



DEMONSTRATION PLAN GUIDANCE

Weapons Systems and Platforms (WP) Projects

November 2017

OVERVIEW

A Demonstration Plan is a requirement of all Environmental Security Technology Certification Program (ESTCP) projects. It should state what the demonstration will attempt to prove, what the criteria are for success, how the demonstration will be conducted, and what measurements will be made to confirm success. It should ensure that pertinent and reliable data are collected during the demonstration.

This document provides guidance for writing Demonstration Plans for projects that receive funding under the ESTCP Weapons Systems and Platforms (WP) program area. The guidance provided here is general and all elements may not apply to all ESTCP WP projects. It is the responsibility of each principal investigator (PI), with the concurrence of ESTCP, to decide what is applicable to the technology being demonstrated.

The Demonstration Plan is reviewed and must be approved by the ESTCP WP Program Manager and ESTCP Director prior to initiation of the demonstration.

The WP program area sponsors projects in many different technology areas. In general, WP projects fall under the following subprogram areas:

- Surface Engineering and Structural Materials
- Energetic Materials and Munitions
- Engine Noise and Emissions
- Waste Reduction and Treatment.

The Surface Engineering and Structural Materials subprogram area includes the following:

- All types of coatings and coating processes
- Surface finishing and modification, including processes such as grinding, peening, anodization, and nitriding
- Surface cleaning
- Nondestructive inspection of coatings and substrates beneath coatings
- Coating removal
- Development of new alloys to preclude use of hazardous materials in coatings
- Welding and joining technologies.

In the WP program area, the two basic types of Demonstration Plans are those that include a Joint Test Protocol (JTP) and those that do not. A JTP is a stand-alone document that addresses the laboratory testing of alternative materials and processes that are the subject of the innovative technology. It defines the laboratory testing required by the end-user community to ensure that weapons system military performance specifications are maintained (or exceeded) as a result of implementing the alternative technology. The JTP must be reviewed and accepted by the end-

user communities who have approval authority for implementing the technology. ESTCP in consultation with the PI will determine whether a JTP needs to be developed for some (or all) applications. If a JTP is necessary, it must be developed separately and must be included in the Demonstration Plan as Appendix A.

In general, the types of WP projects for which JTPs are required fall under the Surface Engineering and Structural Materials subprogram area. These projects usually require extensive coupon testing to verify property and performance characteristics of the alternative material or process. In addition, projects that fall under the Energetic Materials subprogram area may benefit from developing a JTP if a new material is being qualified. Projects that fall under the other subprogram areas generally do not require JTPs, although there may be exceptions.

The subsequent sections of this document provide (I) Guidance for Preparation of Demonstration Plans That Include Joint Test Protocols, (II) Guidance for Preparation of Joint Test Protocols, and (III) Guidance for Preparation of Demonstration Plans That Do Not Include Joint Test Protocols.

Format

Although Demonstration Plans and JTPs are working documents and not intended for publication, they are required deliverables. As such, ESTCP expects them to be professionally written and properly edited. The following general formatting parameters are recommended:

Cover	Include ESTCP project name and number, the words “Demonstration Plan,” date (month/year), version number, and the name(s) and organization(s) of those individuals principally responsible for preparing the Demonstration Plan. (See last page of this guidance for a sample cover.)
Font	Times New Roman proportional font
Cover main title (words “DEMONSTRATION PLAN”)	26 pt, bold, centered
Cover title (Title of Project)	20 pt, bold, centered
Section headings	14 pt, bold, centered
Subsection headings	12 pt, bold, flush left
Text	12 pt
Margins	1" top, left, right, bottom
Page numbering	Bottom center Cover page: none Front matter: i, ii, iii, iv... Body of document: 1, 2, 3, 4...
Word processing software	Use either Microsoft Word or provide a PDF document.
Figures (including photographs, charts, graphs, etc.) and Tables	Insert in the document on the same or first page following the first reference. Liberal use is highly recommended.

Each figure and table must have a caption (table captions above the table and figure captions below the figure) and must be referred to in the text.

References should be numbered. When cited in the document, the number should be placed full-size in brackets (e.g., [2]).

How to Submit a Draft Demonstration Plan or Joint Test Protocol

Demonstration Plans and JTPs must be submitted to the ESTCP Support Office using *one of the methods* indicated below:

- For files that are 100MB or less: Submit the report in SEMS 2.0 (<https://sems2.serdp-estcp.org>). Follow the instructions below for uploading your document:
 - From the project dashboard, click “Overview & Plan” in the left-hand panel, then click “Project Plan”.
 - Scroll down to the document milestone and click “Upload” in the milestone box.
 - Select the file you would like to upload and click the “Upload” button.
 - Click “Submit” in the bottom right corner of the milestone box.
- For files larger than 100MB: Contact serdp-estcp.documents@noblis.org to receive an email with the web link that will allow access to the system to upload your file(s). Please make sure you include the project number and the title(s) of the document(s) to allow identification of your files.

Please do not submit the Demonstration Plan directly to the ESTCP Program Manager.

I. GUIDANCE FOR PREPARATION OF DEMONSTRATION PLANS THAT INCLUDE JOINT TEST PROTOCOLS

The Demonstration Plan is intended to document the plans for establishing the alternative technology at the demonstration site(s) and for evaluating the technology in rig and/or field testing. This may include the application of the technology in an operational maintenance or manufacturing facility or the field testing of the technology on a weapons system or platform. The results obtained during the field demonstration, in concert with the testing described in the JTP, provide information on the expected operational military and environmental performance and cost of the technology.

The typical steps for an ESTCP project under the WP Program Area that utilizes a JTP in developing a Demonstration Plan are:

1. Determine in consultation with the ESTCP WP Program Manager that a JTP is applicable for the project.
2. Identify demonstration sites and platforms, and other test facilities or organizations.
3. Identify and contact the critical stakeholders (i.e., Program Managers, parts engineers, MILSPEC owners, etc.).
4. Develop the JTP. Solicit definition of testing or measurement requirements and the approval process for the alternative technology.
5. Finalize the JTP document and have it reviewed and approved by appropriate stakeholders.
6. Develop plans for conducting the demonstration/validation activities at the demonstration site(s).
7. Write and finalize the Demonstration Plan. The JTP constitutes Appendix A of the Demonstration Plan.

It is possible that during the execution of the project, the JTP could be finalized and execution initiated prior to the completion of the full Demonstration Plan. Whether that occurs or not, PIs should submit a draft Demonstration Plan at least two months prior to system installation or significant field demonstration activities to allow review, comment, and revisions to be completed before work begins. The Program Office recognizes that minor changes to the Demonstration Plan may occur in the field. In the event of substantial changes to the Demonstration Plan that occur after approval, projects must notify the ESTCP WP Program Manager immediately.

