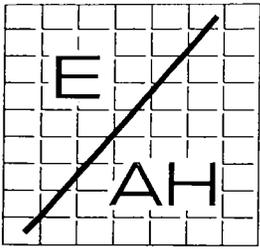


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MEETING MINUTES FOR RESTORATION ADVISORY BOARD MEETING DATED 13  
FEBRUARY 1996 WITH TRANSMITTAL CNC CHARLESTON SC  
2/28/1996  
ENSAFE/ ALLEN AND HOSHALL



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a joint venture for professional services

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February 28, 1996

Commander, Naval Base  
Base Closure Office (Daryle Fontenot)  
1690 Turnbull Ave.  
Suite NH51  
Charleston, SC 29405

Subject: Restoration Advisory Board Meeting Minutes (2/13/96)  
CLEAN Contract# N62467-89-D-0318 CTO# 2900

Dear Mr. Fontenot:

Please find enclosed a copy of the February 13, 1996 Restoration Advisory Board Meeting Minutes with all applicable attachments. Also enclosed is a diskette version with the file saved in both WordPerfect 5.1 and 6.0.

If you have any questions regarding the minutes, feel free to call me at (919) 851-1886.

Sincerely,

EnSafe/Allen&Hoshall

By:

Diane Cutler

enclosures (1)

cc: Todd Haverkost  
Contracts File

**COMMANDER, NAVAL BASE CHARLESTON  
RESTORATION ADVISORY BOARD (RAB)  
Minutes of 13 February 1996**

**1. Call to Order**

Admiral Watkins welcomed the RAB members and guests and thanked everyone for coming to the meeting. He commented that he finds himself learning more than he ever thought he would about the requirements and the procedures of transferring property to the community in a safe and responsible manner. He extended special recognition for the community members who devote their personal time to this effort. Admiral Watkins turned the meeting over to Daryle Fontenot, Navy co-chair of the RAB.

**2. RAB Members Attending**

|                      |                     |
|----------------------|---------------------|
| Captain Jim Augustin | Mr. Don Harbert     |
| Mr. Oliver Addison   | Mr. Virgil Johnston |
| Mr. Doyle Brittain   | Mr. Ralph Laney     |
| LCDR Nick Ciorrelli  | Mr. Robert Mikell   |
| Mr. James Conner     | Mr. Louis Mintz     |
| Mrs. Susan Floyd     | Mr. Arthur Pinckney |
| Mr. Daryle Fontenot  | Ms. Ann Ragan       |
| Mr. Wilburn Gilliard | Ms. Jane Settle     |
|                      | Mr. Bob Veronee     |

**3. Guests Attending**

|                        |                                 |
|------------------------|---------------------------------|
| RADM Edison L. Watkins | Commander Naval Base            |
| Mr. Tony Hunt          | SOUTHNAVFAC                     |
| Mr. Jim Beltz          | SOUTHNAVFAC                     |
| Mr. Joe McCauley       | SOUTHNAVFAC                     |
| J.V. Berotti           | SOUTHNAVFAC                     |
| Ms. Pat Franklin       | SOUTHNAVFAC                     |
| Mr. Tony Danesi        | NAVFAC HQ                       |
| C. Maurer              | NAVFAC HQ                       |
| G. Breland             | NAVFAC HQ                       |
| Mr. Jim Moore          | DOD Base Transition Coordinator |
| CAPT W.F. Nold         | CNSY                            |
| Mr. Tom Gerken         | CNSY                            |
| T.G. Willis            | CNSY                            |
| J.B. Lawrence          | CSNY                            |
| T.N. Dailey            | CSNY                            |
| D.R. Morse             | CSNY                            |
| Mr. William Belli      | CSNY                            |
| Mr. Ted Simon          | EPA                             |
| Mr. Joe Bowers         | SCDHEC                          |
| Ms. Jeannie Olano      | SCDHEC                          |
| Mr. Johnny Tapia       | SCDHEC                          |
| Ms. Susan Dunn         | Grassroots Coalition            |
| Ms. Gussie Greene      | CAC                             |

Subj: RESTORATION ADVISORY BOARD (RAB) Minutes of 13 February 1996

|                        |                      |
|------------------------|----------------------|
| Thomas B. Long, Sr.    | CAC                  |
| Mrs. June M. Brittain  | Concerned Citizen    |
| Ms. Ginny Dearhart     | Concerned Citizen    |
| Mr. Richard S. Hawkins | Concerned Citizen    |
| Ms. Ginny Gray         | EnSafe/Allen&Hoshall |
| Ms. Diane Cutler       | EnSafe/Allen&Hoshall |
| Mr. Mark Bowers        | EnSafe/Allen&Hoshall |
| Mr. Dave Backus        | EnSafe/Allen&Hoshall |
| Dr. Jim Speakman       | EnSafe/Allen&Hoshall |
| Mr. Todd Haverkost     | EnSafe/Allen&Hoshall |
| Mr. Bob Maddux         | EnSafe/Allen&Hoshall |
| Mr. Britton Dotson     | EnSafe/Allen&Hoshall |

#### **4. Administrative Remarks and Comments on Minutes**

Daryle Fontenot welcomed everyone to the meeting and thanked them for coming out. He asked that all RAB members stand up to be recognized by the audience. He also introduced special guests: Ted Simon, EPA; and Cliff Maurer, Mr. Breland, and Tony Danesi, from NAVFAC HQ in Washington, D.C. Mr. Fontenot asked for comments on last month's meeting minutes. Mr Lou Mintz stated that although he was not present at the last meeting, he heard that Mr. Hunt reported that there was a reduction in scheduled testing of approximately \$4 million, and that statement was not in the minutes. Mr. Fontenot responded that he'll check into that after the meeting. There were no other comments on the minutes.

#### **5. Subcommittee Reports**

Mr. Fontenot, as head of the Community Relations Subcommittee, reported that the subcommittee has not been meeting during the months with daytime RAB meetings. He informed the subcommittee members that the next meeting will be on March 12 at 3:30 at the Base Closure Office at the Naval Base.

Ann Ragan reported that she was trying to get the reuse subcommittee together before this meeting. The designated representative from the RDA was unable to make it to the RAB meeting, but pulled some information together and is interested in any input the RAB members have. Mrs. Susan Floyd stated that it takes a lot of time for her to prepare and attend the RAB meetings, and to have to take extra time to make a special effort to talk to the RDA about what they're doing for the community concerns her. If a member of the RDA makes a commitment to be at the RAB meeting, then they should be there. Mr. Jim Moore pointed out that Mr. Virgil Johnston of the RDA regularly attends the RAB meetings. Admiral Watkins added that the RDA does not work for the Navy and that the Navy can't force the RDA to meet with the community on their terms. Susan Floyd reiterated that the RDA does not include the RAB in their decisions and activities.

Subj: RESTORATION ADVISORY BOARD (RAB) Minutes of 13 February 1996

Mr. Arthur Pinckney reported that he met with Ralph Laney. He said the shipyard is working in the right direction by trying to keep people working while cleaning up. Mr. Pinckney's question is why can't we use current workers rather than hire subcontractors to do the work?

A discussion ensued between Mr. Pinckney, Mr. Johnston, and others in the audience about the role of the RDA vs. the assignment of the shipyard detachment personnel.

Admiral Watkins explained that in order for the Navy to move into the future, they need to transfer property into regional reuse. An RDA is established by the State that the Navy is supposed to transpose to. The Navy has programmed the end of all its Navy billets at this point, and no longer wants to support the overhead to administer, manage, and support all functions associated with a viable operation. The Navy's military and civilian support has been cut as of April 1, 1996. The Navy is currently in a transition period to transfer leadership to the RDA. The caretaker function left behind is not meant to manage anything but unoccupied buildings until the property can be transferred to the RDA. The Navy has now matured to the stage in this process where the RDA assumes responsibility for the operation of the base.

