



**SPECIAL REPORT**

**UNDERWATER SYSTEMS GROUP**

**SURVEY OF LITTORAL UNDERWATER VEHICLE TEST SITES**

**WHITE SANDS MISSILE RANGE  
REAGAN TEST SITE  
YUMA PROVING GROUND  
DUGWAY PROVING GROUND  
ABERDEEN TEST CENTER  
NATIONAL TRAINING CENTER  
ELECTRONIC PROVING GROUND**

**NAVAL AIR WARFARE CENTER WEAPONS DIVISION  
NAVAL AIR WARFARE CENTER AIRCRAFT DIVISION  
NAVAL UNDERSEA WARFARE CENTER DIVISION, NEWPORT  
PACIFIC MISSILE RANGE FACILITY  
NAVAL UNDERSEA WARFARE CENTER DIVISION, KEYPORT**

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**SPECIAL REPORT**

**SURVEY OF LITTORAL UNDERWATER VEHICLE TEST SITES**

**JANUARY 2005**

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**Published by**

**Secretariat**

**Range Commanders Council**

**U.S. Army White Sands Missile Range,**

**New Mexico 88002-5110**

THIS DOCUMENT IS AVAILABLE ON THE  
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## PREFACE

This report summarizes work performed during 2004 on the "Survey of Littoral Underwater Vehicle Test Sites" sponsored by the Range Commanders Council (RCC). The work performed directly supports the efforts to identify and capture current and accurate information regarding the various underwater vehicle test sites. As a result, the Underwater Systems Group (USG) and the National Unmanned Undersea Vehicle (UUV) Test and Evaluation (T&E) Center (NUTEC) have developed a comprehensive database system to enable easy access to undersea vehicle test site information. This database, with standardized and accurate information provided directly by USG member organizations, will be highly valuable to the underwater vehicle test site user community.

The USG) would like to provide a special acknowledgement for production of this document for the RCC to:

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# **CHAPTER 1**

## **BACKGROUND**

In the spring of 2001, the National Unmanned Undersea Vehicle (UUV) Test and Evaluation (T&E) Center (NUTEC) was established at the Naval Undersea Warfare Center (NUWC) Division Keyport. During the first year of NUTEC's development, an extensive requirements gathering process was undertaken. Vehicle developers, researchers, program managers, and Fleet personnel who had a stake in the T&E of UUVs were contacted to record their needs, issues, and concerns relative to UUV T&E and Fleet readiness training exercise support. A finding that became apparent through the requirements gathering process was that there was an immediate need for current and accurate information regarding the various underwater vehicle test sites.

This finding led to a review of published documentation for both instrumented and non-instrumented test sites. This initial review revealed that existing documentation was highly fragmented, incomplete, sometimes in error, and usually out of date. For many of the test sites, there was no available documentation, and for others the information did not provide the basic details needed for test planning and coordination. Some of the UUV program offices and developers had compiled their own test site summary spreadsheets that addressed their particular test needs. However, there was no unifying format, nor sufficient content, to enable these summaries to be recommended for general use. NUTEC personnel brought this situation to the attention of the Range Commanders Council (RCC) Underwater Systems Group (USG), which concluded that developing an all-encompassing undersea vehicle test sites database, with standardized and accurate information provided directly by USG member organizations, would be of value to the underwater vehicle test site user community.

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## CHAPTER 2

### OBJECTIVE

In August 2002, the USG proposed to the RCC that a test site database be developed. The project was approved as Task US-16 ([Appendix A](#)). The scope and specific objectives outlined for the task were to:

“Conduct a detailed survey of underwater test sites, both at existing underwater tracking ranges and at appropriate non-instrumented locations that would be suitable for undersea vehicle testing. The objective for this task is to validate and expand upon existing, but incomplete, summaries of physical and operational characteristics of undersea test sites, to create a comprehensive and accurate summary that can be used to optimize planning for, and use of, available sites for in-water testing of undersea vehicles.”

Because the task was planned to take advantage of significant assistance available from NUTEC, the RCC was able to avoid costs of the necessary contractor support for task execution. With task support resources in place, the USG developed a task plan that included performance of the following specific actions:

- a. Review existing range and test site lists and available documentation.
- b. Develop a vehicle test site database.
- c. Collect accurate information about the applicable test sites from USG members and site representatives.
- d. Populate the database with collected information.
- e. Test the database to ensure that the data was accessible and accurate.
- f. Arrange to make the database accessible to potential users via an Internet web-based portal.

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## CHAPTER 3

### TECHNICAL APPROACH

#### 3.1 Assumptions

Within the guidelines provided by the USG task, USG and NUTEC personnel immediately began to study the problem and to talk with range and test site managers. A number of assumptions were made to define the bounds of the task and to describe the intended database development process. These assumptions were as follows:

- a. The database should serve as a definitive reference for the evaluation of range and test sites for underwater vehicle testing.
- b. The database should include both instrumented test sites (ranges) and non-instrumented test sites in order to test in a variety of specific environments.
- c. The database should address multiple sites within ranges and test sites, which may or may not be contiguous. Even contiguous test site areas that have different environmental and geographic attributes need to be addressed separately.
- d. The portable test ranges do not constitute “ranges” for the purpose of this database because they can be placed anywhere. The test sites themselves will be the focus of the database, rather than portable ranges and their related instrumentation systems.
- e. The existing range and test site documentation is diverse and fragmented. The database should provide meaningful, quantitative data to test site users, and systematic and consistent data formats should prevail throughout.
- f. The test site data should be obtained from the designated range/site points of contact (POCs). The USG members who represent many of the sites, can provide much of the targeted test site data (or other POC information).
- g. The database should be relational in nature and SQL-compliant to support web-based operations at the sites. Microsoft Access<sup>®</sup> can serve well as the database management software application for this type of database.
- h. The database should utilize Internet hyperlinks to existing documentation sources. These links and all data collected should be reviewed for accuracy and currency. The applicable range or test site POC should validate the final data edits.
- i. The largest volume of information related to underwater ranges addresses tracking and measurement systems. Because systems’ documentation is so diverse and voluminous, this information should be excluded from the initial database. Instead, links should be provided to existing web sites and range user guides (RUGs), where possible.

#### 3.2 Test Site Selection

The list of candidate ranges and test sites developed for collection of the initial data set is shown in [Figure 3-1](#). This initial list was not meant to be all-inclusive, but it does provide a starting point for the information collection effort. It should be noted that this list is not the same as the final list of range and test site POCs who were ultimately surveyed nor does it represent all sites that are currently included in the database (see [Appendix B](#)).



Figure 3-1. Test sites selected for initial data collection.

### 3.3 Test Site Database Architecture

By cataloging all of the information that range and test site stakeholders indicated as being pertinent to test and exercise planning (see [Appendix B](#)), it was determined that the required information should be broken into four subsets. Dividing the data set in this manner, as indicated in Figure 3-2, greatly simplified the design and construction of the Access<sup>®</sup> database, while maintaining mapping and data continuity across the entire data set.