For projects involving multiple platforms or sites, separate Demonstration Plans or portions thereof may be required. If two or more platforms or sites are being used for the demonstration without significant differences in the experimental design, the second and subsequent platforms or sites may require only an addendum to the main plan describing the platform or site-specific conditions. If the additional platforms or sites require different experimental designs, then a full Demonstration Plan will be required.

Time frames for developing JTPs and Demonstration Plans are difficult to generalize, but as a guide, it is expected that for these types of projects, the JTP should be developed and submitted to ESTCP within six months of receiving initial project funds and the full Demonstration Plan developed and submitted to ESTCP within one year of receiving initial project funds.

The guidance provided in this document is designed to ensure that the project management and technical execution of the demonstration are consistent with ESTCP standards. Adherence to this guidance document will help provide a consistent demonstration methodology and data set, which will facilitate end-user review and evaluation.

Section-by-Section Demonstration Plan Guidance

Cover Page: Include Demonstration Plan title, project number, [ESTCP logo](#) (as on the cover page of this guidance, date, the words “Demonstration Plan,” draft/final status, and revision number. Also include the names and organizations of those individuals principally responsible for preparing the Demonstration Plan. (See the last page of this guidance document for a sample cover).

Front Matter: The Front Matter should consist of the following:

- Table of Contents
- List of Figures including page number on which the figure appears
- List of Tables including page number on which the table appears
- List of Acronyms and Symbols. Symbols would include, for example, “T_s” standing for “substrate temperature.” However, do not include elemental symbols from the periodic table nor standard units, whether English or International System (such as lb or mg), in the list.

Note that each major section should begin at the top of a new page.

1.0 INTRODUCTION

This section is intended to provide a general overview of the project for those reviewers not familiar with the original project proposal. Specific subsections as described below should be included in this section.

1.1 BACKGROUND

Describe the environmental problem being addressed and its impact on Department of Defense (DoD) operations. Briefly describe the technology being demonstrated and its potential benefit compared to conventional practices and alternatives. (This will be expanded upon in Section 2.1, Technology Description.)

1.2 OBJECTIVE OF THE DEMONSTRATION

Describe the overarching objectives of the demonstration, such as to validate the technology in the field or in a real-world industrial setting at the appropriate scale of operation (pilot, prototype, or full-scale), or to transfer the technology to an end user. Explain the environmental, safety, and occupational health (ESOH) benefits of the technology to be demonstrated. In this section, include Table 1 listing the targeted hazardous material, the process in which it is currently used, applications in which the material or process is currently used that will be addressed with the proposed technology, current specifications covering the existing process, the affected weapons programs, and the candidate parts and substrates on which the current material or process is being used that will be addressed in the demonstration.

Table 1. Target Hazardous Material (HazMat) Summary.

Target HazMat	Current Process	Applications	Current Specifications	Affected Programs	Candidate Parts and Substrates

1.3 REGULATORY DRIVERS

State the existing or anticipated federal, state, or local regulations, or DoD directives that have resulted in a need for this innovative technology. Any international regulations that may have an impact on DoD operations should be described as well.

1.4 STAKEHOLDER/END-USER ISSUES

Identify the stakeholders (individuals and organizations) who will be involved in approving the JTP. Describe the requirements and decision process that will lead to ultimate acceptance and implementation of the alternative technology. Summarize how the demonstration will address any stakeholder or end-user decision-making factors concerning the technology.

2.0 TECHNOLOGY

This section is intended to provide an overview of the technology to be demonstrated. Reference to existing papers and reports is highly encouraged.

2.1 TECHNOLOGY DESCRIPTION

- Describe the technology in sufficient detail to provide an accurate and factual understanding of its theory, functionality, and operation.
- Provide an overall schematic diagram of the technology. Include one or more photographs or drawings of the equipment involved in the new technology
- If the technology being demonstrated involves a new method or process, provide a flowchart showing the various steps in the process.
- Provide a chronological summary of the development of the technology to date.
- Describe expected applications of the technology.

2.2 TECHNOLOGY DEVELOPMENT

Provide a description of all research and development conducted on the technology prior to initiation of the ESTCP project. If this work has been published in one or more separate technical reports, provide a summary and reference the reports. If not, this section should be sufficiently detailed to fully describe the work done and results obtained. Use of graphics is encouraged to aid the reader in understanding the results.

2.3 ADVANTAGES AND LIMITATIONS OF THE TECHNOLOGY

State the advantages and limitations of the technology and compare these with the advantages and limitations of currently used and other alternative technologies. These should include issues of cost, military performance, and environmental issues. Identify any prominent alternative technologies.

3.0 PERFORMANCE OBJECTIVES

The performance objectives are a critical component of the Demonstration Plan. They provide the basis for evaluating the performance and costs of the technology. Performance objectives are the primary criteria established by the investigator for evaluating the innovative technology. Meeting these performance objectives is essential for successful demonstration and validation of the technology.

These objectives will generally include the acceptance criteria as delineated in the JTP and other performance objectives associated with component rig and field testing. Field testing could include, for example, demonstration of a new paint removal system at a depot, application of a coating to an aircraft component for flight testing, or test firing a munition containing a new explosive formulation. This section should provide in tabular form a brief review of the JTP objectives, then a detailed description of the performance objectives associated with the field demonstration.

Performance objectives may be presented in two ways, *qualitative and quantitative*, and should be summarized in Table 2 (sample provided). In Section 5.0, details will be required on the methods for collecting and analyzing the data required to assess the quantitative performance objectives listed in the table.

It is emphasized that Table 2 is meant to be all-encompassing and should include performance objectives for testing done under the JTP as well as testing performed under other aspects of the demonstration, including rig and field testing, and evaluation of the technology at the demonstration sites. Explicitly identify which objectives will be assessed by testing during the demonstration, the JTP, or both.

Table 2. Performance Objectives.
[SAMPLE ONLY—Performance objectives must be specific to the technology being demonstrated.]

Performance Objective	Data Requirements	Success Criteria
Quantitative Performance Objectives		
<u>Product Testing</u> - Corrosion testing - Fatigue testing - Bonding capability	<ul style="list-style-type: none"> • The American Society for Testing and Materials (ASTM) test number, MIL-SPEC number or customized tests • Test data collected on components produced in depot as part of the demonstration and on coupons produced for the JTP 	As described in JTP (Appendix A) Field performance requirement
<u>Product Testing</u> Energy release (for energetic material)	<ul style="list-style-type: none"> • ASTM test number • MIL-SPEC requirement • Customized tests on material produced for JTP 	As described in JTP (Appendix A)
<u>Product Testing</u> Energetic release (for full up item)	<ul style="list-style-type: none"> • MIL-SPEC requirement <ul style="list-style-type: none"> ○ Field demonstration 	Equivalent to existing items
Reduction of hazardous waste generated	<ul style="list-style-type: none"> • Raw materials usage, mass balance • Analysis for hazardous materials by EPA standard test number during demonstration 	>90% reduction from current process
Decrease in production rates	Tracking of production time in demonstration	>50% reduction versus baseline characterization
Qualitative Performance Objectives		
Ease of use	Feedback from field technician on usability of technology and time required during demonstration	No operator training required

4.0 SITES/PLATFORM DESCRIPTION

This section should provide a concise description of the selected demonstration sites and platforms. It should include all information that is relevant to the demonstration. Specific subsections below are intended to capture relevant information; however, include any other information that has immediate bearing on the demonstration.