Mr. Pinckney asked why can't Navy workers instead of subcontractors manage the base? Admiral Watkins answered that the Navy doesn't have civilian billets to do that. The Navy does have an environmental detachment that can remain for up to 3 years to do the environmental remediation. This detachment however, can only do Navy work, and doesn't play a role in the management of the facility after closure.

Mr. Pinckney stated that he thought the immediate priority of the Navy is to retrain and maintain workers. The Admiral clarified that he can not retain anyone, that he has orders to close as of April 1, 1996. It is true, however, that they are trying to retrain everyone they can, and have spent \$15 million on a training program for this purpose.

Virgil Johnston explained that the RDA only has about 6 to 8 inspectors that go out maybe once a month, and are not hired on a full-time basis. The RDA couldn't maintain a large group of workers.

There are approximately 160 billets for environmental remediation. Can this work force be used for work such as demolishing buildings rather than having the RDA hire subcontractors?

Daryle Fontenot stated that these issues would be better addressed between the shipyard detachment and the RDA, and continued by reviewing the three subcommittees previously being discussed: the Community Relations Subcommittee, the Reuse Subcommittee, and the Shipyard Detachment Subcommittee.

Ann Ragan suggested since the RDA is not present to represent their point that they send a letter to the RAB members explaining their position.

Subj: RESTORATION ADVISORY BOARD (RAB) Minutes of 13 February 1996

The Admiral explained that the RDA is here to help the Navy. The RDA is a state entity that represents the community. Susan Floyd informed the Admiral that the Charleston RAB is a well informed group, and what they want is for decision-makers to come and participate in the RAB meetings, specifically the Admiral, the Mayor, and the RDA. Yet the RDA (with the exception of Jerri Johnston and Virgil Johnston, who are primarily mouthpieces for the RDA) have never attended. The Admiral stated that he has no authority over the RDA, and that he has a responsibility to support both groups. The best he can do is ask the RDA to be accommodating to the RAB's requests.

#### 6. RDA Update

Virgil Johnston provided an update on the progress of the RDA. Currently there are 16 tenants and 250 structures totalling over 5000 square feet. Government tenants such as the Coast Guard don't help pay for road repairs, sewage, and the like. Approximately 85% of the property is covered, but not many leases have been issued. Three leases in the CIA area involve about 60 or 70 structures. The RDA is about where they planned to be at this time. They hoped to have about 2000 jobs in the area by April, and 7000 jobs after a 5 year period. Mr. Johnston added that he's been coming to these meetings since last April and he doesn't know of an instance where someone has asked him a question he hasn't provided an answer to, and he'd be happy to take any questions.

Mr. Pinckney asked what kinds of jobs at what salary are expected. Mr. Johnston said that exact information is not available, but he expects that many of the jobs will be in ship repair in the range of \$13 to \$17 per hour.

LCDR Nick Cimorrelli asked if asbestos concerns must be addressed before transferring shipyard property to another federal facility. The RDA can't answer that question, but Ann Ragan stated that it is a decision that can be made between the agencies.

#### 7. Environmental Cleanup Progress Report

Tony Hunt presented a brief progress report. During the last several months, the Navy took another look at their costs. They looked at two things, utilizing funds more efficiently, and projected costs. By doing that, they found that funds were used more efficiently (through analytical cost savings, and fewer samples taken than estimated), and further cost savings could be made by utilizing screening methods in future zone work. Based on these findings, it is the Navy's best estimate that there is not a \$4.5 million deficit, as previously thought, and that the money they have right now should be sufficient for activities scheduled this year.

As far as progress in January, a lot of progress was made in Zones C and I. Zones C and I Draft RFI reports were submitted to the regulators, and hopefully a visual presentation can be given in the near future regarding the results. The second quarter of groundwater sampling was completed in Zones C and I, and the Work Plan has been revised to add a couple of sites. One site was found late in the RFA process and will be sampled and reported as an addendum to the report. Susan Floyd asked for an elaboration of the

Subj: RESTORATION ADVISORY BOARD (RAB) Minutes of 13 February 1996

additional sites. One site was the Pesticide Shop or Golf Course. Initially, the location of stored chemicals was unknown, but was discovered later. This evaluation of new sites is a continual process that will continue through the investigation. The other site was a wash area. The Navy is interested in such areas because waste oils could potentially wash into the drain system.

Lou Mintz asked when Zones J, K and L will be on line. Mr. Hunt answered that Zone J and L Work Plans are still in review. Once they've been approved, field work can begin. Preparation of Zone K Work Plan began in January, and a best guess for beginning field work is this summer.

Projected activity for February includes beginning quarterly groundwater sampling in Zone E, and continuation of work on Interim Measures Work Plans.

James Conner asked what the total expenditures is so far for sampling and investigations, and how much has been spent for cleanup. Mr. Hunt responded that approximately \$9 million has been spent on investigations, and \$0.00 has been spent on cleanup. This, however, is according to plans.

Lou Mintz asked how much outstanding lab work is required in Zone H. Mr. Hunt responded that only groundwater monitoring is left and testing for two unexploded ordnance sites is outstanding.

Mr. Conner was under the impression that the Navy knew where the UXO sites were and had made a decision to leave them alone because they've been there for 50 years and didn't create any problems. Now the Navy is talking about removing them, why is this? Mr. Hunt explained that during the Navy's ownership of the base, the UXOs didn't present a problem because they were in an area that wasn't being used. Now, they have to try to locate them, and if that's not possible, implement institutional controls to address them. The UXOs could potentially cause a health and safety issue if construction were to take place in the vicinity. Doyle Brittain added that in the reuse plan they're talking about dredging around the piers and driving pilings in the water and on dry land in the vicinity of the UXOs. The Navy can't take the chance of one of the UXOs exploding during such activities.

Someone from the audience asked where the results of the testing can be found. Mr. Brittain announced that the Zone H, Zone C, and Zone I reports contain the results and are in the Information Repository at the Dorchester Road Regional Library, and that he strongly encourages everyone to visit the library, review the reports, and provide any comments.

#### **8. Zone H RCRA Facility Investigation Report Findings**

Daryle Fontenot introduced Dr. Speakman of EnSafe/Allen&Hoshall who will be presenting the findings of the Zone H RCRA Facility Investigation Report.

Subj: RESTORATION ADVISORY BOARD (RAB) Minutes of 13 February 1996

Due to the length and technical detail of this presentation, only a brief transcription follows. A complete package of detailed handouts is provided as an attachment to the minutes.

Dr. Speakman announced that the results of the investigation can be found in the Zone H RCRA Facility Assessment Report, a six volume report that can be found in the Dorchester Road Regional Library, and encouraged everyone to visit the library and review the report.

Dr. Speakman proceeded to introduce the other speakers who will be helping him present the information: Britton Dotson, senior professional who managed and directed field work, and one of the major authors of the report; Todd Haverkost, Task Order Manager for Zone H who also oversees all the investigative work of the Naval Base; and Mark Bowers who led the risk assessment.

The results will be presented in the following order:

Background of Zone H

Site Specific Results

Risk Assessment

Recommendations by EnSafe/Allen&Hoshall

Where We Go From Here

The Zone H report was delivered in July 1995, then underwent a thorough review by the regulators. The report was revised based on comments, and submitted in final form in December 1995. Currently, the final document is being reviewed by the regulators who estimate completion by April 1, 1996.

There are four main types of chemicals that have been found at Zone H: 1) Metals, 2) Pesticides/Herbicides/PCBs, 3) Semivolatile Organic Compounds, and 4) Volatile Organic Compounds. During investigation, 25 metals, 28 Pesticides/Herbicides/PCBs, 70 Semivolatile Organic Compounds, and 40 Volatile Organic Compounds were tested. Only 8 of the 25 metals, 5 of the 28 Pesticides/PCBs, 5 of the 70 Semivolatile, and 7 of the 40 Volatile Organic Compounds were found to be problematic.