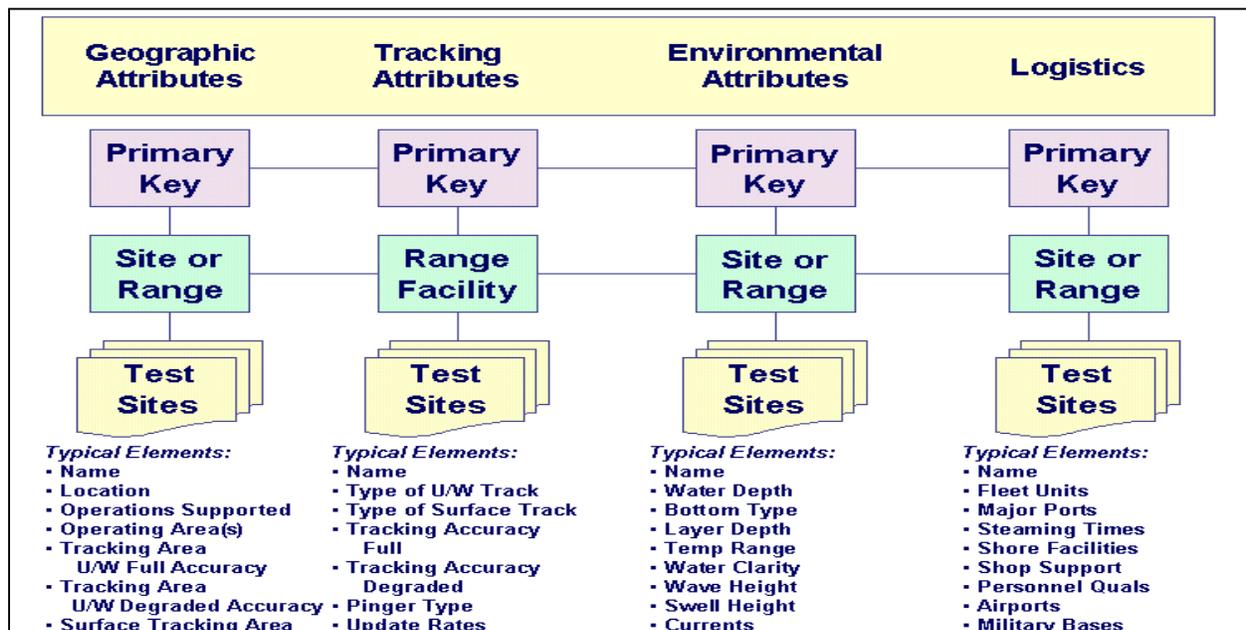


Figure 3-2. Test site database architecture.

### 3.4 Database Structure and Use

Microsoft Access<sup>®</sup> was determined to be an extremely flexible and capable database support tool, but it has not been found to be particularly “user-friendly” in some applications. In order to ensure that the database will be of utility to laymen and database experts alike, it was deemed necessary to build a selection of standard query-based reports and graphics that would allow the user to quickly select the types of data desired and how it would be displayed. The architecture concept for this capability is outlined in Figure 3-3. Non-standard queries can also be accommodated as needed.

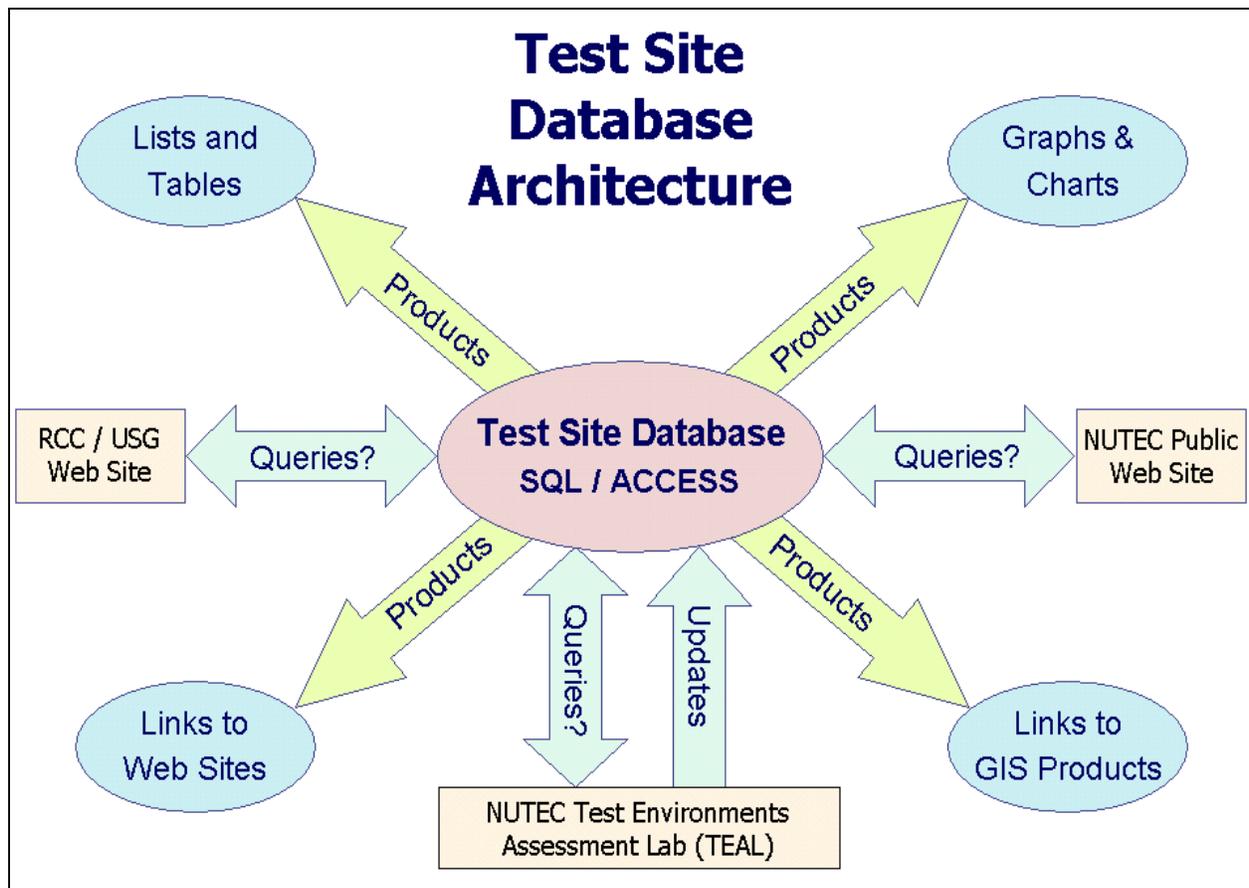


Figure 3-3. Test site database access and products.

In designing the database and the supporting query and report generation capabilities, the development team tried to adhere to the above concept, but query development proved to be a difficult task. Essentially, the team members had to play the roles of various types of database users and forecast the information users would likely need and how they would like to see it.

[Figure 3-4](#) provides a synopsis of the initial Access<sup>®</sup> queries that were developed. Queries were only developed for the module for which the development team had been able to obtain a significant amount of data, the geographic attributes section (see [Figure 3-2](#)).

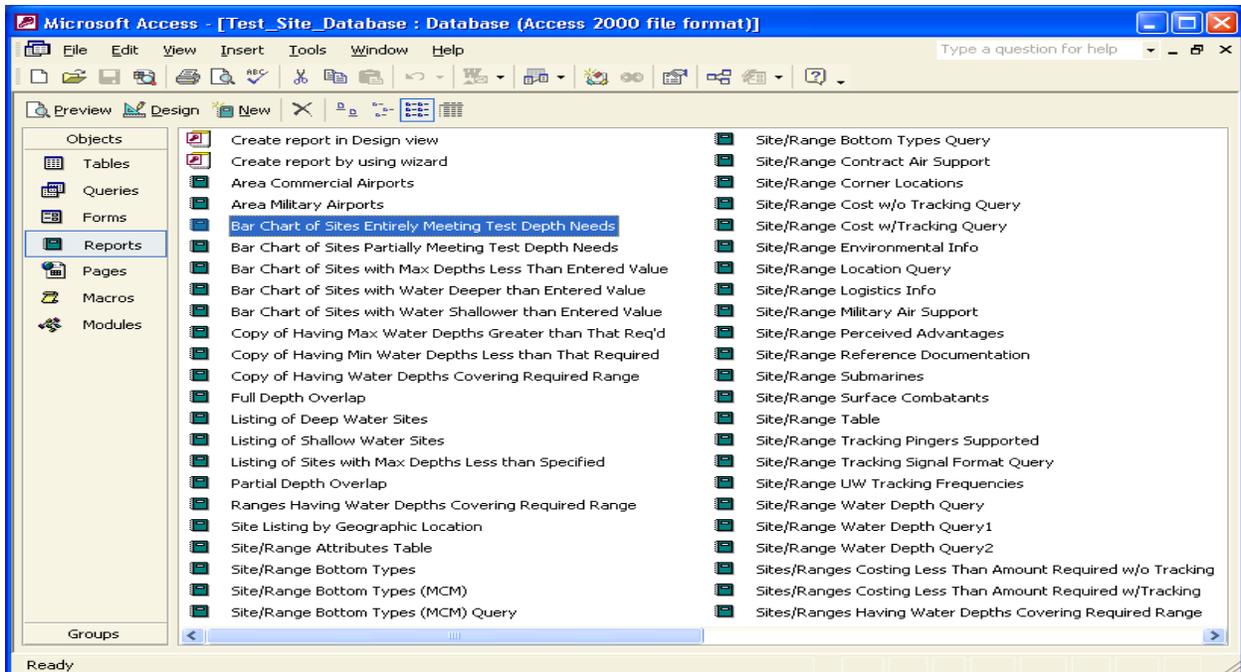


Figure 3-4. Initial queries and reports available for the initial test site database.