4.1 TEST PLATFORMS/FACILITIES

Identify the selected sites or platforms. Describe the criteria and requirements used in selecting test platforms and host facilities to be used for the demonstration. Discuss how they relate to the technology. For example, does the test platform provide maximum likelihood of success, have good existing infrastructure, or have stakeholder buy-in? Describe which weapons systems, support vehicles, or equipment are produced at or serviced by the facility.

4.2 PRESENT OPERATIONS

Describe the current industrial process operations for the activities or applications that the technology is intended to replace. Provide an overview of the process in which the technology to be demonstrated will reside. As appropriate, provide schematics or layout drawings, and describe the characteristics of the process stream or maintenance activities.

4.3 SITE-RELATED PERMITS AND REGULATIONS

Identify any permits or potential regulations that may apply to the demonstration. Provide information on the status of and appropriate references for pertinent environmental permits required for the demonstration to proceed.

5.0 TEST DESIGN

This section provides the detailed description of the system design and testing to be conducted in addition to that described in the JTP in order to address the performance objectives described in Section 3.0, Performance Objectives. In other words, the description of all types of testing (laboratory, field, “real-world”) to be done in the demonstration should be found either in the JTP (in Appendix A) or in this section. Descriptions here should be sufficiently detailed such that a technician or engineer can use this section to conduct the demonstration.

5.1 CONCEPTUAL EXPERIMENTAL DESIGN

Provide a broad overview of the experimental design to be used to evaluate the performance objectives not related to the JTP, including a discussion of controls, various operational phases, and means to evaluate the technology performance. Provide a Gantt chart that shows the schedule for each phase of testing and how the various operational phases are related. Identify the decision points on this chart. Specific details should be provided in the following sections.

5.2 PRE-DEMONSTRATION TESTING AND ANALYSES

Summarize any relevant testing to be performed prior to the innovative technology demonstration to provide baseline data for the existing operation or practice, against which the performance of the innovative technology will be compared. This is intended to capture information relevant for the site activities not conducted under the JTP.

5.3 DESIGN AND LAYOUT OF TECHNOLOGY COMPONENTS

Provide a thorough description with accompanying schematic diagrams of all technology and system components. Describe site preparation and other requirements for installing the demonstration equipment. Provide a subsection for each significant technology component, describing its design and location. As appropriate provide detailed information and specification in an appendix, or cite available references.

5.4 FIELD TESTING

Provide a description of each significant phase of operation and the activities that will be conducted during that phase. Include a description of exactly what will be measured or monitored during each phase of the field testing. Either describe in sufficient detail expected operations or reference existing standard operating practices or similar material. Activities may include system start-up, system operation under different operating parameters, and system shut down. Provide information on each operating parameter condition.

Describe plans for removal of equipment, if any, at the conclusion of the demonstration. If equipment is to be left in place or transferred to the installation, please plan to obtain written permission from the facility to do so and provide this written permission as an appendix to the Demonstration Plan.

5.5 PERFORMANCE ASSESSMENT PLAN

This plan should result in sufficient data to validate the technology performance under real-world conditions and allow stakeholders to evaluate the innovative technology. In the plan, define in detail what the performance criteria are and what will constitute a successful demonstration. Discuss procedures to ensure consistent and scientific evaluation of performance, and to ensure that data collection and analyses are appropriate to yield the desired results. Analysis plans should be provided for all performance criteria and objectives. This should include a description of the statistical analyses to be conducted.

If specific analytical equipment is to be used to make measurements of performance, describe the calibration procedures to ensure accurate measurements. Describe other quality assurance methods that will be followed. If standard published tests or procedures (e.g., ASTM standards) are to be followed, they should be briefly described and referenced.

It is emphasized that this is one of the most important sections of the Demonstration Plan; therefore, it should be very extensive and detailed.

The following example is provided to illustrate the type of information to be included in these subsections:

EXAMPLE

Demonstration of New Corrosion-Resistant Coating on Carrier-Based Aircraft Components

This hypothetical project involves setting up equipment to deposit the coatings at a Navy aircraft repair depot, which is the demonstration site.

- Section 5.2 would include a description of any coating deposition development work or coatings evaluations to be performed prior to setting up the equipment at the depot. Since a JTP is being developed for this project, it is possible that this section would not be relevant.
- Section 5.3 would provide a detailed description of setting up the new equipment at the depot, including site preparation, utilities requirements, equipment check-out, operator training, methods for ensuring uniform and repeatable deposition of coatings, etc.
- Section 5.4 would provide a detailed description of testing and evaluation of the coatings as applied to the aircraft components. This might include rig testing of the coated component and/or lead-the-fleet flight testing. It should include a description of how the coatings are to be applied to the components and the quality control procedures to ensure deposition of coatings with design properties.
- Section 5.5 would describe in detail how the performance of the coated components would be assessed, what data would be acquired, whether there would be baseline data obtained for comparison purposes, and how the data would be analyzed, including statistical analysis.

6.0 COST ASSESSMENT

ESTCP projects are required to develop and validate, to the extent possible, the anticipated operational and life-cycle costs of the demonstrated technology. If the demonstrated technology is replacing an existing technology, then the same costs for the baseline technology should be determined if not already known. The intent of this section in the Demonstration Plan is to identify information that can be tracked or obtained during the execution of the demonstration that will aid in establishing realistic life-cycle costs and savings estimates for the technology if implemented. To identify these items, an initial life-cycle cost model must be constructed. The actual cost data and the life-cycle cost analysis are required to be included in the ESTCP Final Report and Cost and Performance (C&P) Report after completion of the demonstration.

Just as the PI is expected to consult with stakeholders and end users in developing performance requirements for the alternative technology, the PI is also expected to consult with the same individuals in terms of identifying appropriate cost factors associated with implementing the alternative technology. Table 3 provides examples of the cost factors, broken down by category that could be measured or calculated in an ESTCP demonstration project. It is the responsibility of the PI, working with other performers and stakeholders, to determine which of these, plus any additional ones, are relevant to the project.