Six groupings were designated for the purpose of this presentation - these groupings will not be found in the report, the report will present data on an individual Solid Waste Management Unit (SWMU) and Area of Concern (AOC) basis. Groupings are as follow and incorporate all SWMUs and AOCs in Zone H.

Grouping 1 - Landfill

Grouping 2 - Petroleum Sites

Grouping 3 - Chemical Disposal Area

Grouping 4 - Submarine Training Facility

Grouping 5 - Unexploded Ordnance (UXO)

Grouping 6 - Sites Recommended for No Further Action

**Grouping 1:** Consists of SWMUs 9, 19, 20, 121, and AOCs 649, 650, and 651. During the site slide show, a photograph was presented showing what appeared to be black gravel, but is actually some type of boiler clink or slag-type material that is deposited around the base. The significance of this substance is that it is associated with Benzo(a)pyrene, one contaminant whose presence was prevalent throughout the investigation of Zone H. As an example of the contaminants found at Grouping 1, the Primary Contributors to Risk/Hazard for SWMU 9 are: SOIL - Arsenic, Benzo(a)pyrene equivalents, Beryllium, Copper, and PCBs, WATER - Aluminum, Benzidine, Chloroform, Hexachlorobenzene, Manganese, Thallium, and Vinyl Chloride.

**Grouping 2:** Consists of the sites that were found through investigation to have petroleum constituents of some type, and include SWMUs 13, 136, 138, 159, and 178, and AOCs 653, 655, 656, 659, 663, 665, and 667. As an example of the contaminants found at Grouping 2, the Primary Contributors to Risk/Hazard for AOC 663/SWMU 136 are: SOIL- Aluminum, Arsenic, Benzo(a)pyrene equivalents, PCBs, and 4'4'-DDE, WATER - 2,3,7,8-TCDD.

**Grouping 3:** Grouping 3 is the Chemical Disposal Area and consists of SWMUs 14 and 15 and AOCs 670 and 684. Samples were collected as one grouping due to the proximity of the sites. The Primary Contributors to Risk/Hazard for SWMU 14 are: SOIL - Arsenic, Benzo(a)pyrene equivalents, and Beryllium, WATER - Aluminum, BEHP, 2,3,7,8-TCDD equivalents, and Heptachlor epoxide.

**Grouping 4:** Grouping 4 is the Submarine Training Facility and consists of SWMU 17. Primary Contributors to Risk/Hazard are: SOIL - Benzo(a)pyrene Equivalents and PCBs, WATER - Benzidine, Chlorobenzene, 1,4-Dichlorobenzene, and 1,2,4-Trichlorobenzene.

**Grouping 5:** Consists of the two unexploded ordnance (UXO) areas, AOCs 503 and 661. AOC 503 was a marshy area in 1943 when an aircraft jettisoned two depth-charges on take-off or landing. These UXOs have never been recovered. These areas have not been sampled, and will not be sampled until the areas are cleared by the Navy's Explosives Ordnance Detachment.

**Grouping 6:** Grouping 6 consists of 3 of the 30 sites that are recommended by E/A&H for No Further Action; AOCs 654, 660, and 662. Although these are the only 3 sites recommended right now, other sites may "drop-out" later in the process.

Of all the Groundwater Monitoring Wells installed, two, (located in SWMUs 9 and 17), had the most significant contamination. The contaminants of concern include Arsenic, Benzidine, Chlorobenzene, Hexachlorobenzene, Vinyl Chloride, 1,4-Dichlorobenzene, and 1,2,4-Trichlorobenzene. Groundwater at these two locations is moving toward Shipyard Creek and the Cooper River respectively. Given the physical setup of Zone H and direction of water flow, migration of contamination is expected to move at a rate of 6 to 7 feet per year.

Subj: RESTORATION ADVISORY BOARD (RAB) Minutes of 13 February 1996

Lou Mintz asked if Lead was found at SWMU 14. Mr. Dotson answered that Lead was found in soil, but not in water, and that it was not a primary contributor to risk or hazard at that site in soil.

Mr. Mintz also asked how much the Zone H investigation cost. Mr. Haverkost answered that it cost approximately \$2.7 million.

Ms. Jane Settle asked what was meant by the two monitoring wells in SWMUs 9 and 17 being "the most heavily contaminated," the number of contaminants found or the concentrations as they relate to risk. Dr. Speakman answered that they were classified as most heavily contaminated relative to risk. Todd Haverkost added that the main point they wanted to get across to the audience is that there isn't any groundwater contamination migrating off site from Zone H.

As a review of risk, there is no such thing as zero risk. There are four steps of Risk Assessment: Hazard Identification, Exposure Assessment, Toxicity Assessment, and Risk Characterization. After the Risk Assessment takes place, the next step in the process is Risk Management.

Risks are divided into two categories: 1) Carcinogenic Risk, and 2) Non-Carcinogenic Risk or Toxicity. Carcinogenic Risk is estimated as the probability of adding one more case of cancer in a certain population (e.g. 10,000 or 1,000,000). Toxicity risk is calculated by comparing it to a Hazard Index. A Hazard Index of less than one indicates that no toxic effect is likely. A Hazard Index greater than one indicates that a toxic effect is likely, typically in sensitive individuals.

A summary of groundwater and soil Chemicals of Concern (COCs) for each SWMU and AOC, and a table showing Risk and Hazard Projections on a site by site basis can be found near the end of the presentation handout and summarizes the results for Zone H.

Four ecological zones were reviewed for any environmental impact. Sub-zones H-1, H-2, and H-3 were terrestrial areas and sub-zone H-4 was an aquatic habitat.

The "Recommendations" handout reviews the E/A&H findings of Zone H. Either No Further Action, or Further Action is recommended. For those sites requiring further action, action may be necessary due to the regulatory requirement of remediation when Total Petroleum Hydrocarbons are found at >100 ppm, and/or when risk or hazard levels were exceeded according to the findings in the Baseline Risk Assessment.

The next steps in the process include the finalization of the regulatory review, a public comment period on the permit which allows the Navy to begin the Corrective Measures Study, and the permit revision which will specify which sites will require No Further Action, which sites will be included in the Corrective Measures Study, and which sites will be remediated under the State's Underground Storage Tank program.

Subj: RESTORATION ADVISORY BOARD (RAB) Minutes of 13 February 1996

Admiral Watkins asked for suggestions and recommendations on the presentation. The audience responded positively, that it covered the material at an appropriate level of detail.

**Questions:**

What happens to the permit when the base closes? The permit doesn't just go away, after the base closes, it will be held by the caretaker who will be SouthDiv. Admiral Watkins introduced Commander Darby who is in charge of the Caretaker function at SouthDiv.

Pat Franklin added that the permit revision is required at all bases as part of the investigative process, and isn't occurring just because the Base is closing.

When will actual cleanup activities begin? Mr. Hunt answered that Interim Measures may begin as early as the end of April, 1996. All of the Zone wide investigations do not have to be completed before cleanup can begin.

Dr. Speakman concluded with asking the audience to please provide any other comments on the presentation, because more presentations will be coming in as the reports are submitted. Draft Zones C and I reports are in, Zone B is scheduled for April, and Zone A is scheduled for June.

Captain Augustin asked for a general overview of how things look to give the audience perspective on the state of Zone H. Dr. Speakman stated that in his personal opinion, he felt good about the No Further Action Sites, and that at least two sites, (the landfill, and SWMU 17 where free product was found) will require substantial remediation. The majority of the remaining sites of the sites fall into the risk management area where relatively straight-forward action can hopefully be implemented that would, for example, cause a 1 in 10,000 risk to be reduced to a 1 in a million risk.

Susan Floyd added as a community representative she expects the sites to be cleaned up to the 1 in a million risk level. She would like to see it cleaned up good the first time.