To view database information, a user could access the Test Site Database reports section (Figure 3-4) and use the query that reads “Bar Chart of Sites Entirely Meeting Test Depth Needs.” The database would prompt the user to specify a minimum and a maximum depth. If the minimum depth were set to zero and the maximum depth to 1000 feet, the database would return the results in Figure 3-5. In this case, the database returned 7 of the 38 test sites that matched the requested criteria. Note that the chart shows the full range of depths for the sites that meet the user’s test depth needs, rather than just the depth range that the user entered. This can be important for considerations of maximum operating depths allowed for vehicles, such as to avoid crushing due to pressure, should a vehicle failure allow it to sink to the sea floor.

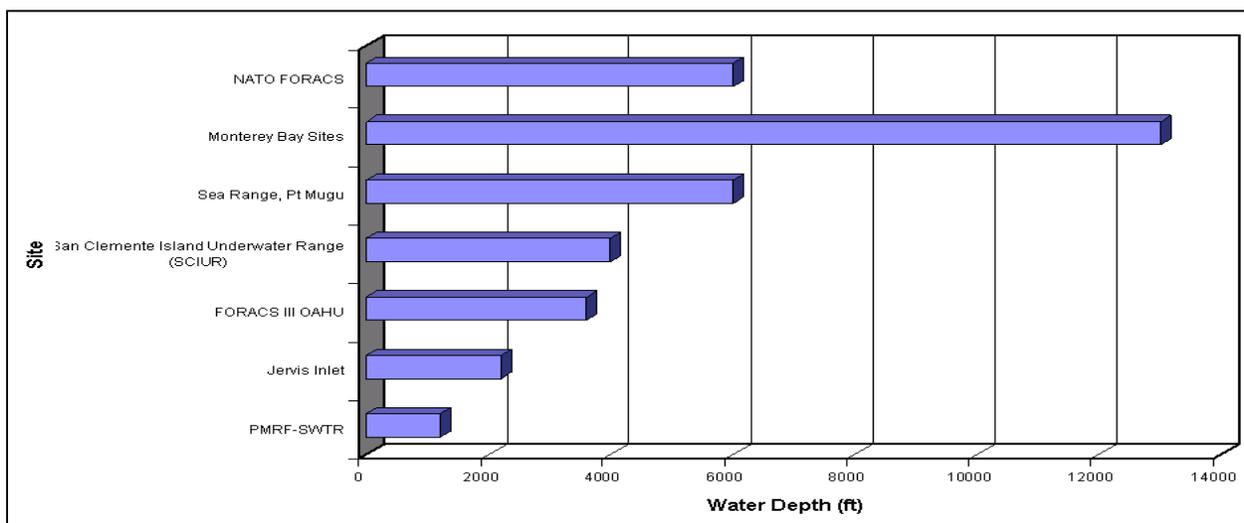


Figure 3-5. Example database report of test sites with water depths of 0 to 1000 feet.

Figure 3-6 shows one of the standard list-type database reports, identifying test sites on the west coast of the U.S., with their operating areas and water depths.

<i>Geographic Location</i> West Coast			
<i>Site Range Name</i>	<i>Site Area, sq nm</i>	<i>Minimum Water Depth, ft</i>	<i>Maximum Water Depth, ft</i>
Acoustic Research Detachment	10	600	1200
Dabob Bay	9	120	600
DBRC (Dabob Bay Range Complex)	45	0	600
Fox Island Acoustic Laboratory	7	60	360
Jervis Inlet	9	0	2200
Keyport Range	5	0	140
Kingfisher Range (SCI)	2	60	300
Monterey Bay Sites	625	0	13000
NanOOSE -WF	97	200	1300
NanOOSE -WG	68	300	1300
Quinalt Underwater Tracking Range	45	120	330
San Clemente Island Underwater Range (SCIUR)	25	0	4000
Santa Rosa Island	21	0	240
Sea Range, Pt Mugu	36000	0	6000
SEAFAC (Behm Canal)	3	600	1300
Southern California ASW Range	665		8000
Tanner and Cortez Banks (SCI)	600	300	1200

Figure 3-6. Example database report on areas and depths of west coast U.S. test sites.

Figure 3-7 shows a report listing test sites with water depths less than 600 feet, such as might be used to find sites to test a vehicle that could leak/crush at any greater depth.

<i>Site Name</i>	<i>Geographic Location</i>	<i>Site Area, sq nm</i>	<i>Minimum Depth, ft</i>	<i>Maximum Depth, ft</i>
Dabob Bay	West Coast	9	120	600
DBRC (Dabob Bay Range Complex)	West Coast	45	0	600
EX_SALMON	East Coast		356	356
Fox Island Acoustic Laboratory	West Coast	7	60	360
Gould Island ACOMMS and Tracking Range	East Coast	2	20	60
Inner Range (The Hole), NarraBay	East Coast	1	110	125
Keyport Range	West Coast	5	0	140
Kingfisher Range (SCI)	West Coast	2	60	300
Kwejalein Missile Impact Scoring System (KMISS)	Mid-Pac	150	0	200
Outer Range, NarraBay	East Coast	6	100	120
Quinalt Underwater Tracking Range	West Coast	45	120	330
Santa Rosa Island	West Coast	21	0	240
Sonar Test Facility, Seneca Lake	East Coast	15	480	600
South Florida Testing Facility	East Coast	46	60	600
UNDEX Test Facility, Aberdeen Test Center	East Coast	0	0	150
WHOI sites	East Coast		0	50

Figure 3-7. Example database report showing sites no deeper than 600 feet.

Figure 3-8 shows the type of additional test site details contained in the geographic and contact data section of the database.

<b>Site/Range Name</b>		Dabob Bay	
<b>Geographic Location</b>	West Coast	<b>Link to Site Map</b>	<a href="http://kpt.nuwc.navy.mil/">#http://kpt.nuwc.navy.mil/</a>
<b>Underwater Track Routinely Provided?</b>	<input checked="" type="checkbox"/>	<b>Naval OP Area?</b>	<input checked="" type="checkbox"/>
<b>Site City/Locale</b>	On the Toandos Peninsula in Kitsap County	<b>OP Area Designation</b>	Dabob Bay
<b>Site State</b>	WA	<b>Operating Org.</b>	NUWC Division Keyport - Code
<b>Site Country</b>	USA	<b>Link to Org. Site</b>	
<b>Site Geographic Information</b>			
Located in Dabob Bay off Hood Canal along the Olympic Peninsula, Dabob is a military reservation area with Range Warning lights at key points to advise boaters of navy operations in progress.			
<b>Site Description</b>			
Secure, extremely quiet, protected range site, with underwater, surface, and air tracking in water depths from 300 to 600 feet.			
<b>Site/Range Corner Locations</b>			
<b>Latitude</b>	<b>South Latitude?</b>	<b>Longitude</b>	<b>East Longitude?</b>
47 deg-39.78'	<input type="checkbox"/>	122 deg-50.48'	<input type="checkbox"/>
47 deg-40.13'	<input type="checkbox"/>	122 deg-52.81'	<input type="checkbox"/>
47 deg-46.06'	<input type="checkbox"/>	122 deg-48.31'	<input type="checkbox"/>
47 deg-46.37'	<input type="checkbox"/>	122 deg-50.66'	<input type="checkbox"/>
<b>POC First Name</b>	John	<b>POC Phone</b>	(360) 396-7516
<b>POC Last Name</b>	LeGare	<b>POC Extension</b>	
<b>POC Title</b>	Range POC	<b>POC Fax</b>	
<b>POC Site Address</b>	610 Dowell Street	<b>POC Email</b>	johnl@kpt.nuwc.navy.mil
<b>POC Site City</b>	Keyport	<b>Scheduling Activity</b>	NUWC Division Keyport - Code
<b>POC Site State</b>	WA	<b>Sched. Activity Phone</b>	(360) 396-2313
<b>POC Site Zip Code</b>	98345-7610	<b>Sched. Activity Fax</b>	(360) 396-7014
<b>POC Site Country</b>	USA	<b>Sched. Activity Email</b>	hscott@kpt.nuwc.navy.mil
<b>Site/Range Name</b>		Dabob Bay	
<b>NEPA Doc. Level</b>	EA (Environmental Assessment)	<b>Site/Range Reference Documentation</b>	
<b>NEPA Doc. Caveats</b>	No tests when marine mammal	Fleet Training Area/Range Directory	
<b>NEPA POC</b>	Shaari Unger - Code 521	Northwest Range User's Guide	
<b>Prohibited Activities</b>	Explosive tests	NUWC Keyport Report 1509	

Figure 3-8. Example of geographic and contact data for test sites in the database.

