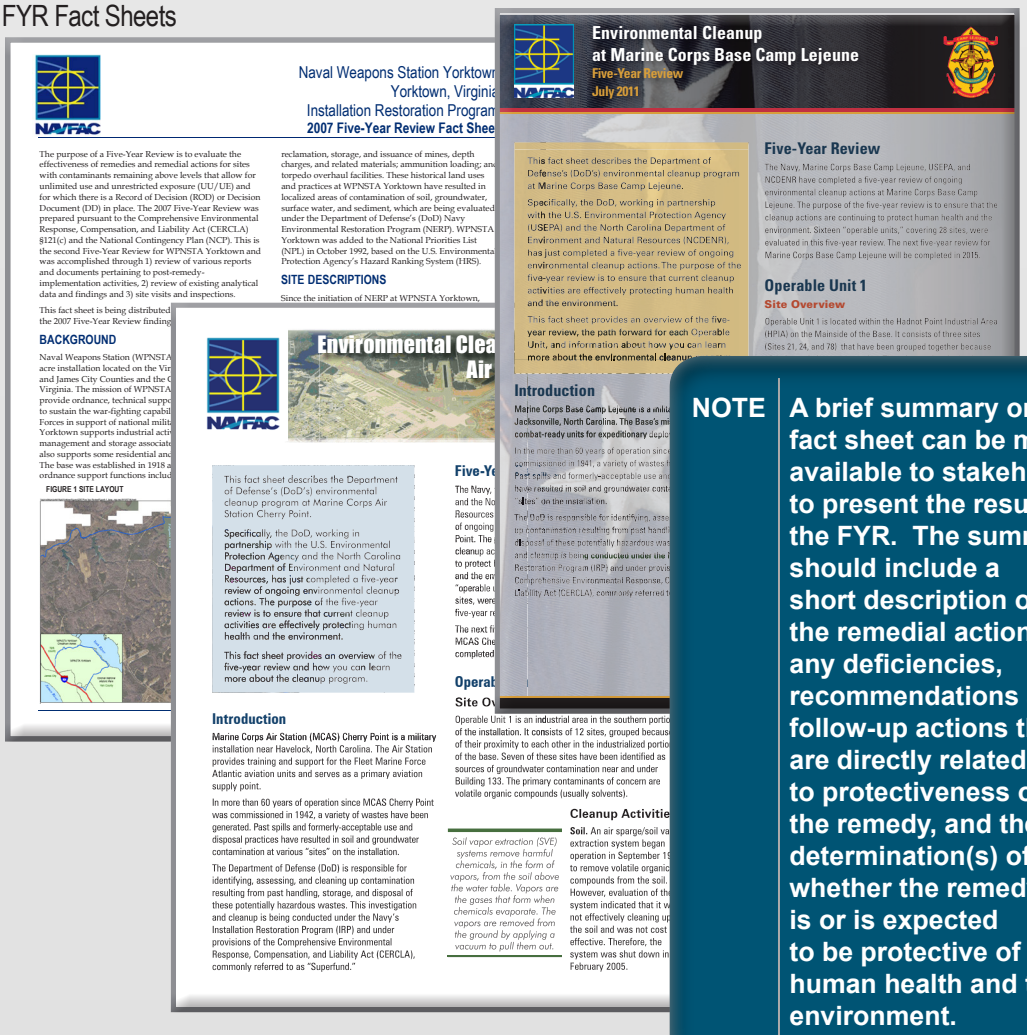
Members of the public who have questions regarding the five-year review are encouraged to contact the Navy Remedial Project Manager.

Jane Smith
jane.smith@internet.com
(999) 999-9999

The next five-year review for ongoing remedial actions at Marine Corps Base Camp Lejeune is scheduled for 2015.

NOTE Public notices should be issued at the initiation and completion of the FYR for an installation.

FYR Fact Sheets



Naval Weapons Station Yorktown
Yorktown, Virginia
Installation Restoration Program
2007 Five-Year Review Fact Sheet

BACKGROUND

SITE DESCRIPTIONS

Environmental Cleanup
at Marine Corps Base Camp Lejeune
Five-Year Review
July 2011

Five-Year Review

Operable Unit 1
Site Overview

Introduction

Environmental Clea
Air

Introduction

NOTE A brief summary or fact sheet can be made available to stakeholders to present the results of the FYR. The summary should include a short description of the remedial action, any deficiencies, recommendations and follow-up actions that are directly related to protectiveness of the remedy, and the determination(s) of whether the remedy is or is expected to be protective of human health and the environment.