There are many techniques and methodologies available for conducting cost-benefit analyses (see, for example, *Economic & Financial Analysis for Engineering & Project Management* by Abol Ardalan, Technomic Publishing Company, Inc., 2000). However, ESTCP recognizes that PIs and other project performers most likely do not have the background and expertise to perform the detailed analysis required. Therefore, often an outside organization, company, or consultant will need to be retained for this task. For the Demonstration Plan, the PI should identify the entity that will perform the analysis and provide a brief description of the methodology that will be used, including references. It is emphasized that a standard methodology must be used.

The Demonstration Plan should provide a summary description of the cost model proposed for estimating the life-cycle cost of the new technology. A table of all items that are to be tracked during the execution of the demonstration should be provided. A brief description of how each item will be tracked should be included. These cost factors should be determined for the alternative technology and, unless they are already known, for the existing technology.

In many instances, especially in the surface engineering area, test data indicates that the alternative technology could result in improved performance such as a new coating lasting longer in service than existing coatings, resulting in increased time between repair and overhaul and decreased life-cycle costs. For these cases, cost-benefit analyses should be conducted that assume both equivalent performance and expected improved performance of the alternative technology.

It is important to describe the approach for developing an estimated life-cycle cost for the technology. This would generally include 1) facility capital cost, 2) start-up and operations and maintenance costs, 3) equipment replacement costs, 4) ESOH costs and cost avoidance, and 5) reprocessing or re-application costs.

Table 3. Examples of Types of Costs by Category.

Direct Environmental Activity Process Costs				Indirect Environmental Activity Costs		Other Costs	
Start-Up		Operation & Maintenance					
Activity	\$	Activity	\$	Activity	\$	Activity	\$
Equipment purchase		Labor to operate equipment		Compliance audits		Overhead associated with process	
Equipment design		Labor to manage hazardous waste		Document maintenance		Productivity and cycle time	
Permitting		Utilities		Environmental Management Plan development and maintenance		Worker injury claims and health costs	
Installation		Management and treatment of by-products		Reporting requirements		Maintenance cycle time	
Training of operators		Hazardous waste disposal fees		Test and analyze waste streams			
		Raw materials		Medical exams (including loss of productive labor)			
		Process chemicals, nutrients		Waste transportation (on and off site)			
		Consumables and supplies		ESOH training			
		Equipment maintenance					
		Training of operators					

To summarize, the following information related to the cost assessment should be included in the Demonstration Plan:

- Cost model and factors for the existing technology (if applicable) and the new technology being demonstrated
- Identification of the organization or company performing the cost-benefit and life-cycle cost analyses
- Description of the expertise and experience of the organization or company in performing cost analyses similar to the one to be performed in the project (provide references if available)
- Description of the methodologies that will be used to perform the analyses (provide references, if available)
- Identification of items to be tracked during demonstration and approach for tracking.

7.0 SCHEDULE OF ACTIVITIES

Provide a Gantt chart to show the date and anticipated duration of each task of the demonstration, from project initiation to project completion. This chart differs from the Gantt chart requested in Section 5.1, Conceptual Experimental Design, in that it should encompass the entire project, including activities associated with the JTP, while the Gantt chart in Section 5.1 should be specific to the activities conducted as part of the non-laboratory testing. Identify key milestones that if not met may impact or delay the overall schedule of activities.

8.0 MANAGEMENT AND STAFFING

Identify and describe the duties and responsibilities of all performers during the demonstration. Provide a flowchart to show managerial hierarchy and the relationship between the PI, other performers (government and nongovernment), and stakeholders.

9.0 REFERENCES

List all references cited in the Demonstration Plan. This list may include published reports, articles, data sources, and web sites. References should be properly cited using standard bibliographic formats so the reader can access the information. Oral presentations and unpublished reports are not acceptable references. Private communications are acceptable, but the reference must provide the name, organization, and contact information (phone number or e-mail address) of the individual and the date of the communication.

APPENDICES

Appendix A: Joint Test Protocol

Appendix A should consist of the complete stand-alone JTP approved by the stakeholders.

Appendix B: Points of Contact

List all the important points of contact (POC) involved in the demonstration, such as the PI, co-investigators, sponsors, industry partners, and regulators. The list should include the following information: 1) full name; 2) complete mailing and FedEx addresses (if different); 3) telephone number, fax number, and e-mail address; and 4) the role of the individual in the project.

Use the tabular format below:

POINT OF CONTACT Name	ORGANIZATION Name Address	Phone Fax E-mail	Role in Project

Appendix C: Health and Safety Plan (HASP)

Each Demonstration Plan should include or reference a Health and Safety Plan. **Demonstrators are responsible for ensuring that the HASP is reviewed and approved by appropriate offices. The ESTCP Office will not formally review and approve these plans.** Demonstrators should anticipate the most likely scenarios and develop plans for handling emergencies that are as detailed as possible to ensure the safety of everyone involved.

Demonstrators who already have a HASP can adapt that plan to the demonstration.

Overall, demonstrators should consider the following issues:

- What are the applicable local, state, and Federal health and safety laws and regulations?
- What is the potential for worker exposure to hazardous materials and/or other hazards?
- What physical requirements are expected of workers?
- How many people are required to operate the technology?
- What is the technology's history of breakdowns or accidents?

- Will there be any potential effects from the transporting of equipment, samples, wastes, or other materials associated with the technology?
- What impact will this technology have on the surrounding environment?
- Where is the closest medical facility? (Provide a map and written directions.)

Additional Appendices

As needed, provide additional appendices to fully define methodologies identified in Section 5.0.

II. GUIDANCE FOR PREPARATION OF JOINT TEST PROTOCOLS

A JTP is a stand-alone document that addresses the laboratory testing of material, coupons, or items intended to simulate components that are the subject of the innovative technology being demonstrated. Testing is required because these are the materials to which the innovative technology would be applied if implemented into a manufacturing or maintenance operation as a replacement of an existing process. The JTP defines the laboratory testing and validation efforts required by the end-user/stakeholder community to ensure that weapons system military performance specifications are maintained (or exceeded) as a result of implementing the alternative technology. The JTP must be reviewed and accepted by the end-user/stakeholder communities who have approval authority for implementing the technology.

The ESTCP WP Program Manager in consultation with the PI will determine whether a JTP needs to be developed for some (or all) applications. The typical steps for development and execution of a JTP are:

1. Determine in consultation with the ESTCP WP Program Manager that a JTP is applicable for the project.
2. Identify military weapons systems, platforms, and components that are relevant to the technology being demonstrated.
3. Identify and contact the critical stakeholders (i.e., Program Managers, component or depot engineers, MILSPEC owners, etc.).
4. Develop the JTP. Solicit definition of testing or measurement requirements and the approval process for the alternative technology.
5. Finalize the JTP document and have it reviewed and approved by appropriate stakeholders.
6. Submit a copy of the JTP to the ESTCP Office.
7. Execute the JTP.
8. Document results of the JTP in a Joint Test Report (JTR).