### 3.5 Database Deployment, Hosting, And Maintenance

As envisioned, the database will be made available via the Internet to users who are granted permission to access the information (Figure 3-9). Although a logical place to host the database would be directly on the USG web site, doing so would present potential maintenance problems because a continual effort would be required to ensure that the database is kept up to date and user access is monitored. Currently, the database resides within the NUTEC Test Environments Assessment Laboratory (TEAL) at NUWC Division Keyport. It is available to approved users who can connect through the firewall that protects Keyport's Intranet. Password-protected links to the database will be provided through the NUTEC public web site. The RCC USG web site will have a link to the database page of the NUTEC public web site. This may take some time to implement, as some links require a lengthy approval process, involving local, Naval Sea Systems Command (NAVSEA), and Navy Marine Corps Intranet (NMCI) scrutiny. Database access could also be made available via the Secret Internet Protocol Router Network (SIPRNET).

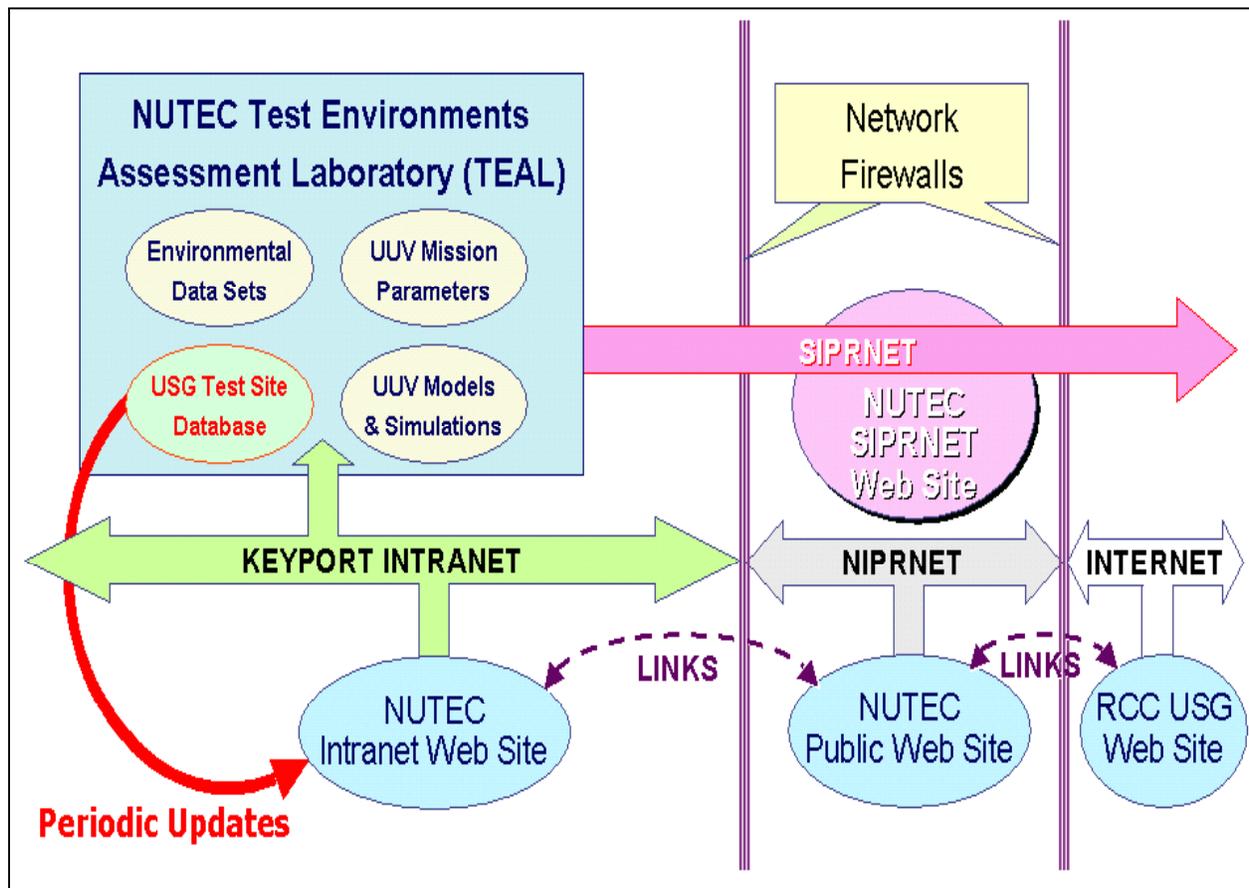


Figure 3-9. Test site database hosting and access interfaces.

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## CHAPTER 4

### DATABASE DEVELOPMENT

#### 4.1 Access® Database Structure and Coding

As indicated in Chapter 3, Microsoft Access® was selected as the Test Site Database implementation software. After defining the structure based upon the four separate modules of [Figure 3-2](#), the development team started building the database. The first actions were to select the individual data elements (see [Appendix C](#)) and to establish fixed formats so that these elements could be easily tracked and be consistent across the data set ([Appendix D](#)). For example, it was decided that the coordinates of a range or test site should be provided in degrees, minutes and tenths of minutes (e.g., 44-22.3N) of latitude and longitude. For ranges or test sites with square or rectangular boundaries, this meant that the area could be defined by four sets of latitude and longitude coordinates. However, the boundaries for most sites are not that simple, and additional points are required to accurately define the areas. This process of defining the variables and fixing the format had to be repeated for each of the 44 primary variables and more than 100 secondary variables identified by the development team. As the database development proceeded, it became evident that to facilitate web-based deployment of the database, a Microsoft Sequel front-end was required. The front-end was developed in parallel with the data format definition effort.

#### 4.2 Populating the Database

To populate the database, the development team prepared Microsoft Word® forms (see [Appendix C](#)) that would allow the various range and test site POCs to simply fill in the data for their particular site. These forms were highly structured to ensure adherence to standard formats and help-menus were included to assist with the data development effort by the POCs. Once the data was returned, it could be downloaded directly into the database. As a test case of the data-encoding scheme, the forms were sent to the site POCs for the five range sites that make up the Northwest Range Complex at NUWC Division Keyport. It became obvious that most of the POCs did not have the data requested, at least not in the desirable format and structure. Numerous discussions and e-mail exchanges between the development team and the range/test site POCs were needed in order to capture and acquire the initial data set.

4.2.1 Data Collection. In May 2003, data collection forms were e-mailed to the other identified range and site POCs. The responses were mixed, and only a few completed data forms were returned. In some instances, the team was simply referred to existing documentation sets or asked to contact other individuals for the information. Over the next several months, the team worked on the limited responses and the list of contacts was updated to include those individuals shown in [Appendix B](#). A limited set of information was then targeted to allow initial population of the database. This information was collected via telephone and e-mail interviews, providing the limited data set initially comprising the Test Site Database. To date, 38 sites are represented, including most of the major Fleet training and test and evaluation ranges and sites. However, the data set for each site is limited to the targeted information set identified after the first survey attempt.