Dr. Speakman added that they found lower levels of contamination in general than they were expecting to find. Joe Bowers from SCDHEC added that he's surprised (and pleased) that they haven't seen the degree of contamination that they were expecting to find. Compared to many other facilities SCDHEC is dealing with, they haven't encountered what he would consider really significant areas of contamination.

Mr. Ted Simon, Risk Assessor for EPA, added that to the extent that he has reviewed the data, he would also concur with Joe Bowers statement. He went into his review with the attitude that Charleston has been around so long that there must be significant contamination, but when reviewing the results of Zone H, he was pleasantly surprised to find that the levels are not that extreme. He reiterated Dr. Speakman's statement that creative risk management techniques such as extending an asphalt parking lot which would reduce workers' exposure may be considered.

**9. Remaining Questions and Comments**

Mr. Fontenot thanked everyone for staying for the entire meeting and hoped that the presentation was helpful in informing everyone what has been found to date.

Mr. Fontenot, in an effort to keep the RAB members up to date with the players in the Charleston project, asked Mr. Joe Bowers of SCDHEC to introduce their newest player. Mr. Bowers introduced Johnny Tapia who is DHECs Hazardous Waste Permitting Engineer. Mr. Tapia will be attending upcoming RAB meetings.

Mr. Fontenot also extended special thanks to Mr. Ted Simon who came in from EPA in Atlanta.

**10. Agenda for Next Meeting**

The next meeting will be an evening meeting to be held on Tuesday March 12. An open-house session will be held from 6:00 p.m. to 7:00 p.m. and the meeting will start at 7:00 p.m. and run until approximately 9:00 p.m. The North Charleston City Council Chamber is available on Tuesday nights so the next meeting may be held in the same location - watch for the final location on the upcoming agenda.

An agenda item for next time will be RAB membership. As of April 1, 1996 the RAB will lose all their military members, and the group has to decide how and if they want to replace them.

Mr. Doyle Brittain stated that the Shipyard Detachment group would like to bring to the RAB some of the options for beginning cleanup of the base and to get the RAB's input. Mr. Daryle Fontenot said he would add that subject to next month's agenda.

Mr. Lou Mintz addressed the fact that a Finance Subcommittee was suggested at the last meeting. He would like to volunteer for that subcommittee.

**11. Adjournment**

The meeting was adjourned at 5:10 p.m.

**Summary of Action Items**

- Request RDA to submit position letter to RAB members.
- Susan Floyd stated that she would like to see cleanup required at residential standards.
- Lou Mintz volunteered to lead the Finance Subcommittee.

Subj: RESTORATION ADVISORY BOARD (RAB) Minutes of 13 February 1996

**Attachments to Minutes**

- (1) Tuesday February 13, 1996 RAB Meeting Agenda**
- (2) Charleston Naval Complex Tenant Summary**
- (3) RCRA Facility Investigation Progress Report for January 1996**
- (4) Zone H RCRA Facility Investigation Results**

**Minutes recorded by:**

**Diane Cutler, EnSafe/Allen&Hoshall**

**Minutes approved by:**

\_\_\_\_\_  
**Daryle Fontenot**  
**Co-Chairman**

\_\_\_\_\_  
**Don Harbert**  
**Co-Chairman**

**Tuesday, February 13, 1996**

**Charleston Naval Base**

**RESTORATION ADVISORY BOARD MEETING AGENDA**

**2:30 PM** Location: North Charleston City Hall located @ 4900 LaCross Road at North Charleston. Meeting will be in the City Council Chambers.

**2:30 RAB MEETING**

- A. Introduction of the RAB Members and Guests
- B. Administrative Remarks, Comments on the minutes of last meeting
- C. Subcommittee Reports
- D. RDA update
- E. Environmental. Cleanup Progress Report      Cleanup Team
- F. Discussion of Zone H RFI Report Findings
  - Data interpretation
  - Risk assessment
- G. Remaining Questions and Comments from Visitors.
- H Agenda for next meeting

Please mark for calendar. Our next meeting is Tuesday, March 12, 1996. Time and location to be determined.

## CHARLESTON NAVAL COMPLEX TENANT SUMMARY

----- CURRENT FACILITIES/EMPLOYMENT-----

| DRY DOCKS | PIERS | BUILD-INGS | TOTAL SQ. FT. | EMPLOY- EES |
|-----------|-------|------------|---------------|-------------|
|-----------|-------|------------|---------------|-------------|

----- ULTIMATE FACILITIES/EMPLOYMENT-----

| DRY DOCKS | PIERS | BUILD-INGS | TOTAL SQ. FT. | EMPLOY- EES |
|-----------|-------|------------|---------------|-------------|
|-----------|-------|------------|---------------|-------------|

### CURRENT LEASES/LICENSES

|                                     |          |          |           |                |            |
|-------------------------------------|----------|----------|-----------|----------------|------------|
| BABCOCK & WILCOX                    | 0        | 0        | 2         | 175,992        | 10         |
| CHARLESTON MARINE MANUFACTURING     | 1        | 1        | 4         | 137,472        | 250        |
| CHARLESTON SHIPBUILDING, INC.       | 0        | 0        | 1         | 39,000         | 5          |
| CHARLESTON COUNTY PARK & RECREATION | 0        | 2        | 2         | 6,087          | 5          |
| NATIONAL CIVILIAN COMMUNITY CORPS   | 0        | 0        | 6         | 161,328        | 75         |
| U.S. POSTAL SERVICE                 | 0        | 0        | 1         | 17,782         | 114        |
| <b>SUBTOTAL</b>                     | <b>1</b> | <b>3</b> | <b>16</b> | <b>537,661</b> | <b>459</b> |

|  |          |           |            |                  |              |
|--|----------|-----------|------------|------------------|--------------|
|  | 0        | 0         | 2          | 175,992          | 225          |
|  | 3        | 7         | 90         | 1,504,130        | 2,404        |
|  | 2        | 5         | 96         | 734,419          | 2,000        |
|  | 0        | 3         | 2          | 6,087            | 7            |
|  | 0        | 0         | 6          | 161,328          | 75           |
|  | 0        | 0         | 1          | 17,782           | 400          |
|  | <b>5</b> | <b>15</b> | <b>197</b> | <b>2,599,738</b> | <b>5,111</b> |

### UNDER NEGOTIATION

|                                      |          |          |          |          |          |
|--------------------------------------|----------|----------|----------|----------|----------|
| ALLIED TECHNOLOGY                    | N/A      | N/A      | N/A      | N/A      | N/A      |
| BORDER PATROL                        | N/A      | N/A      | N/A      | N/A      | N/A      |
| DEPT OF HEALTH & ENV. CONTROL (DHEC) | N/A      | N/A      | N/A      | N/A      | N/A      |
| FOX ASSOCIATES                       | N/A      | N/A      | N/A      | N/A      | N/A      |
| M. ROSENBLATT                        | N/A      | N/A      | N/A      | N/A      | N/A      |
| <b>SUBTOTAL</b>                      | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> |

|  |          |          |           |                |            |
|--|----------|----------|-----------|----------------|------------|
|  | 0        | 0        | 1         | 8,553          | 100        |
|  | 0        | 0        | 8         | 405,821        | 100        |
|  | 0        | 0        | 1         | 16,173         | 54         |
|  | 0        | 0        | 1         | 4,040          | 15         |
|  | 0        | 0        | 1         | 2,800          | 25         |
|  | <b>0</b> | <b>0</b> | <b>11</b> | <b>428,834</b> | <b>194</b> |