Note that development and execution of the JTP is typically done in conjunction with development of the overall Demonstration Plan for the project. JTP development offers an approach that can help a demonstration meet the technology transfer challenges. The development process for the JTP is designed to effectively incorporate the needs and requirements of the end users early in the demonstration planning phase. Consideration of user needs will facilitate the design of a demonstration that will generate the data that decision makers need to transfer a technology to full-scale implementation. The process includes a series of meetings with various stakeholders for the technology. Stakeholders include, but are not limited

to, the Weapons Systems Program Managers/Single Managers or their technical representatives, depot environmental managers and engineers, and other representatives involved in the approval of technologies utilized in the acquisition and maintenance communities.

The JTP is not formally approved by ESTCP. The WP Program Manager should be kept apprised of stakeholder meetings and the status of JTP development in Quarterly Progress Reports. Upon completion of the JTP, a memorandum describing stakeholder acceptance, together with a copy of the final, approved version of the JTP, should be provided to the Program Manager.

The JTP guidance provided here is general and all elements may not apply to all ESTCP Weapons Systems and Platforms projects. It is recognized that ESTCP projects cover a wide range of topics so it is impossible to develop guidance that is rigorously appropriate for all situations. It will be the responsibility of each demonstrator, with concurrence of the identified stakeholders, to decide what is most appropriate, and to what degree, for the technology being demonstrated.

Section-by-Section Joint Test Protocol Guidance

Cover Page: Include prominent [ESTCP logo](#) as on cover page of this guidance, the words “JOINT TEST PROTOCOL,” project title, project number, date (month/year), draft/final status, and revision number.

Front Matter: The Front Matter should consist of the following:

- Table of Contents
- List of Figures including page number on which the figure appears
- List of Tables including page number on which the table appears
- List of Acronyms and Symbols. Symbols would include, for example, “T_s” standing for “substrate temperature.” However, do not include elemental symbols from the periodic table nor standard units, whether English or International System (such as lb or mg), in the list
- Table showing the name, organization and contact information for the individuals principally responsible for preparing the JTP

Note that each major section should begin at the top of a new page.

1.0 INTRODUCTION

This section should serve as introduction to the broad stakeholder community on the project. It should include the following:

- Objectives of the JTP
- Identification and description of the stakeholders and other parties involved with development of the JTP
- Brief discussion of the meetings, communications, etc. that led to the development of the JTP.

In this section, include Table 1 listing the targeted hazardous material, the process in which it is currently used, applications in which the material or process is currently used that will be addressed with the proposed technology, current specifications covering the existing process, the affected weapons programs, and the candidate parts and substrates on which the current material or process is being used that will be addressed in the project.

Table 1. Target HazMat Summary.

Target HazMat	Current Process	Applications	Current Specifications	Affected Programs	Candidate Parts and Substrates

2.0 PERFORMANCE AND TESTING REQUIREMENTS

This section should provide a summary of the tests to be conducted under the JTP. In many instances there will be tests that are required by all stakeholders and then extended tests that are required by only certain stakeholders or programs. These should be differentiated, identifying the stakeholders or programs requiring the extended tests.

Tables 2 and 3 should be completed and included in this section of the JTP. They include acceptance criteria and the references, if any, used for developing the tests. An example of an acceptance criteria is, “B117 salt fog corrosion performance equal or better than currently used process.”

It is anticipated that the JTP will not address all health and safety issues associated with either using the technology to be demonstrated or performing the tests delineated in the JTP. Therefore, it is recommended that the following sentences, or something similar, be inserted into the document: “Tests in this JTP may involve the use of hazardous materials, operations, and equipment. This JTP does not address all safety issues associated with its use. It is the responsibility of each user of this JTP to establish appropriate safety and health practices and to determine the applicability of regulatory limitations prior to its use. Refer to the Health and Safety Plan developed for the Demonstration Plan corresponding to this JTP.”

Table 2. Common Performance and Testing Requirements.

Engineering Requirement	Test	JTP Section	Acceptance Criteria	References

Table 3. Extended Performance and Testing Requirements.

Engineering Requirement	Test	JTP Section	Acceptance Criteria	References	Participants Requiring Test

3.0 TEST DESCRIPTIONS

This section will comprise the bulk of the JTP. For each type of test to be performed, there should be a separate subsection containing the following information:

- Rationale for the test
- Detailed description of the test coupons/specimens, including
 - Type of material (e.g., alloy designation)
 - Material condition (e.g., heat treat condition)
 - Coupon/specimen geometry
 - Preparation procedures for coupons/specimens
 - Number of coupons/specimens for each test condition
- If the technology being evaluated includes a coating or surface modification process, a description of the application of the coating or process to the test coupons/specimens, including the quality control procedures
- Detailed description of the test itself. If the test follows a published standard such as from ASTM or SAE, reference the document number and include a summary description of the test. If the test follows a MIL-SPEC or is a company specification, provide a detailed description of the test, including a definition of test parameters, number of trials per condition (e.g., substrate/coating combination), and acceptance (pass/fail) criteria.

Quite often, a JTP will include property and performance characterization tests or evaluations. The former can include items such as coating hardness, adhesion and internal stress, and the latter can include items such as fatigue, corrosion, wear, and embrittlement testing. Regardless of which category of test or evaluation is included, a detailed description should be provided.

Any major or unique equipment or instrumentation the tests may require should be described in the appropriate subsection.

Finally, within each subsection there should be a description of data acquisition and analysis, including statistical analysis, to show whether or not the demonstrated technology met the acceptance or pass/fail criteria.

It is recommended that the following table be completed for each type of test to be performed.

Table 4. Test Description.

Parameters	
Number and type of specimens per candidate alternative	
Trials per specimen (if needed)	
Experimental control specimens	
Acceptance criteria	

4.0 REFERENCE DOCUMENTS

Provide a table listing all documents referenced in the development of the JTP.

Table 5. Reference Documents.

Reference Document	Title	Date	Applicable Sections of Reference Document	JTP Test	JTP Section

III. GUIDANCE FOR PREPARATION OF DEMONSTRATION PLANS THAT DO NOT INCLUDE JOINT TEST PROTOCOLS

The Demonstration Plan is intended to fully document the plans for demonstrating and validating the cost and performance of the proposed technology at demonstration sites. The main objective of the Demonstration Plan is to fully document the intended actions for establishing or qualifying the alternative technology at the demonstration sites and for evaluating the technology in some type of field or other “real-world” testing. This may include the application of the technology in an operational maintenance or manufacturing facility and/or the field testing of the technology on a weapon system or platform. The results obtained should provide information on the expected operational military and environmental performance and cost of the technology.