4.2.2 Data Entry and Verification. The data collected through this process has been entered into the database. The data entered into the Access<sup>®</sup> database was examined by the development team. This examination was performed by plotting or listing the data in tables and checking to see if the data matched the collected data set and whether it met the “reasonability” test based upon the combined expertise and knowledge of the team. This information has not yet been fully fed back to all range and test site POCs to be further vetted. This action should be done before the database is officially deployed in order to confirm validity of the data and instill user confidence in the database.

4.2.3 Database Documentation. While the database development team members were building the database, they were also developing the accompanying documentation set which describes the database, describes its use, and provides help-menus for its users. Subjects dealt with and described in the database documentation include:

- a. Design Description
  - 1) Overall Description
  - 2) Hardware Perspective
  - 3) Data Architecture Perspective
  - 4) Tables and Fields
  - 5) Forms
  
- b. Operating Instructions
  - 1) How to Get Access to the Database.
  - 2) How to Open the Database.
  - 3) How to Make Reports.
  - 4) How to Make Queries.
  - 5) How to Make Charts.
  - 6) How to Add and Edit Data.
  
- c. Data Update Process
  
- d. CD-ROM Publishing Process

The above listed documentation set is an integral part of and accessible from the database itself.

## CHAPTER 5

### CURRENT DATABASE STATUS

As previously indicated, the Test Site Database, including the structure, the data, and the query and report object set, resides on the NUTEC server inside the network firewall of NUWC Division Keyport. The database (i.e., the structure and the initial data set) is contained in Systems Query Language (SQL), allowing future deployment via a web site. Microsoft Access<sup>®</sup> is used as the primary user interface and it includes the initial query and report structures. Additional reporting and queries can be readily generated using Access<sup>®</sup>. The database may be deployed on CD-ROM in its current state. To date, only the Geographic Attributes segment of the database has been significantly populated, and some of that information has not been fully verified by the test site/range points of contact. Likewise, queries and reports have been developed for the Geographic Attributes segment, but they do not yet exist for the other three segments (Tracking Attributes, Environmental Attributes, and Logistics). Development of queries and reports for these segments is, of course, dependent upon the range of values resident in that yet-to-be-collected data set.

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## CHAPTER 6

### CONCLUSIONS AND RECOMMENDATIONS

Collection of detailed test site data to more fully populate the Undersea Vehicles Test Site Database was found to be much more difficult than initially anticipated. Although development of the database was relatively straightforward, gathering, assimilating, and verifying the test site data was challenging. Further, it appears that maintaining the database as a viable, accurate, and current reference will require a continuing effort because of the dynamics of the current range and test site environment.

#### 6.1 Modified Approach To Populate The Database

To make the task economically and technically manageable, the USG may need to accept a modified approach to continued population of the database. The new approach could be done in two ways:

a. First, the total number of test sites and the total number of individual data elements to be collected for each test site could be reduced. The reduction could be based upon a prioritization scheme to identify the most needed and most useful information, with additional emphasis on the ease of obtaining and maintaining the data. The database could still hold any extra information for the data elements identified, including such data already obtained, and other test sites could always be added. However, the remaining data collection effort could be greatly reduced by revising the objective for total number of sites and, particularly, the total data elements to collect per site.

b. Second, the method of data collection could, and should, be revised. The initial method of requesting detailed information from the various points of contact at the test sites has not worked well (the same problem has been experienced in other RCC tasks). We can conclude that a significant number of the individual points of contact are either too busy or not sufficiently interested to take the time to find the requested information within their organizations. Perhaps more significantly, they have not been funded to provide this assistance, which tends to limit participation even for people who otherwise support the project. A more productive approach may be to conduct a centralized research effort to obtain the needed information from key individuals and publications, and then to ask the points of contact to simply verify the information for their respective sites.

The above two-step process would have the advantages of faster task execution, use of a more consistent approach in addressing the questions and entering the data, and better efficiency by avoiding involvement of a large number of people in generating the data set. Note that reducing the number of people would reduce the time and effort to educate them on the project and associated data elements.

## **6.2 Recommended Follow-on Task For The Underwater Vehicles Test Site Database**

With the above approach in mind, and acknowledging the substantial time and effort that has been expended in developing the existing database capability, the USG recommends that the RCC endorse and fund a logical follow-on USG task to:

- a. Reduce the scope of the database effort to address a limited subset of the initial list of test sites and data elements.
- b. Compile a collection of range and test site user's guides and similar documentation.
- c. Assign a small group of individuals to conduct the research required to obtain the missing database information.
- d. Present the collected data to appropriate USG members and other points of contact to verify the information.
- e. Make arrangements and database modifications as necessary to deploy the combined information set as planned via the NUTEC and USG web sites.
- f. Prepare a report on the improvements to the content and functions of the test site database and associated web site access.

The above approach will require some funding for contractor support efforts. However, the approach will result in a much better database and will most likely be cost-effective in the long term as test planners use the information. Moreover, individual users will avoid the need to independently conduct research to identify and investigate the characteristics of the many test sites to find the best locations for their projects' testing or training.

## APPENDIX A

### RCC TASK ASSIGNMENT TO THE UNDERWATER SYSTEMS GROUP (USG)

*Assigned Task US-16: August 2002*

#### ASSIGNED TASK

##### UNDERWATER SYSTEMS GROUP

1. **TITLE: SURVEY OF LITTORAL UNDERWATER-VEHICLE TEST SITES**
2. **SCOPE AND SPECIFIC OBJECTIVES**: Conduct a detailed survey of underwater test sites, both at existing underwater tracking ranges and at appropriate non-instrumented locations, that would be suitable for undersea vehicle testing. The objective for this task is to validate and expand upon existing, but incomplete, summaries of physical and operational characteristics of undersea test sites, to create a comprehensive and accurate summary that can be used to optimize planning for, and use of, available sites for in-water testing of undersea vehicles.
3. **UTILITY OF END PRODUCT**: Undersea vehicle programs, whether conducting in-water exercises for science and technology or research and development testing, acquisition, or Fleet readiness training, need to have accurate information about the characteristics of available underwater test sites. Program managers and test planners must have up-to-date information about the environmental and operational characteristics of test sites in order to make technical and financial decisions regarding test locations and test strategies. The proposed survey will provide this needed information and also facilitate more effective use of the available test facilities of RCC member organizations. The National Unmanned Undersea Vehicle (UUV) Test and Evaluation Center (NUTEC), at NUWC Division, Keyport, also has a documented requirement for the data produced by this task, in support of Navy UUV test planning. The collective expertise of the RCC-USG members is considered essential to achieving the task objective of producing an up-to-date, accurate, and objective characterization of available undersea vehicle test sites.
4. **APPROACH**:
  - a. Locate and obtain existing listings, databases, and summaries related to the physical and operational characteristics of undersea vehicle test sites.
  - b. Review the collected items to determine the categories used and the evaluation criteria.
  - c. Select a common, unambiguous, and useful set of test site characterization criteria for the survey (and the resultant summary listing) to facilitate simple data collection, such as through questionnaires and unassisted, Internet-web-page-based data entry, and subsequent updates.

- d. Create a database or other repository that is appropriate for the anticipated scope of the survey data set and for efficient access to the information after collection and processing.
- e. Prepare a data collection plan to gather test site information from RCC-USG member facilities as well as from other sources, such as the Office of Naval Research, Navy and university laboratories, and private industry undersea vehicle developers. Include a plan for conducting future updates to the data set.
- f. Conduct the survey, using an appropriate combination of personal contacts, Internet research, e-mail inquiries, and meetings.
- g. Organize, analyze, evaluate, validate/de-conflict the collected information, and populate the database or repository. Screen the material intended for public release in accordance with operational security (OPSEC) policies.
- h. Establish an Internet web-page-based method to provide access to the test site data, both on the RCC-USG web page and at a Government web site that is generally accessible to program managers involved with undersea vehicle testing.
- i. Publish the undersea vehicle test site survey results, in printed form and electronically, via the web pages noted above and on CD-ROM media. Distribute to RCC-USG member organizations, undersea vehicle program offices, and undersea vehicle developers involved in Department of Defense programs. Obtain public release approval for the information that will be accessed by recipients outside the Government.
- j. Prepare a brief RCC task report documenting the conduct and results of the task.