### FEDERAL OWNERS

|                                       |          |          |           |                |            |
|---------------------------------------|----------|----------|-----------|----------------|------------|
| DEFENSE FINANCE & ACCOUNTING SERVICE  | 0        | 0        | 3         | 257,909        | 473        |
| DEFENSE PRINTING                      | 0        | 0        | 1         | 26,520         | 37         |
| NISE EAST                             | 0        | 0        | 16        | 362,057        | 250        |
| NATIONAL OCEANIC & ATMOSPHERIC ADMIN. | 0        | 1        | 5         | 44,865         | 35         |
| STATE DEPARTMENT                      | 0        | 0        | 5         | 197,750        | 55         |
| U.S. COAST GUARD                      | N/A      | N/A      | N/A       | N/A            | N/A        |
| <b>SUBTOTAL</b>                       | <b>0</b> | <b>1</b> | <b>30</b> | <b>889,101</b> | <b>850</b> |

|  |          |          |           |                |              |
|--|----------|----------|-----------|----------------|--------------|
|  | 0        | 0        | 1         | 229,293        | 750          |
|  | 0        | 0        | 0         | 0              | 0            |
|  | 0        | 0        | 16        | 362,057        | 250          |
|  | 0        | 2        | 5         | 44,865         | 200          |
|  | 0        | 0        | 5         | 197,750        | 400          |
|  | 0        | 1        | 2         | 65,128         | 402          |
|  | <b>0</b> | <b>3</b> | <b>29</b> | <b>899,093</b> | <b>2,002</b> |

|                    |          |          |           |                  |              |
|--------------------|----------|----------|-----------|------------------|--------------|
| <b>GRAND TOTAL</b> | <b>1</b> | <b>4</b> | <b>46</b> | <b>1,426,762</b> | <b>1,309</b> |
|--------------------|----------|----------|-----------|------------------|--------------|

|  |          |           |            |                  |              |
|--|----------|-----------|------------|------------------|--------------|
|  | <b>5</b> | <b>18</b> | <b>237</b> | <b>3,927,665</b> | <b>7,307</b> |
|--|----------|-----------|------------|------------------|--------------|

**Naval Base Charleston  
RCRA Facility Investigation (RFI)  
PROGRESS REPORT FOR JANUARY 1995**

INVESTIGATIVE ZONES

- A. Warehousing and scrap metal yard
- B. Golf course and residential
- C. Office space and warehouse (NH-45, Navbase HQ)
- D. Parking lot, warehouses
- E. Shipyard
- F. Recreational areas and public works shops
- G. Fuel farm and transfer facility
- H. Southern end of the base excluding waterfront
- I. Southern end of the base including waterfront and dredge material area
- J. Ecological study area (waterbodies and certain areas on land)
- K. Non-contiguous areas (Naval Station South Annex and tip of Clouter Island)
- L. Sewer systems and railroad system

FUNDING

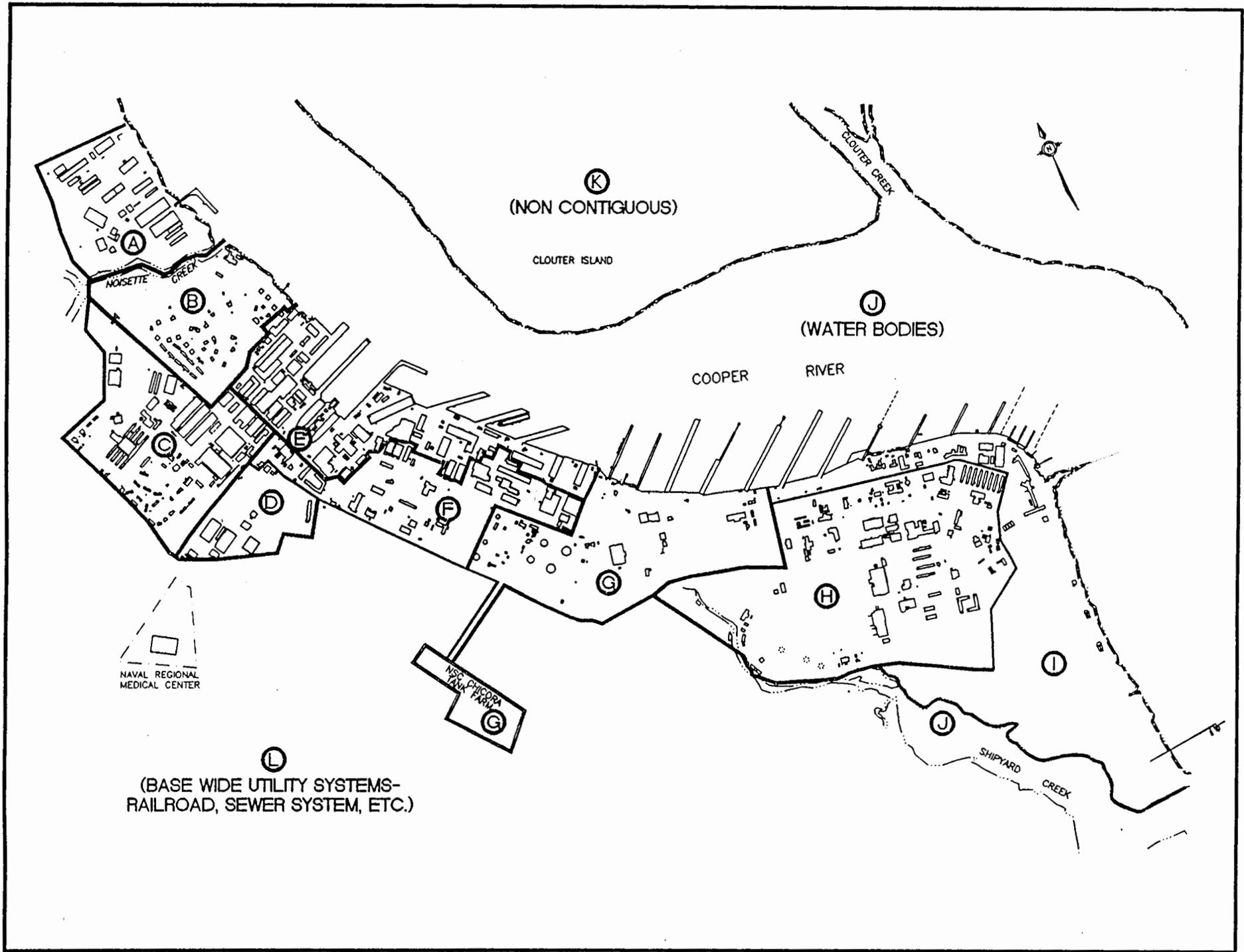
- ◆ Funding status  
Fully funded through completion of the Corrective Measures Study:  
Zones A, B, C, E, H, I  
The remaining zones are funded for work plans, funds for investigation through Corrective Measures Study is available however it is not yet negotiated and awarded.

PROGRESS FOR JANUARY

- ◆ Zones C & I RFI reports were submitted on 26 January to EPA and SCDHEC for review and comment.
- ◆ Second quarter of groundwater sampling in Zones C & I completed.
- ◆ A revision to Zones C and I RFI Work Plans was submitted to include two additional sites. These sites will be investigated and submitted as an addendum to the RFI report.
- ◆ Field work continued at Zone E. Soil sampling is close to completion, groundwater sampling will begin in February.
- ◆ Preparation of Zone K Work Plan began.

PROJECTED ACTIVITY FOR FEBRUARY

- ◆ Begin quarterly groundwater sampling in Zone E.
- ◆ Continue work on Interim Measure Work Plans.