EXHIBIT 12. TRACKING MILESTONES

Toolkit Tip

Consider developing a summary table to list the installation-wide Five-Year Review (FYR) recommendations by site to help with tracking milestones. This table should be prepared post-FYR and incorporated into the Site Management Plan or other planning documents to ensure that issues and recommendations are tracked, monitored, and implemented.

This table is a good tool for communicating progress with stakeholders and regulators. It can also be useful for development of spending plans to ensure funds are available to address issues within milestone dates.

TABLE 2-1
Summary of Five-Year Review Recommendations and Milestones
FY 2012 Site Management Plan

Issues/Recommendations	Sites/OU					Milestones	Current Status (02/2012)
	OU3		OU5	OU6			
	3	6	16	35	36		
State regulatory standards have been updated since the ROD/Update COCs and cleanup levels for LTM	X	X		X	X	September 2012	Completed as part of LTM UFP-SAP (November 2011)
LTM program was optimized and identified extraneous well locations/Evaluate LTM monitoring well networks and recommend wells for abandonment	X	X		X	X	September 2012	Planned during LTM 2012-2013
Effluent contained elevated concentrations of metals/Complete treatment plant evaluation		X				December 2012	Optimization planned for October 2012
State regulatory standards have been updated since the ROD/Prepare ESD to document change in ARARs	X	X		X	X	May 2013	Planned for 2012-2013, pending funding
Residential cleanup levels were met in northern area of site/Revise LUCs to reflect current conditions			X			December 2013	Planned for 2013 following annual LTM
Treatment system is asymptotic/Evaluate alternative groundwater treatment technologies		X				September 2015	Planned in 2015, following RIP for all sites
Basewide vapor intrusion evaluation conducted and potential future pathways identified/Evaluate and mitigate vapor intrusion pathways during building and construction planning	X	X		X	X	Ongoing	Base Planning maintains current groundwater data and construction projects go through environmental review

NOTE **If an issue is directly related to a land use control (LUC) then enter the issue as an inspection deficiency in the Naval Installation Restoration Information Solution (NIRIS) LUC Tracker tool.**

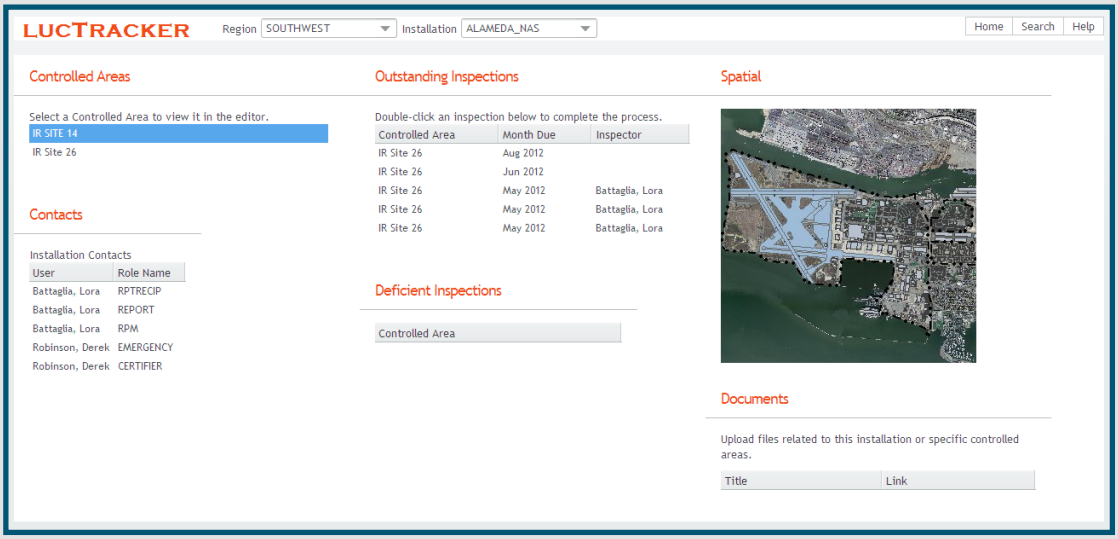


EXHIBIT 13. EXECUTIVE SUMMARY

Toolkit Tip

Although the executive summary is the first section of the report, it should be the last section that is written. It is important to consider the audience as the executive summary is intended for a general reader.