5. **ADDITIONAL COORDINATION REQUIRED:** Support from RCC member organizations that have or use undersea test sites is essential to assure accurate and timely responses to the test site survey and participation in reviews. RCC Executive Committee members and Technical Representatives can greatly facilitate this task by emphasizing the need for timely and complete survey responses from personnel within their organizations.

6. **RESOURCES REQUIRED:** RCC-USG members will need to provide answers to the survey, or direct the questions to appropriate personnel within their organizations. The bulk of the planning and data collection, as well as preparation of the database and arrangements for a method to access/distribute the resulting test site information, can be provided by NUTECH personnel at NUWC Division, Keyport. RCC-USG members will need to assist in: (1) providing range site information, (2) reviewing the data collected to identify inaccurate or incomplete information in existing test site listings, (3) locating missing information, and (4) reviewing the final results for accuracy and completeness.

7. **TOTAL COST ESTIMATE:** This task is expected to require approximately \$50K of contractor support effort, which can be funded by the NUTECH Project, without cost to the RCC.

8. **MILESTONES:**

Task Initiated	Complete	1	AUG	2002
Identify & Obtain Existing Test Site Summaries	Complete	31	AUG	2002
Create Database/Repository For Test Site Data	Complete	30	SEP	2002
Prepare Data Collection Plan	Complete	31	OCT	2002
Complete Test Site Survey	Complete	31	MAR	2003
Process & Check Survey Results	Complete	30	APR	2003
Populate Test Site Database/Repository	Complete	31	MAY	2003
Review and Publish Test Site Database	Complete	31	JUL	2003
Submit Task Completion Report	Complete	31	AUG	2003

9. **NAME, ORGANIZATION AND PHONE NUMBER OF TASK CHAIR:** Rich Peel, NUWC Division, Keyport, (360) 396-2520, richp@kpt.nuwc.navy.mil.

10. **COMPLETION DATE:** 31 August 2003 (Original). Extended to 30 April 2004.

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## APPENDIX B

### UNDERSEA VEHICLE TEST SITE GEOGRAPHIC ATTRIBUTES AND POINTS OF CONTACT

Test Site / Range	Complex	Minimum Depth (Feet)	Maximum Depth (Feet)	Site Area (Square Nautical Miles)	Bottom Type	Data Source (Name & Phone)	Comments
Berry Islands Shallow Water Range and Minefield	AUTEC	110	1,700	60	Shallow Sand Over Carbonate Basement 60-140ft <b>A2</b> 440-2800ft <b>B1/B2</b>	Dennis Desharnais (401) 832-1071	Includes Op Area – Inshore Phones Gone
NATO FORACS	AUTEC	0	6,000	96	Thick Calcium Carbonate Mud / Sand <sup>1</sup> <b>B1</b>	Trevor Kelly-Bissonnette (401) 832-3452	Check with Scott Lowell
Weapons Range N & S	AUTEC	4,000	6,000	600	Thick Calcium Carbonate Mud / Sand <sup>1</sup> <b>B1</b>	Trevor Kelly-Bissonnette (401) 832-3452	North & South Range are Continuous Tracking
East Coast – Shallow Water Training Range (EC-SWTR)	Newport						
Sonar Test Facility Seneca Lake	Newport	480	600	15	Mud	Mark Hammond (860) 739-9416	Lake – 33 miles long – Use more than 5 miles
Gould Island Acoustic Communications and Tracking Range (GIATR)	NarraBay	20	60	2	Mud, Silt & Clay	Rich Kaiser (401) 832-1185	Part of Inner Range
Inner Range (The Hole)	NarraBay	110	125	1	Mud, Silt & Clay	Rich Kaiser (401) 832-1185	
Outer Range	NarraBay	100	120	6	Sand	Rich Kaiser (401) 832-1185	

Test Site / Range	Complex	Minimum Depth (Feet)	Maximum Depth (Feet)	Site Area (Square Nautical Miles)	Bottom Type	Data Source (Name & Phone)	Comments
EX_SALMON Site	NarraBay	356	356	---	Mud	Rich Kaiser (401) 832-1185	Lots of Nets
Gulf of Maine (GOM)	NarraBay						
Northwest Range Dabob Bay Site	Northwest Range	120	600	9	Sand, Silt, Clay, Mud & Rock	Howard Scott (360) 396-2313	From the RUG
Dabob Bay (DBRC)	Northwest Range	0	600	45	Mud, Sand & Gravel	Martin Prehm (360) 396-5189	Includes the Dabob Bay Site and adjacent Hood Canal area
Northwest Range Nanoose Site – WG Area	Northwest Range	300	1,300	68	Mud, Silt & Rock	From Chart 17520	
Northwest Range Nanoose Site – WF Area	Northwest Range	200	1,300	97	Mud, Silt & Rock	From Chart 17520	Shallow Area – Halibut Bank
Northwest Range Nanoose Site – WN Area	Northwest Range	0	2,200	9	Mud, Silt & Rock	From CND Chart 3514	Jervis Inlet
Northwest Range Quinault Site	Northwest Range	120	330	45	Sand	Howard Scott (360) 396-2313	
Northwest Range Keypoint Site	Northwest Range	0	140	5	Silt & sand	Martin Prehm (360) 396-5189	
SCIUR		0	4,000	25	Rocky	Jerry McCue (619) 553-7062	Entire OP Area
FORACS III		0	3,600	22	Sand & Coral	OP Area Chart	Entire OP Area
PMRF Underwater Tracking Range	PMRF	120	16,000	1200	Coral & Lava	Mike Dick (808) 335-4106	Includes BARSTUR, BSURE & SWTR
Kingfisher Range	SCI Range Complex	60	300	2	Rock, Mud, & Sand	Heidi Nevitt (619) 455-6539	Chart 18769
Southern California Acoustic Range (SOAR)	SCI Range Complex		8,000	665	Sand & Rock	Heidi Nevitt (619) 455-6539	SOAR North & SOAR South
West Coast – Shallow Water Training Range (WC-SWTR)	SCI Range Complex			1,500		Heidi Nevitt (619) 455-6539	

Test Site / Range	Complex	Minimum Depth (Feet)	Maximum Depth (Feet)	Site Area (Square Nautical Miles)	Bottom Type	Data Source (Name & Phone)	Comments
Tanner & Cortez Banks	SCI Range Complex	300	1,200	600	Rock	Heidi Nevitt (619) 545-6539	From Website
Santa Rosa Island Shallow Water Test Site	PT Mugu Sea Range Complex	0	240	21	Sand, Shell, & Rock	Chart 18769	
South Florida Testing Facility (SFTF)	SFOMC	60	600	46	Sand	Website & Presentations	
Riviera Beach	Lockheed Martin / Perry Tech.					Eric Holmes (315) 456-2691	
Key West	PAX River						
Mid-Atlantic Test & Training Range	PAX River						
Guam Fleet Training Area							
Regan Test Site Kawjalein	USASMDC	0	200	150	Sand & Coral	Al Dillman DSN 645-1974	
SE Alaska Acoustic Measurement Facility (SEAFAC)	NSWC CD	600	1,300	3	Mud, Silt, & Rock	From Chart	
Acoustic Research Detachment – Lake Pend Orielle	NSWC CD	600	1,200	10	Sand, Silt & Rock	Doug Odell (208) 683-2321	
Fox Island Acoustic Lab (FIAL)	NSWC CD	60	360	7	Mud & Silt	OP Area Chart & Website	Areas outside 60 feet.
Aberdeen Test Center	U.S. Army	0	150	<1	Sand & Silt	John Kopczynski (410) 278-7301	
Panama City	NSWC DD					Tony Bond (850) 235-5391	
Gulf of Mexico (GOM)	NAVO					Rick Swanson (228) 689-8095	
Crescent Harbor	Navy EOD						
MIW Ingleside	CMWC					Rob McGrath (361) 961-1545	
Monterey Bay Sites	NPS/MBARI	0	13,000	375	Sand, Rock, & Clay	Jim Bellingham (831) 775-1731	Monterey Bay