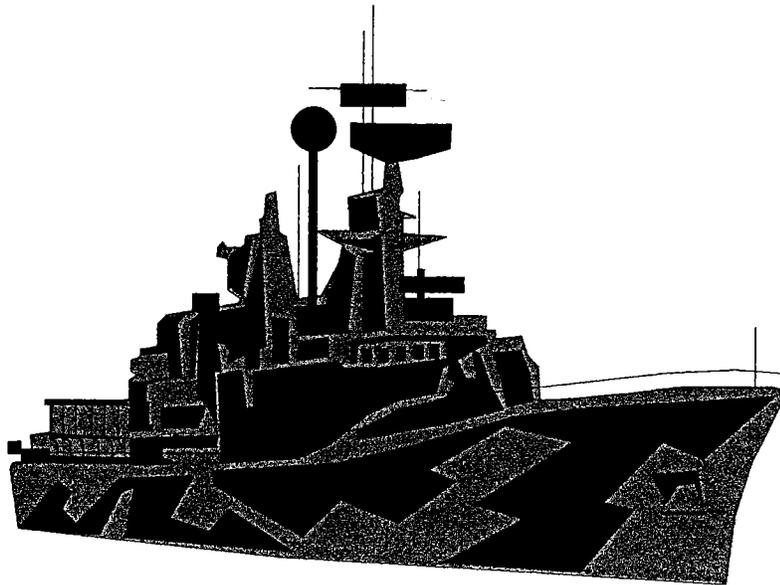


# **Zone H**

# **RCRA Facility Investigation**

# **Results**

Naval Base Charleston

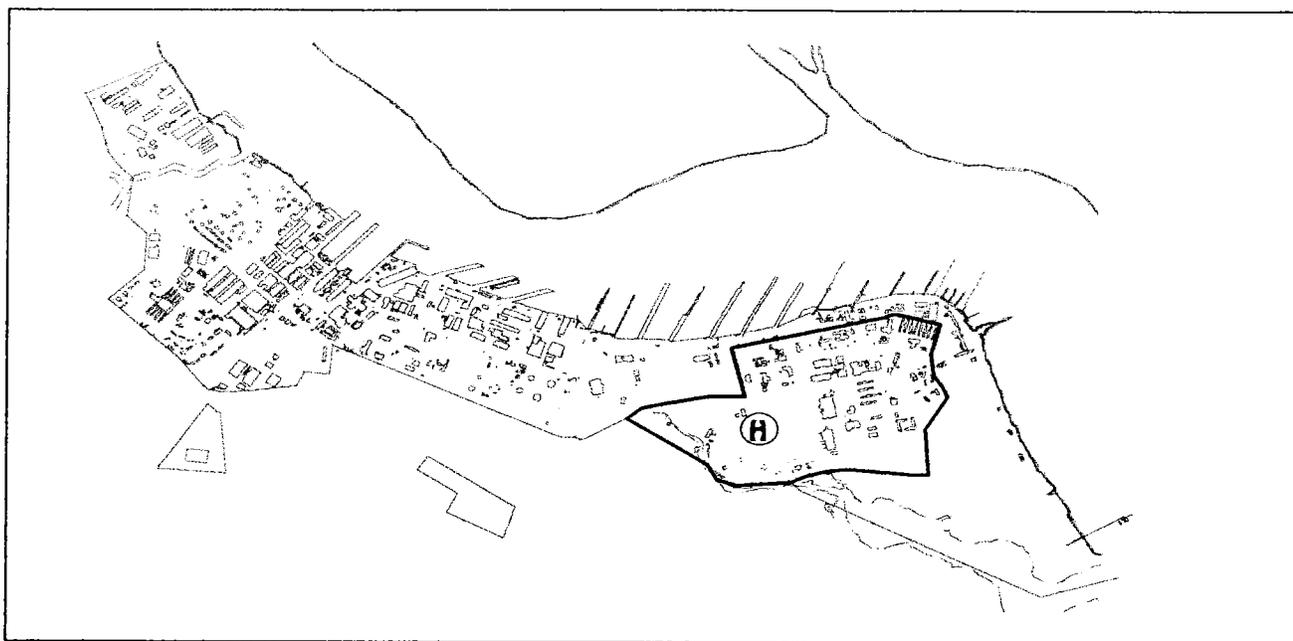


Presented by: EnSafe/Allen&Hoshall  
February 13, 1996

## ACRONYMS

|             |  |
|-------------|--|
| <b>AOC</b>  | <b>Area of Concern</b>   |
| <b>BaP</b>  | <b>Benzo(a)pyrene equivalents</b>                                    |
| <b>BRA</b>  | <b>Baseline Risk Assessment</b>                                      |
| <b>CMS</b>  | <b>Corrective Measures Study</b>                                     |
| <b>COC</b>  | <b>Chemical of Concern</b>   |
| <b>COPC</b> | <b>Chemical of Potential Concern</b>                                 |
| <b>DHEC</b> | <b>South Carolina Department of Health and Environmental Control</b> |
| <b>EOD</b>  | <b>Explosive Ordnance Disposal</b>                                   |
| <b>EPA</b>  | <b>U. S. Environmental Protection Agency</b>                         |
| <b>HI</b>   | <b>Hazard Index</b>  |
| <b>HQ</b>   | <b>Hazard Quotient</b>   |
| <b>ILCR</b> | <b>Incremental lifetime excess cancer risk</b>                       |
| <b>NFA</b>  | <b>No Further Action</b>   |
| <b>NNPA</b> | <b>N-nitroso-di-n-propylamine</b>                                    |
| <b>PCB</b>  | <b>Polychlorinated Biphenyl</b>                                      |
| <b>RCRA</b> | <b>Resource Conservation and Recovery Act</b>                        |
| <b>RFA</b>  | <b>RCRA Facility Assessment</b>                                      |
| <b>RFI</b>  | <b>RCRA Facility Investigation</b>                                   |
| <b>SVOC</b> | <b>Semivolatile Organic Compound</b>                                 |
| <b>SWMU</b> | <b>Solid Waste Management Unit</b>                                   |
| <b>TPH</b>  | <b>Total Petroleum Hydrocarbons</b>                                  |
| <b>UST</b>  | <b>Underground Storage Tank</b>                                      |
| <b>UXO</b>  | <b>Unexploded Ordnance</b>   |
| <b>VOC</b>  | <b>Volatile Organic Compound</b>                                     |

# Zone H Overview



## Location

- ▲ Zone H is in the southern portion of the peninsula formed by Shipyard Creek and the Cooper River.

## Reuse

- ▲ Identified for transfer to the State Department, Naval Support Activities, training areas, and administrative areas.