The typical steps in developing a Demonstration Plan for an ESTCP project under the WP program area that does not utilize a JTP are:

1. Determine in consultation with the ESTCP WP Program Manager that a JTP is not applicable for the project.
2. Identify demonstration sites, platforms, and other test facilities and organizations.
3. Identify and contact the critical stakeholders and end users (i.e., Program Managers, parts engineers, MIL-SPEC owners, etc.).
4. Through consultation with stakeholders and end users, identify any laboratory testing that will be necessary or essential prior to demonstration/validation activities at the demonstration sites or in real-world testing.
5. Execute laboratory testing delineated in above step.
6. Develop plans for conducting the demonstration/validation activities at the demonstration sites.
7. Write and finalize the Demonstration Plan.

For these projects for which no JTP will be developed, it is possible that laboratory testing will be necessary in order to design the subsequent field or real-world demonstration. In those cases, the description of the laboratory testing and the results should be provided in the Demonstration Plan (see Section 5.2, Pre-Demonstration Testing and Analyses). PIs should submit a draft Demonstration Plan at least two months prior to system installation or significant field demonstration activities to allow for review, comment, and revisions to be completed before that type of work is initiated. ESTCP recognizes that minor changes to the Demonstration Plan may occur in the field. In the event of substantial changes to the Demonstration Plan that occur after approval, projects must notify the ESTCP WP Program Manager immediately.

For projects involving multiple platforms or sites, separate Demonstration Plans or portions thereof may be required. If two or more platforms or sites are being used for the demonstration without significant differences in the experimental design, the second and subsequent platforms or sites may require only an addendum to the main plan describing the platform or site-specific conditions. If the additional platforms or sites require different experimental designs, then a full Demonstration Plan will be required.

Time frames for developing Demonstration Plans are difficult to generalize, but as a guide, it is expected that for these types of projects, the plan should be developed and submitted to the ESTCP Office within nine months of receiving initial project funds. This can vary depending on whether laboratory testing must be conducted prior to finalizing the Demonstration Plan.

The guidance provided in this document is designed to ensure that the project management and technical execution of the demonstration are consistent with ESTCP standards. Adherence to this guidance document will help provide a consistent demonstration methodology and data set, which will facilitate end-user review and evaluation.

Section-by-Section Demonstration Plan Guidance

Cover Page: Include Demonstration Plan title, project number, [ESTCP logo](#) (as on the cover page of this guidance, date, the words “Demonstration Plan,” draft/final status, and revision number. Also include the names and organizations of those individuals principally responsible for preparing the Demonstration Plan. (See the last page of this guidance document for a sample cover).

Front Matter: The Front Matter should consist of the following:

- Table of Contents
- List of Figures including page number on which the figure appears
- List of Tables including page number on which the table appears
- List of Acronyms and Symbols. Symbols would include, for example, “T_s” standing for “substrate temperature.” However, do not include elemental symbols from the periodic table nor standard units, whether English or International System (such as lb or mg), in the list

Note that each major section should begin at the top of a new page.

1.0 INTRODUCTION

This section is intended to provide a general overview of the project for those reviewers not familiar with the original project proposal. Specific subsections as described below should be included in this section.

1.1 BACKGROUND

Describe the environmental problem being addressed and its impact on DoD operations. Briefly describe the technology being demonstrated and its potential benefit compared to conventional practices and alternatives. (This will be expanded upon in Section 2.1, Technology Description.)

1.2 OBJECTIVE OF THE DEMONSTRATION

Describe the overarching objectives of the demonstration, such as to validate the technology in the field or in a real-world industrial setting at the appropriate scale of operation (pilot, prototype, or full-scale), or to transfer the technology to an end user. Explain the environmental, safety and occupational health (ESOH) benefits of the technology to be demonstrated.

1.3 REGULATORY DRIVERS

State the existing or anticipated federal, state, or local regulations, or DoD directives that have resulted in a need for this innovative technology. Any international regulations that may have an impact on DoD operations should be described as well.

1.4 STAKEHOLDER/END-USER ISSUES

Identify the stakeholders (individuals and organizations) who will be involved in developing requirements for acceptance of the alternative technology. Describe the decision process that will lead to ultimate acceptance and implementation of the alternative technology. Identify weapons systems that will be impacted. Summarize how the demonstration will address any stakeholder or end-user decision-making factors concerning the technology.

2.0 TECHNOLOGY

This section is intended to provide an overview of the technology to be demonstrated. Reference to existing papers and reports is highly encouraged.

2.1 TECHNOLOGY DESCRIPTION

- Describe the technology in sufficient detail to provide an accurate and factual understanding of its theory, functionality, and operation.
- Provide an overall schematic diagram of the technology. Include one or more photographs of the equipment involved in the new technology.
- If the technology being demonstrated involves a new method or process, provide a flowchart showing the various steps in the process.
- Provide a chronological summary of the development of the technology to date.
- Describe expected applications of the technology.

2.2 TECHNOLOGY DEVELOPMENT

Provide a description of all research and development conducted on the technology prior to initiation of the ESTCP project. If this work has been published in one or more separate technical reports, provide a summary and reference the reports. If not, this section should be sufficiently detailed to fully describe the work done and results obtained. Use of graphics is encouraged to aid the reader in understanding the results.

2.3 ADVANTAGES AND LIMITATIONS OF THE TECHNOLOGY

State the advantages and limitations of the technology and compare these with the advantages and limitations of currently used and other alternative technologies. These should include issues of cost, military performance, and environmental issues. Identify any prominent alternative technologies.

3.0 PERFORMANCE OBJECTIVES

The performance objectives are a critical component of the Demonstration Plan. They provide the basis for evaluating the performance and costs of the technology. Performance objectives are the primary criteria established by the investigator for evaluating the innovative technology. Meeting these performance objectives is essential for successful demonstration and validation of the technology.

These objectives will generally include the acceptance criteria related to any laboratory testing of material produced in the demonstration and other performance objectives associated with field or “real-world” testing. This section should provide in tabular form a brief review of the laboratory test objectives, then a detailed description of the performance objectives associated with the field demonstration.

Performance objectives may be presented in two ways, *qualitative and quantitative*, and should be summarized in Table 1 (sample provided). In Sections 5.0 and 6.0, details will be required on the methods for collecting and analyzing the data required to assess the quantitative performance objectives listed in the table.

Table 1. Performance Objectives.
[SAMPLE ONLY—Performance objectives must be specific to the technology being demonstrated.]