Test Site / Range	Complex	Minimum Depth (Feet)	Maximum Depth (Feet)	Site Area (Square Nautical Miles)	Bottom Type	Data Source (Name & Phone)	Comments
WHOI Sites	WHOI	0	50	---	Various	Chris von Alt (508) 289-2290	Local sites around WHOI depending on depth and bottom type requirements. No permitting.
Lake Travis Test Station – ARL:UT	ARL:UT						
Northrop Grumman Corporation (NGC) Site	NGC	N/A	N/A	N/A	N/A	John Lademan (410) 260-5270	Will use Aberdeen, Keyport, & pools

NOTE: Shading indicates incomplete data

## APPENDIX C

### TEST SITE DATA SHEETS

#### Site-Specific Information

- ⊕ **Site/Range Location Key**
- ⊕ **Site/Range Name**
- ⊕ **U/W Track Provided (Y/N)**
- ⊕ **Site/Range Location**
  - City/Locale
  - State/Country
  - Geographic Information
  - Site/Range Description
- ⊕ **Site Geodetic Coordinates**
  - Corner Latitude (1....N)
  - Corner Longitude (1....N)
- ⊕ **Link to Site Map (*Hyperlink*)**
  - Bathymetry
  - Land Features
  - Lat & Long
  - Site Outline
- ⊕ **Naval OPAREA (Y/N)**
- ⊕ **OPAREA Designation**
- ⊕ **Operating Organization**
- ⊕ **Link to Organization Site (*Hyperlink*)**
- ⊕ **Site Information POC**
  - Title
  - Address
  - E-Mail
  - Phone
  - FAX
- ⊕ **Scheduling Activity (If Different)**
  - E-Mail
  - Phone
  - FAX
- ⊕ **NEPA Documentation (Level)**
  - NEPA Caveats – If Any
  - NEPA POC
- ⊕ **Site/Range Prohibited Activities**
- ⊕ **References (Navy Directives)**

## Range Attributes – Tracking Information

- ⊕ **Site/Range Key**
- ⊕ **Site/Range Name**
- ⊕ **Site/Range Descriptive Information**
- ⊕ **Link to Range Map (*Hyperlink*)**
  - U/W Tracking Area
  - U/W Tracking Type
  - Objects Tracked
  - U/W Tracking Accuracy
  - Average Water Depth
  - Tracking Area Depth Range
  - Bottom Profile
  - U/W Tracking Frequencies
  - Tracking Signal Formats
  - Tracking Pingers Supported
  - Pinger Data Telemetry
- ⊕ **U/W Telemetry Capability (Y/N)**
  - Acoustic Command Link
  - Acoustic COMM Capability
- ⊕ **Surface Tracking Area(s)**
  - Tracking Type(s)
  - Objects Tracked
  - Tracking Accuracy
- ⊕ **Air Tracking Area(s)**
  - Tracking Type(s)
  - Objects Tracked
  - Tracking Accuracy
- ⊕ **Range Control Site Location**
- ⊕ **Remote Range Display Capability**

## Site/Range Database – Environmental Information

### ⊕ Site/Range Key

### ⊕ Site/Range Name

### ⊕ Surrogate Environments

### ⊕ Meteorological Information

- Annual Air Temperature Range
- Annual Mean Precipitation
- Annual Mean Cloud Cover
- Average Number of Foggy Days
- Annual Mean Visibility
- Annual Mean Wind Speed
- Annual Mean Wind Direction
- Wind Distribution (*Hyperlink*)
- Forecast Winds Distribution (*Hyperlink*)
- Sign. Wave Ht. Distribution (*Hyperlink*)
- Forecast Sign. Wave Ht. Dist. (*Hyperlink*)
- Mean Annual Swell Direction
- Mean Annual Swell Period
- Mean Annual Swell Height

### ⊕ Physical Oceanography

- Annual Mean SST
- Annual SST Range
- Monthly Mean SST (*Hyperlink*)
- Current SST Distribution (*Hyperlink*)
- Annual Mean MLD
- Annual MLD Range
- Monthly Mean MLD (*Hyperlink*)
- Current MLD Distribution (*Hyperlink*)
- Mean Water Clarity
- Mean Surface Current Range
- Spatial Surface Current (*Hyperlink*)
- Annual Mean Tidal Height Range
- Spatial Tidal Height (*Hyperlink*)
- Annual Mean Surface Salinity
- Annual Mean Sea State
- Annual Mean Sea State Range
- Sound Velocity Profile (*Hyperlink*)
- Sound Ray Path Plot (*Hyperlink*)
- Site/Range Bottom Type
- Site/Range Bottom Type (MCM)

## Range Database – Range Logistics Information

- ⊕ **Site/Range Key**
- ⊕ **ROM Cost for Usage (Nominal/Day)**
- ⊕ **Site/Range Security Statement**
- ⊕ **Availability of Support Craft**
  - Support Craft (>150')
  - Support Craft(50'-150")
  - Small Support Craft (RHIBs etc.)
  - Others Support Craft
- ⊕ **Staging Pier(s)**
  - Distance to Op Area
  - Pier Length
  - Water Depth
- ⊕ **Crane Services**
  - Number of Fixed Cranes
  - Capacity of Fixed Cranes
  - Number of Mobile Cranes
  - Capacity of Mobile Cranes
- ⊕ **Availability of Fleet Combatants**
  - Surface Combatants
  - Submarines
- ⊕ **Airports in the Site/Range Vicinity**
  - Commercial Airports
  - Military Airports
- ⊕ **Air Support**
  - Military Air Support for Site/Range
  - Contract Air Support for Site/Range
- ⊕ **Support Services**
  - Bottom Recovery
  - Surface Retrieval
  - Navy Dive Services
  - Commercial Dive Services
  - Target Services
  - Small Boat Launching, Fueling & Berthing
- ⊕ **Shore Support**
  - Inside Storage
  - Lay Down Area
  - Lab Space
  - Shop Support

## Range Database – Range Logistics Information

- ⊕ **Computer/COMMS Support**
  - **IT Connectivity**
  - **Secure Communication (Y/N)**
    - ⊕ Craft/Facilities/Aircraft Equipped
  - **Operational Communications (Y/N)**
    - ⊕ VHF - Craft/Facilities/Aircraft Equipped
    - ⊕ UHF - Craft/Facilities/Aircraft Equipped
- ⊕ **Test Operations Planning Support**
- ⊕ **Transportation, Packaging & Shipping**
- ⊕ **Perceived Advantages/Attributes of Site/Range (6)**

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## APPENDIX D

### UNDERSEA VEHICLE TEST SITE DATABASE RECORD FORMS

### *Range/Test Site Locations*

<i>Geographic Location</i>		<i>Link to Site Map</i>	_____
<i>Underwater Track Routinely Provided?</i>	<input type="checkbox"/>	<i>Naval OP Area?</i>	<input type="checkbox"/>
<i>Site City/Locale</i>		<i>OP Area Designation</i>	
<i>Site State</i>		<i>Operating Organization</i>	
<i>Site Country</i>		<i>Link to Organization Site</i>	_____
<i>Site Geographic Information</i>			
<i>Site Description</i>			
<i>Site/Range Corner Locations</i>			
<i>Latitude (00°-00.00')</i>	<i>South Latitude?</i>	<i>Longitude (000°-00.00')</i>	<i>East Longitude?</i>
	<input type="checkbox"/>		<input type="checkbox"/>
	<input type="checkbox"/>		<input type="checkbox"/>
	<input type="checkbox"/>		<input type="checkbox"/>
	<input type="checkbox"/>		<input type="checkbox"/>
	<input type="checkbox"/>		<input type="checkbox"/>
	<input type="checkbox"/>		<input type="checkbox"/>
	<input type="checkbox"/>		<input type="checkbox"/>
	<input type="checkbox"/>		<input type="checkbox"/>
<i>POC First Name</i>		<i>POC Phone</i>	
<i>POC Last Name</i>		<i>POC Extension</i>	
<i>POC Title</i>		<i>POC Fax</i>	
<i>POC Site Address</i>		<i>POC Email</i>	
<i>POC Site City</i>		<i>Site Scheduling Activity</i>	
<i>POC Site State</i>		<i>Scheduling Activity Phone</i>	
<i>POC Site Zip Code</i>		<i>Scheduling Activity Fax</i>	
<i>POC Site Country</i>		<i>Scheduling Activity Email</i>	
<i>NEPA Documentation Level</i>		<i>Site/Range Reference Documentation</i>	
<i>NEPA Documentation Caveats</i>			
<i>NEPA POC</i>			
<i>Site Prohibited Activities</i>			
<i>Additional Drop-Down Menu Items or Additional Comments</i>			