## Purpose of Investigation

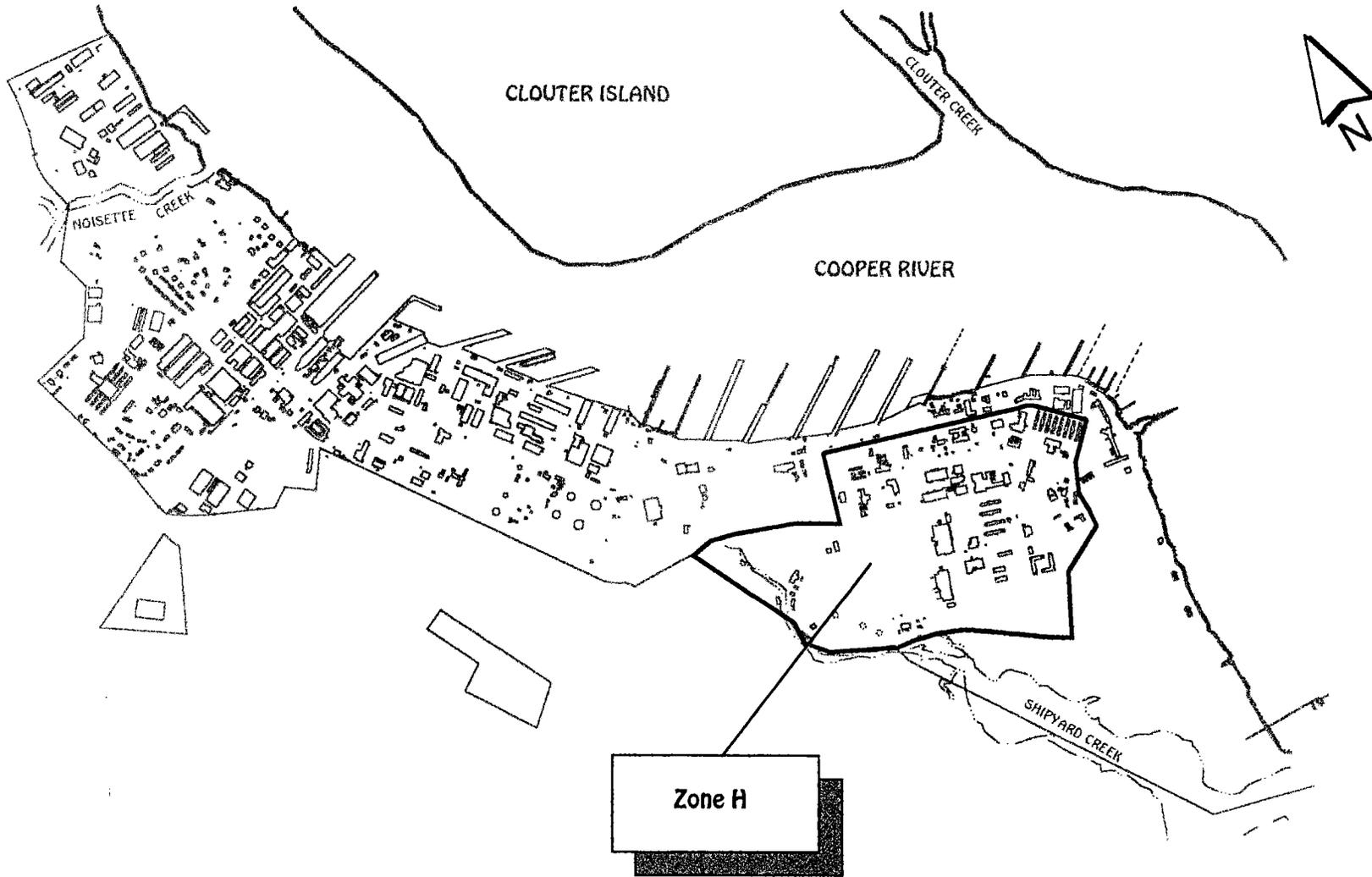
- ▲ To evaluate the nature and extent of hazardous wastes and to identify, develop and implement appropriate corrective measures to protect human health and the environment.

## Sampling Approach

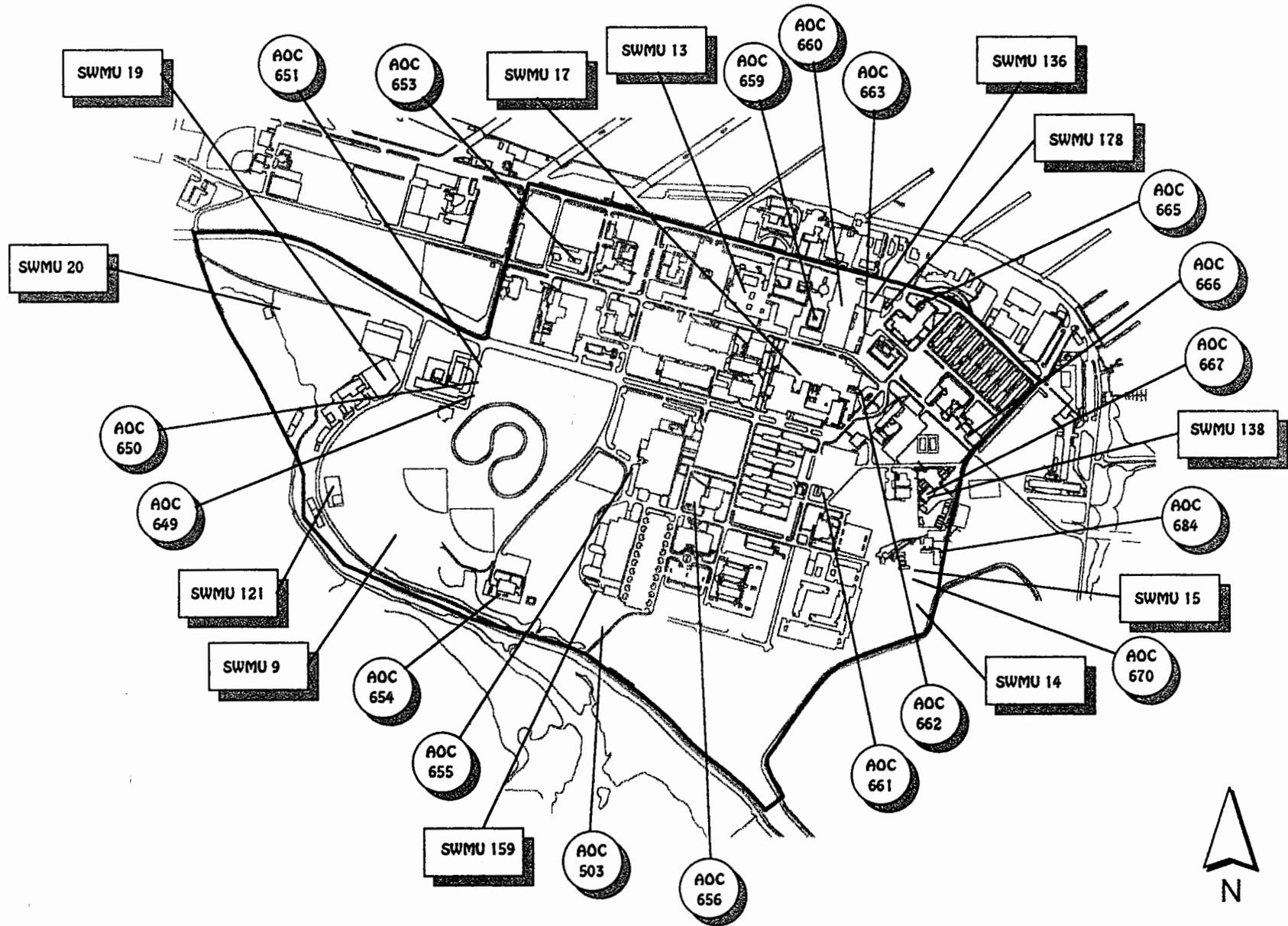
- ▲ 12 Solid Waste Management Units
- ▲ 18 Areas Of Concern
- ▲ 714 soil samples, 119 water samples

# Charleston Naval Shipyard

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# Zone H AOCs/SWMUs



# Common Contaminant Categories

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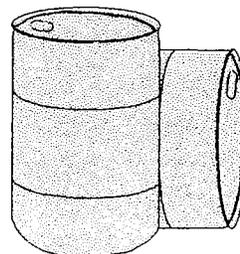
## Metals



Metals are naturally occurring elements that are generally flexible and good conductors of electricity. These properties, along with the relative abundance of metals, make them valuable materials in industrial and manufacturing processes. Household items that commonly contain metals include paint and enamel, batteries, coins, and electrical components.

## Pesticides, Herbicides, & PCBs

Pesticides are chemicals used to eliminate insects and other pests. Herbicides are chemicals used to kill unwanted plants or weeds. PCBs, or Polychlorinated Biphenyls, are industrial compounds that are used as insulating and heat exchange fluids in electrical transformers, and are found in hydraulic fluids used in electrical components and systems.