Performance Objective	Data Requirements	Success Criteria
Quantitative Performance Objectives		
Product Testing - Energy release (for energetic material)	<ul style="list-style-type: none"> • ASTM test number • MIL-SPEC requirement • Customized tests 	Equivalent to existing energetic material
Reduction of hazardous waste generated	<ul style="list-style-type: none"> • Raw materials usage, mass balance • Analysis for hazardous materials by EPA standard test number during demonstration 	>90% reduction from current process
Decrease in production rates	Tracking of production time	>50% reduction vs. baseline characterization
Qualitative Performance Objectives		
Ease of use	Feedback from field technician on usability of technology	End-item manufacture process simpler than existing process

4.0 SITES/PLATFORM DESCRIPTION

This section should provide a concise description of the selected demonstration sites and platforms. It should include all information that is relevant to the demonstration. Specific subsections below are intended to capture relevant information; however, include any other information that has immediate bearing on the demonstration.

4.1 TEST PLATFORMS/FACILITIES

Identify the selected sites or platforms. Describe the criteria and requirements used in selecting test platforms and host facilities to be used for the demonstration. Discuss how they relate to the technology. For example, does the test platform provide maximum likelihood of success, have good existing infrastructure, or have stakeholder buy-in? Describe which weapons systems, support vehicles, or equipment are produced at, serviced by, or operated at the facility.

4.2 PRESENT OPERATIONS

Describe the current industrial process operations for the activities or applications that the technology is intended to replace. Provide an overview of the process in which the technology to be demonstrated will reside. As appropriate, provide schematics or layout drawings, and describe the characteristics of the process stream or maintenance activities.

4.3 SITE-RELATED PERMITS AND REGULATIONS

Identify any permits or potential regulations that may apply to the demonstration. Provide information on the status of and appropriate references for pertinent environmental permits required for the demonstration to proceed.

5.0 TEST DESIGN

This section provides the detailed description of the system design and testing to be conducted to address the performance objectives described in Section 3.0, Performance Objectives. Descriptions here should be sufficiently detailed such that a technician or engineer can use this section to conduct the demonstration.

5.1 CONCEPTUAL EXPERIMENTAL DESIGN

Provide a broad overview of the experimental design to be used to evaluate the performance objectives, including a discussion of controls, various operational phases, and other means to evaluate the technology performance. Provide a Gantt chart that shows the schedule for each phase of testing and how the various operational phases are related. Identify the decision points on this chart. Specific details should be provided in the following sections.

5.2 PRE-DEMONSTRATION TESTING

Provide the results of any pre-demonstration testing or laboratory confirmation studies conducted as part of the ESTCP project that were determined to be necessary prior to developing plans for field or real-world testing. If the results have been published in a separate archival technical report, provide a brief summary and reference that report. If not, the section should be sufficiently detailed to fully describe the results. As appropriate, detailed data sets should be provided in appendices, but a summary of the results should be provided in this section. Liberal use of graphics is encouraged to aid the reader in understanding the results.

5.3 DESIGN AND LAYOUT OF TECHNOLOGY COMPONENTS

Provide a thorough description with accompanying schematic diagrams of all technology and system components. Describe site preparation and other requirements for installation of the demonstration equipment. Provide a subsection for each significant technology component describing its design and location. As appropriate provide detailed information and specification in an appendix, or cite available references.

5.4 FIELD TESTING

Provide a description of each significant phase of operation and activities that will be conducted during that phase. Either describe in sufficient detail expected operations or reference existing standard operating practices or similar material. Activities may include system start-up, system operation under different operating parameters, and system shut down. Provide information on each operating parameter condition.

Describe plans for removal of equipment, if any, at the conclusion of the demonstration. If equipment is to be left in place or transferred to the installation, please plan to obtain written permission from the facility to do so and provide this written permission as an appendix to the Demonstration Plan.

5.5 MEASUREMENT/MONITORING PLAN

This plan should result in sufficient data to validate the technology performance under real-world conditions and allow stakeholders to evaluate the innovative technology. Provide a description of exactly what will be measured or monitored during each phase of the field testing. This might involve, for example, assessing the extent of corrosion for a new protective coating, measuring the energy release for a munition containing a new explosive material, or collecting particulates from a gas turbine engine operating under different conditions. If possible, summarize the measurement and monitoring activities in a table.

In addition, provide a brief description of each method. Methods that are not standard must be described in detail in the text. If specific analytical equipment is to be used to make measurements of performance, describe the calibration procedures to ensure accurate measurements. Describe other quality assurance methods that will be followed. If standard, published tests or procedures (e.g., ASTM standards) are to be followed, they should be briefly described and referenced. Provide a detailed sampling schedule as applicable. When appropriate, provide a map or schematic showing the sampling points.

For projects developing and demonstrating a new material, this section should also describe which ESOH assessments will be performed, such as toxicity studies and waste disposal issues.

5.6 LABORATORY MATERIAL TESTING

This section should describe all laboratory tests of material produced or collected during the demonstration required by stakeholders for qualification of the alternative technology. This is differentiated from laboratory testing described in Section 5.2, Pre-Demonstration Testing and Analyses, that was performed prior to field testing and for which results are included in the Demonstration Plan. This section describes laboratory testing to be done in conjunction with field or real-world demonstrations. Table 2 should be prepared to summarize all the tests to be performed.

Table 2. Laboratory Testing Requirements.

Engineering Requirement	Test	Acceptance Criteria	References

There should be separate subsections for each type of test to be performed. Each subsection should have the following information:

- Rationale for the test
- Detailed description of the laboratory test itself. If the test follows a published standard such as from ASTM or SAE, reference the document and include a summary description of the test. If the test follows a MIL-SPEC or a local specification, include a detailed description of the test. This includes a definition of test parameters, number of trials per condition, and acceptance (pass/fail) criteria.

Finally, within each subsection there should be a description of data acquisition and analysis, including statistical analysis, to show whether or not the demonstrated technology met the acceptance or pass/fail criteria.

6.0 PERFORMANCE ASSESSMENT

A summary of all data analysis planned in support of the assessment of performance objectives should be provided in this section. Describe the intended statistical procedures and tests to be applied for analyzing the data and determining statistical significance, especially when comparisons with data from current or alternative technologies and methodologies are needed or comparisons to success criteria are sensitive to variances in the data and sample size. Discuss the bases for selecting these procedures. As appropriate, reference information presented in Section 5 rather than repeating all information.

At a minimum, provide a subsection for each performance objective. Plans for analyses of data obtained during the field demonstration that address each performance objective in Section 3.0, Performance Objectives, should be provided.

Please note that equivalent subsections should be provided for each performance objective. It is recognized that related performance objectives may have similar data analysis needs. As a result, reference can be made to earlier subsections rather than repeating all information.