## Range/Test Site Attributes

<i>Site/Range Name</i>			
<i>Link to Range Map</i>	_____		<i>Tracking Type Comments</i>
<i>UW Tracking Area (nm<sup>2</sup>)</i>			
<i>UW Tracking Type</i>			
<i>No. UW Objects Tracked</i>			
<i>UW Tracking Accuracy (ft)</i>			
<i>Average Water Depth (ft)</i>			
<i>Range of WD (ft) from</i>		<i>to</i>	
<i>Tacking Signal Format</i>			<i>UW Telemetry Capability?</i> <input type="checkbox"/>
<i>Pinger Data Telemetry</i>			<i>UW Acoustic Command Link?</i> <input type="checkbox"/>
<i>Site/Range Tracking Pingers Supported</i>			<i>WQC/UQC?</i> <input type="checkbox"/>
<i>Site/Range Tracking Pingers Supported</i>			<i>Site/Range Underwater Tracking Frequencies</i>
<i>Description of Data and Command ACOMMS</i>			
<i>Surface Tracking Area (nm<sup>2</sup>)</i>			<i>Air Tracking Area (nm<sup>2</sup>)</i>
<i>Surface Tracking Type</i>			<i>Air Tracking Type</i>
<i>No. Surface Objects Tracked</i>			<i>No. Air Objects Tracked</i>
<i>Surface Tracking Accuracy (ft)</i>			<i>Air Tracking Accuracy (ft)</i>
<i>Description of Range Control Site Location</i>			
<i>Remote Display Range Capability?</i>			<input type="checkbox"/>
<i>Describe</i>			
<i>Additional Drop-Down Menu Items or Additional Comments</i>			

## *Range/Test Site Environmental Data*

<i>Site/Range Name</i>				
<i>Description of Surrogate Environments</i>		<i>Mean SST (°F)</i>		
		<i>SST Range (°F) from</i>		<i>to</i>
<i>Mean Air Temp. (°F)</i>		<i>Monthly Mean SST</i> _____		
<i>Mean Annual Precipitation (in)</i>		<i>Current SST Distribution</i> _____		
<i>Mean Cloud Cover (pct)</i>		<i>Mean MLD (ft)</i>		
<i>Mean Annual Number of Foggy Days</i>		<i>MLD Range (ft) from</i>		<i>to</i>
<i>Mean Visibility (nm)</i>		<i>Monthly Mean MLD</i> _____		
<i>Mean Wind Speed (kts)</i>		<i>Current MLD Distribution</i> _____		
<i>Mean Wind Direction (°T)</i>		<i>Mean Water Clarity (ft)</i>		
<i>Spatial Wind Distribution</i>	_____	<i>Current Range (kts) from</i>		<i>to</i>
<i>Forecast Wind Distribution</i>	_____	<i>Spatial Surface Current Distribution</i> _____		
<i>Mean Annual Days of Heavy Weather</i>		<i>Tidal Height Range (ft) from</i>		<i>to</i>
<i>Mean Significant Wave Height (ft)</i>		<i>Spatial Tidal Height Distribution</i> _____		
<i>Spatial Distribution of Wave Height</i>	_____	<i>Mean Surface Salinity (ppt)</i>		
<i>Forecast Significant Wave Height Dist.</i>	_____	<i>Mean Sea State</i>		
<i>Mean Swell Direction (°T)</i>		<i>Sea State Range from</i>		<i>to</i>
<i>Mean Swell Period (s)</i>		<i>Sound Velocity Profile</i> _____		
<i>Mean Swell Height (ft)</i>		<i>Sound Ray Path Plot</i> _____		
<i>Site/Range Bottom Types</i>		<i>Site/Range Bottom Types (MCM)</i>		
<i>Bottom Structure Description</i>				
<i>Additional Drop-Down Menu Items or Additional Comments</i>				

## Range/Test Site Logistics

<i>Site/Range Name</i>			
<i>ROM Daily Cost of Site w/Tracking</i>		<i>Description of Staging Piers</i>	
<i>ROM Daily Cost of Site w/o Tracking</i>			
<i>Site Security Statement</i>		<i>Distance from Pier to Op Area (nm)</i>	
		<i>Pier Length (ft)</i>	
		<i>Water Depth at Pier (ft)</i>	
		<i>Description of Crane Services</i>	
		<i>Number of Fixed Cranes</i>	
		<i>Fixed Crane Load Capacity</i>	
<i>Number of Support Craft &gt; 150 ft</i>		<i>Fixed Crane Service Arc (ft)</i>	
<i>Number of Support Craft 50-150 ft</i>		<i>Number of Mobile Cranes</i>	
<i>Number of Small Support Craft</i>		<i>Mobile Crane Load Capacity</i>	
<i>Number of Other Support Craft</i>		<i>Mobile Crane Service Arc (ft)</i>	
<i>Perceived Advantages of Site</i>			

## Range/Test Site Logistics

<i>Site/Range Name</i>			
<i>Site/Range Surface Combattants</i>		<i>Surface Combattant Comments</i>	
<i>Site/Range Submarines</i>		<i>Submarine Comments</i>	
<i>Site/Range Military Air Support</i>			
<i>Aircraft Type</i>		<i>Quantity</i>	
<i>Military Air Support Comments</i>			
<i>Site/Range Contract Air Support</i>			
<i>Aircraft Type</i>		<i>Quantity</i>	<i>Unit Cost per Day</i>
<i>Contract Air Support Comments</i>			
<i>Area Military Airports</i>		<i>Area Commercial Airports</i>	
<i>Airport Name</i>	<i>Distance to Site (mi)</i>	<i>Airport Name</i>	<i>Distance to Site (mi)</i>

## Range/Test Site Logistics

<i>Site/Range Name</i>			
<i>Bottom Recovery Services?</i>	<input type="checkbox"/>	<i>Shop Support?</i>	<input type="checkbox"/>
<i>Describe</i>		<i>Describe</i>	
<i>Surface Retrieval Services?</i>	<input type="checkbox"/>	<i>IT Connectivity Available?</i>	<input type="checkbox"/>
<i>Describe</i>		<i>Describe</i>	
<i>Navy Dive Services?</i>	<input type="checkbox"/>	<i>Secure Communications Available?</i>	<input type="checkbox"/>
<i>Describe</i>		<i>Describe</i>	
<i>Commercial Dive Services?</i>	<input type="checkbox"/>	<i>UHF Operational Communications Available?</i>	<input type="checkbox"/>
<i>Describe</i>		<i>Describe</i>	
<i>Targets Available?</i>	<input type="checkbox"/>	<i>VHF Operational Communications Available?</i>	<input type="checkbox"/>
<i>Describe</i>		<i>Describe</i>	
<i>Small Boat Launch Facilities?</i>		<i>Test Operations Planning Support?</i>	<input type="checkbox"/>
<i>Describe</i>		<i>Describe</i>	
<i>Fueling Available?</i>	<input type="checkbox"/>	<i>Contract Purchasing Support?</i>	<input type="checkbox"/>
<i>Describe</i>		<i>Describe</i>	
<i>Craft Berthing Available?</i>	<input type="checkbox"/>	<i>Environmental Testing Support?</i>	<input type="checkbox"/>
<i>Describe</i>		<i>Describe</i>	
<i>Inside Storage?</i>	<input type="checkbox"/>	<i>Instrumentation and Calibration Support?</i>	<input type="checkbox"/>
<i>Describe</i>		<i>Describe</i>	
<i>Lay-Down Area?</i>	<input type="checkbox"/>	<i>Transportation Support?</i>	<input type="checkbox"/>
<i>Describe</i>		<i>Describe</i>	
<i>Lab Space?</i>	<input type="checkbox"/>	<i>Packaging and Shipping Support?</i>	<input type="checkbox"/>
<i>Describe</i>		<i>Describe</i>	