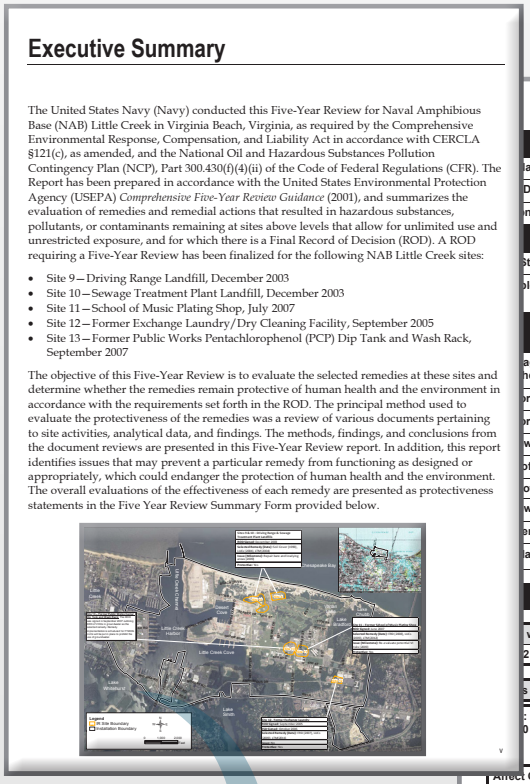
The executive summary should orient the reader to the installation, sites, and Operable Units (OUs); and distill the technical messages contained in the report. Use a table or figure and the Environmental Protection Agency (EPA) summary form to highlight the following:

- Status
- Issues/recommendations
- Protectiveness statements
- Milestones

Consider including a summary table to present the status and designation (Navy's and EPA's) of all sites identified at the installation.

Only sites where a Remedial Action (RA) or an Interim RA was selected in a Record of Decision (or Decision Document) and has been initiated, but unlimited use and unrestricted exposure (no further action) has not been achieved, should be evaluated in the FYR.

Sites that have reached no further action, site closeout, or achieved unlimited use/unrestricted exposure should not be evaluated in the FYR.



Executive Summary

The United States Navy (Navy) conducted this Five-Year Review for Naval Amphibious Base (NAB) Little Creek in Virginia Beach, Virginia, as required by the Comprehensive Environmental Response, Compensation, and Liability Act in accordance with CERCLA §121(c), as amended, and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), Part 300.430(f)(4)(ii) of the Code of Federal Regulations (CFR). The Report has been prepared in accordance with the United States Environmental Protection Agency (USEPA) *Comprehensive Five-Year Review Guidance* (2001), and summarizes the evaluation of remedies and remedial actions that resulted in hazardous substances, pollutants, or contaminants remaining at sites above levels that allow for unlimited use and unrestricted exposure, and for which there is a Final Record of Decision (ROD). A ROD requiring a Five-Year Review has been finalized for the following NAB Little Creek sites:

- Site 9—Driving Range Landfill, December 2003
- Site 10—Sewage Treatment Plant Landfill, December 2003
- Site 11—School of Music Plating Shop, July 2007
- Site 12—Former Exchange Laundry/Dry Cleaning Facility, September 2005
- Site 13—Former Public Works Pentachlorophenol (PCP) Dip Tank and Wash Rack, September 2007

The objective of this Five-Year Review is to evaluate the selected remedies at these sites and determine whether the remedies remain protective of human health and the environment in accordance with the requirements set forth in the ROD. The principal method used to evaluate the protectiveness of the remedies was a review of various documents pertaining to site activities, analytical data, and findings. The methods, findings, and conclusions from the document reviews are presented in this Five-Year Review report. In addition, this report identifies issues that may prevent a particular remedy from functioning as designed or appropriately, which could endanger the protection of human health and the environment. The overall evaluations of the effectiveness of each remedy are presented as protectiveness statements in the Five Year Review Summary Form provided below.