7.0 COST ASSESSMENT

ESTCP projects are required to develop and validate, to the extent possible, the anticipated operational and life-cycle costs of the demonstrated technology. If the demonstrated technology is replacing an existing technology, then the same costs for the baseline technology should be determined if not already known. The intent of this section in the Demonstration Plan is to identify information that can be tracked or obtained during the execution of the demonstration that will aid in establishing realistic life-cycle costs and savings estimates for the technology if implemented. To identify these items, an initial life-cycle cost model must be constructed. The actual cost data and the life-cycle cost analysis are required to be included in the ESTCP Final Report and Cost and Performance (C&P) Report after completion of the demonstration.

Just as the PI is expected to consult with stakeholders and end users in developing performance requirements for the alternative technology, the PI is also expected to consult with the same individuals in terms of identifying appropriate cost factors associated with implementing the alternative technology. Table 3 provides examples of the cost factors, broken down by category that could be measured or calculated in an ESTCP demonstration project. It is the responsibility of the PI, working with other performers and stakeholders, to determine which of these, plus any additional ones, are relevant to the project.

There are many techniques and methodologies available for conducting cost-benefit analyses (see, for example, *Economic & Financial Analysis for Engineering & Project Management* by Abol Ardalan, Technomic Publishing Company, Inc., 2000). However, ESTCP recognizes that PIs and other project performers most likely do not have the background and expertise to perform the detailed analysis required. Therefore, often an outside organization, company, or consultant will need to be retained for this task. For the Demonstration Plan, the PI should identify the entity that will perform the analysis and provide a brief description of the methodology that will be used, including references. It is emphasized that a standard methodology must be used.

The Demonstration Plan should provide a summary description of the cost model proposed for estimating the life-cycle cost of the new technology. A table of all items that are to be tracked during the execution of the demonstration should be provided. A brief description of how each item will be tracked should be included. These cost factors should be determined for the alternative technology and, unless they are already known, for the existing technology.

In many instances, especially in the surface engineering area, test data indicates that the alternative technology could result in improved performance such as a new coating lasting longer in service than existing coatings, resulting in increased time between repair or overhaul and decreased life-cycle costs. For these cases, cost-benefit analyses should be conducted that assume both equivalent performance and expected improved performance of the alternative technology.

It is important to describe the approach for developing an estimated life-cycle cost for the technology. This would generally include 1) facility capital cost, 2) start-up and operations and maintenance costs, 3) equipment replacement costs, 4) ESOH costs and cost avoidance, and 5) reprocessing or re-application costs.

Table 3. Examples of Types of Costs by Category.

Direct Environmental Activity Process Costs				Indirect Environmental Activity Costs		Other Costs	
Start-Up		Operation & Maintenance					
Activity	\$	Activity	\$	Activity	\$	Activity	\$
Equipment purchase		Labor to operate equipment		Compliance audits		Overhead associated with process	
Equipment design		Labor to manage hazardous waste		Document maintenance		Productivity/cycle time	
Permitting		Utilities		Environmental Management Plan development and maintenance		Worker injury claims and health costs	
Installation		Management and treatment of by-products		Reporting requirements		Maintenance cycle time	
Training of operators		Hazardous waste disposal fees		Test and analyze waste streams			
		Raw materials		Medical exams (including loss of productive labor)			
		Process chemicals, nutrients		Waste transportation (on and off site)			
		Consumables and supplies		ESOH training			
		Equipment maintenance					
		Training of operators					

To summarize, the following information related to the cost assessment should be included in the Demonstration Plan:

- Cost model and factors for the existing technology (if applicable) and the new technology being demonstrated
- Identification of the organization or company performing the cost-benefit and life-cycle cost analyses
- Description of the expertise and experience of the organization or company in performing cost analyses similar to the one to be performed in the project (provide references if available)
- Description of the methodologies that will be used to perform the analyses (provide references if available)
- Identification of items to be tracked during demonstration and approach for tracking.

8.0 SCHEDULE OF ACTIVITES

Provide a Gantt chart to show the date and anticipated duration of each task of the demonstration, from project initiation to project completion. Identify key milestones that if not met may impact or delay the overall schedule of activities. This chart differs from the Gantt chart requested in Section 5.1, Conceptual Experimental Design, in that it should encompass the entire project whereas the Gantt chart in Section 5.1 should be specific to the activities conducted as part of the field testing.

9.0 MANAGEMENT AND STAFFING

Identify and describe the duties and responsibilities of all performers during the demonstration. Provide a flowchart to show managerial hierarchy and the relationship between the PI, other performers (government and nongovernment), and stakeholders.

10.0 REFERENCES

List all references cited in the Demonstration Plan text. This list may include published reports, articles, data sources, and web sites. References should be properly cited using standard bibliographic formats so the reader can access the information. Oral presentations and unpublished reports are not acceptable references. Private communications are acceptable, but the reference must provide the name, organization and contact information (phone number or e-mail address) of the individual and the date of the communication.

APPENDICES

Appendix A: Points of Contact

List all the important POCs involved in the demonstration, such as the PI, co-investigators, sponsors, industry partners, and regulators. The list should include the following information: 1) full name; 2) complete mailing and FedEx addresses (if different); 3) telephone number, fax number, and e-mail address; and 4) the role of the individual in the project.

Use the tabular format below:

POINT OF CONTACT Name	ORGANIZATION Name Address	Phone Fax E-mail	Role in Project

Appendix B: Health and Safety Plan (HASP)

Each demonstration plan should include or reference a Health and Safety Plan. **Demonstrators are responsible for ensuring that the HASP is reviewed and approved by appropriate offices. The ESTCP Office will not formally review and approve these plans.** Demonstrators should anticipate the most likely scenarios and develop plans for handling emergencies that are as detailed as possible to ensure the safety of everyone involved.

Demonstrators who already have a HASP can adapt that plan to the demonstration.

Overall, demonstrators should consider the following issues:

- What are the applicable local, state, and federal health and safety laws and regulations?
- What is the potential for worker exposure to hazardous materials or other hazards?
- What physical requirements are expected of workers?
- How many people are required to operate the technology?
- What is the technology's history of breakdowns or accidents?
- Will there be any potential effects from the transporting of equipment, samples, wastes, or other materials associated with the technology?
- What impact will this technology have on the surrounding environment?

- Where is the closest medical facility? (Provide a map and written directions.)

Additional Appendices

As needed, provide additional appendices to fully define methodologies identified in Section 5.0 and to report on pre-demonstration laboratory testing.

Sample cover page



DEMONSTRATION PLAN

Replacement of Hazardous Materials in Weapons Systems

ESTCP Project WP-xxxxxx

**John Doe
Army Research Laboratory**

**Jane Smith
Naval Air Systems Command**

**Ron Roe
Air Force Materiel Command**

Version 1

January 2017