Table ES-1
Site Status Summary Table

OU	Site	Name/Description	Basis for Action	Site Status	Five-Year Review Status
					Not included in this report. Five-Year Review planned in 2015.
					Not included in this report. Five-Year Review planned in 2015.
					Not included in this report. Five-Year Review planned in 2015.
					Not included in this report. Five-Year Review planned in 2015.
					Included in this report.
					Included in this report.
					Included in this report.
					Included in this report.
					Included in this report.

Five-Year Review Summary Form

SITE IDENTIFICATION

lame: Naval Amphibious Base Little Creek

D: VA5170022482

n: 3 | **State:** VA | **City/County:** Virginia Beach

SITE STATUS

Status: Final

le OUs? | **Has the site achieved construction completion?** No

REVIEW STATUS

agency: Other Federal Agency
her Federal Agency" was selected above, enter Agency name: United States Navy
r name (Federal or State Project Manager): Click here to enter text.
r affiliation:
w period: 2003 - 2008
f site inspection: September 17, 2008
f review: Statutory
w number: 1
ering action date: 2003 signature of Sites 9 and 10 ROD
ate *(five years after triggering action date)*: January 2009

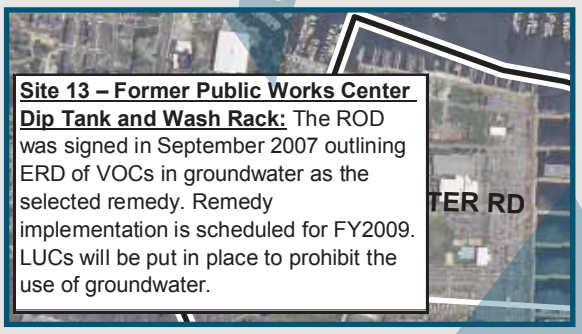
Issues/Recommendations

without Issues/Recommendations Identified in the Five-Year Review:
2

s and Recommendations Identified in the Five-Year Review:

: Sites 9 0	**Issue Category: Operations and Maintenance**
	Issue: Bare and low-lying areas observed on landfill covers.
	Recommendation: Repair bare and low-lying areas.

Affect Current Protectiveness	Affect Future Protectiveness	Implementing Party	Oversight Party	Milestone Date
No	Yes	Federal Facility	EPA/State	May 2009



Site 13 – Former Public Works Center Dip Tank and Wash Rack: The ROD was signed in September 2007 outlining ERD of VOCs in groundwater as the selected remedy. Remedy implementation is scheduled for FY2009. LUCs will be put in place to prohibit the use of groundwater.

NOTE **EPA and Navy terminology for Operable Unit, site, and installation may differ. When developing FYRs it is important to ensure a crosswalk or other method is used to clearly link Navy and EPA designations.**

OU	Site	Name/Description	Basis for Action	Site Status	Five-Year Review Status
1	SWMU 3	Sandblasting Yard	COCs under investigation.	RI/FS	Site still under investigation.
	SWMU 7	Small Boats Sandblast Yard	ABM in sediment	RIP (LTM & LUCs)	Included in this report.
2	Site 7	Base Landfill	Waste in-place and metals in groundwater	RIP (LTM & LUCs)	Included in this report.
3	Site 11a	Waste Oil Tank	VOCs in groundwater	RIP (LTM & LUCs)	Included in this report.
4	Site 9	Driving Range Landfill	Waste in-place and metals in groundwater	RIP (LTM & LUCs)	Included in this report.
	Site 10	Sewage Treatment Plant Landfill	Waste in-place and metals in groundwater	RIP (LTM & LUCs)	Included in this report.
5	Site 11	Plating Shop	Metals in soil and groundwater	RIP (LTM & LUCs)	Included in this report.
6	Site 12	NEX Laundry Disposal Area	VOCs in groundwater	RIP (Groundwater Injections, LTM, & LUCs)	Included in this report.
7	Site 13	Wash Rack and PCP Dip Tank	VOCs in groundwater	RIP (Groundwater Injections, LTM, & LUCs)	Included in this report.