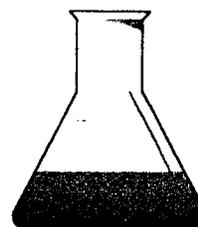
## Semivolatile Organic Compounds



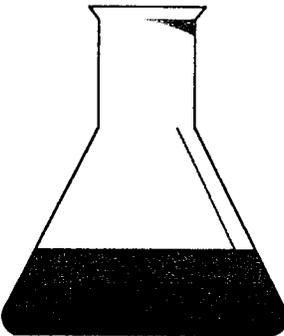
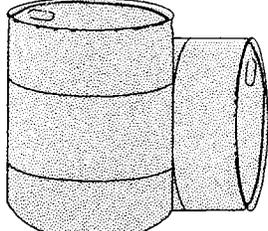
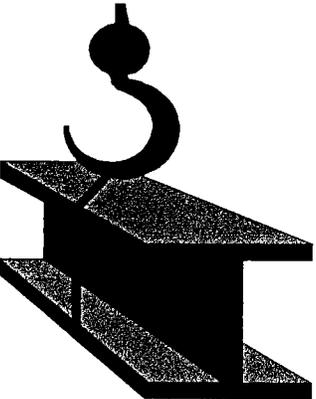
Semivolatile Organic Compounds, also called SVOCs, are common components of asphalt, coal tar, and pitch. Some SVOCs are components of diesel, jet fuel, waste oil, and hydraulic oil. A commonly used household SVOC is naphthalene, which is the main ingredient in many furniture refinishing products including paints, stains, finishes and varnish thinner.

## Volatile Organic Compounds

Volatile Organic Compounds, also called VOCs, are commonly used chemicals. Many VOCs are solvents, which are liquid compounds used to dissolve other substances. Ordinary household solvents include paint thinner and mineral spirits. Other household products that contain VOCs include hair spray, nail polish remover, air fresheners, and oven cleaners.



# Zone H Chemicals of Concern (COCs)

|   | <b>Contaminant</b>                        | <b>Category</b> |
|---|---|-----------------|
|    | 1,2,4-Trichlorobenzene (1,2,4-TCB)        | VOC             |
|   | 1,4-Dichlorobenzene (1,4-DCB)             | VOC             |
|   | Chlorobenzene                             | VOC             |
|   | Chloroform                                | VOC             |
|   | Chloromethane                             | VOC             |
|   | Hexachlorobenzene                         | VOC             |
|   | Vinyl chloride                            | VOC             |
|   | BEHP                                      | SVOC            |
|   | Benzidine                                 | SVOC            |
|   | Benzo(a)pyrene equivalents (BaP)          | SVOC            |
|   | Dioxins/Furans (2,3,7,8-TCDD equivalents) | SVOC            |
|   | N-nitroso-di-n-propylamine (NNPA)         | SVOC            |
|  | 4,4'-DDE                                  | Pesticide       |
|   | Chlordane                                 | Pesticide       |
|   | Dieldrin                                  | Pesticide       |
|   | Heptachlor Epoxide                        | Pesticide       |
|   | PCBs (Aroclor-1248, -1254, -1260)         | PCB             |
|  | Aluminum                                  | Metal           |
|   | Arsenic                                   | Metal           |
|   | Beryllium                                 | Metal           |
|   | Copper                                    | Metal           |
|   | Manganese                                 | Metal           |
|   | Mercury                                   | Metal           |
|   | Thallium                                  | Metal           |
| Vanadium  | Metal                                     |                 |

Note: This table includes only COCs that are primary contributors to Risk/Hazard.

# Groupings of Sites

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**Grouping 1 - Landfill**

**Grouping 2 - Petroleum Sites**

**Grouping 3 - Chemical Disposal Area**

**Grouping 4 - Submarine Training Facility**

**Grouping 5 - Unexploded Ordnance (UXO)**

**Grouping 6 - Sites Recommended for No Further Action**

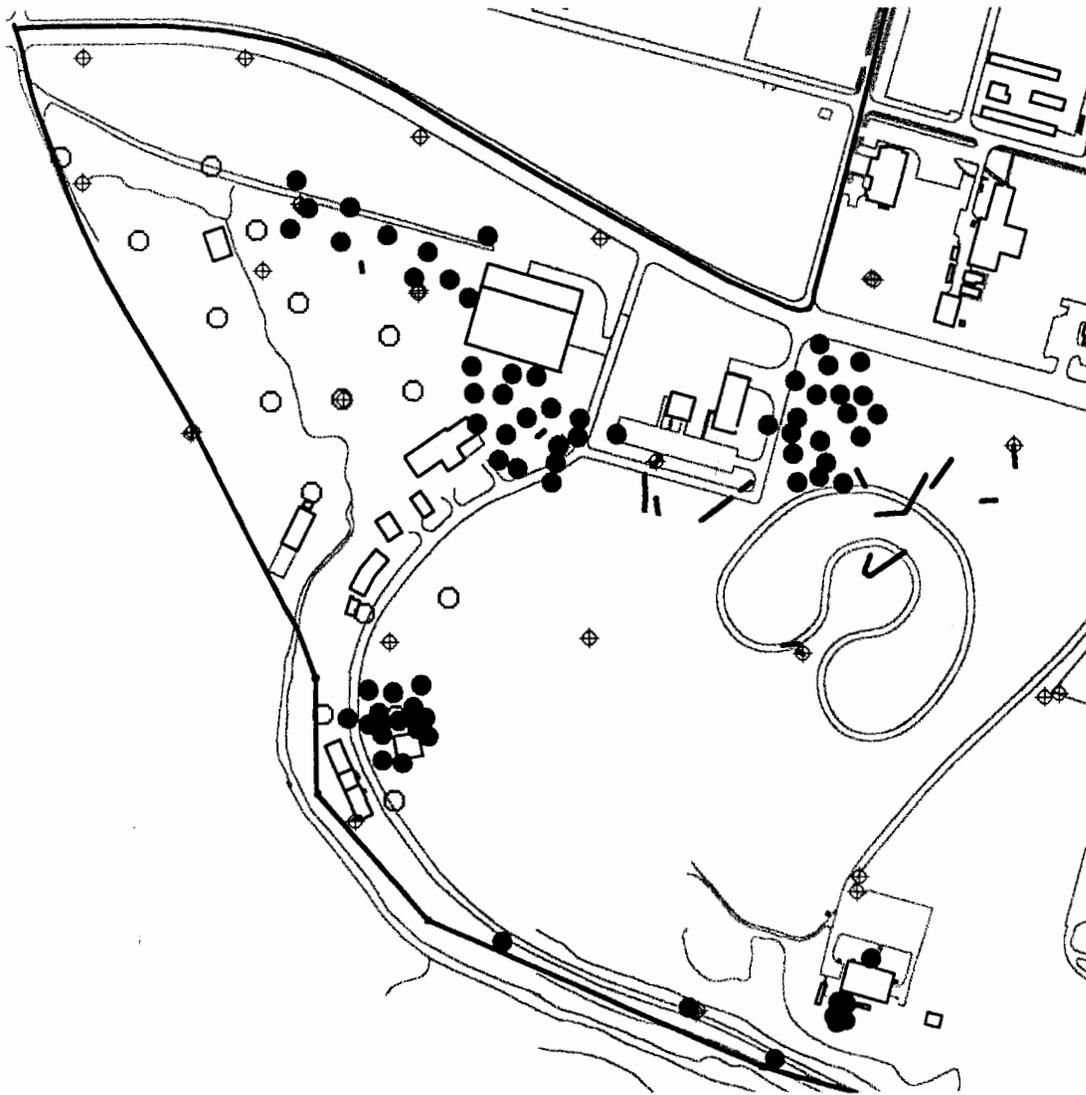
Zone 9 RFI Results - 2/13/96



# Grouping 1 - Landfill

| Site #                                 | Site Description             | Samples Collected                     |
|--|------------------------------|---------------------------------------|
| SWMU 9                                 | Closed Landfill              | Soil (11)<br>Sediment (15)            |
| SWMU 19                                | Solid Waste Transfer Station | Soil (20)                             |
| SWMU 20                                | Waste Disposal Area          | Soil (12)                             |
| SWMU 121                               | Satellite Accumulation Area  | Soil (18)                             |
| AOC 649                                | Storage Area                 | Soil (20)                             |
| AOC 650                                | Storage Area                 |                                       |
| AOC 651                                | Storage Area                 |                                       |
| <b>Total water samples collected</b> → |                              | Groundwater (29)<br>Surface Water (4) |

# Grouping 1 - SWMU 9



**Primary Contributors to Risk/Hazard**

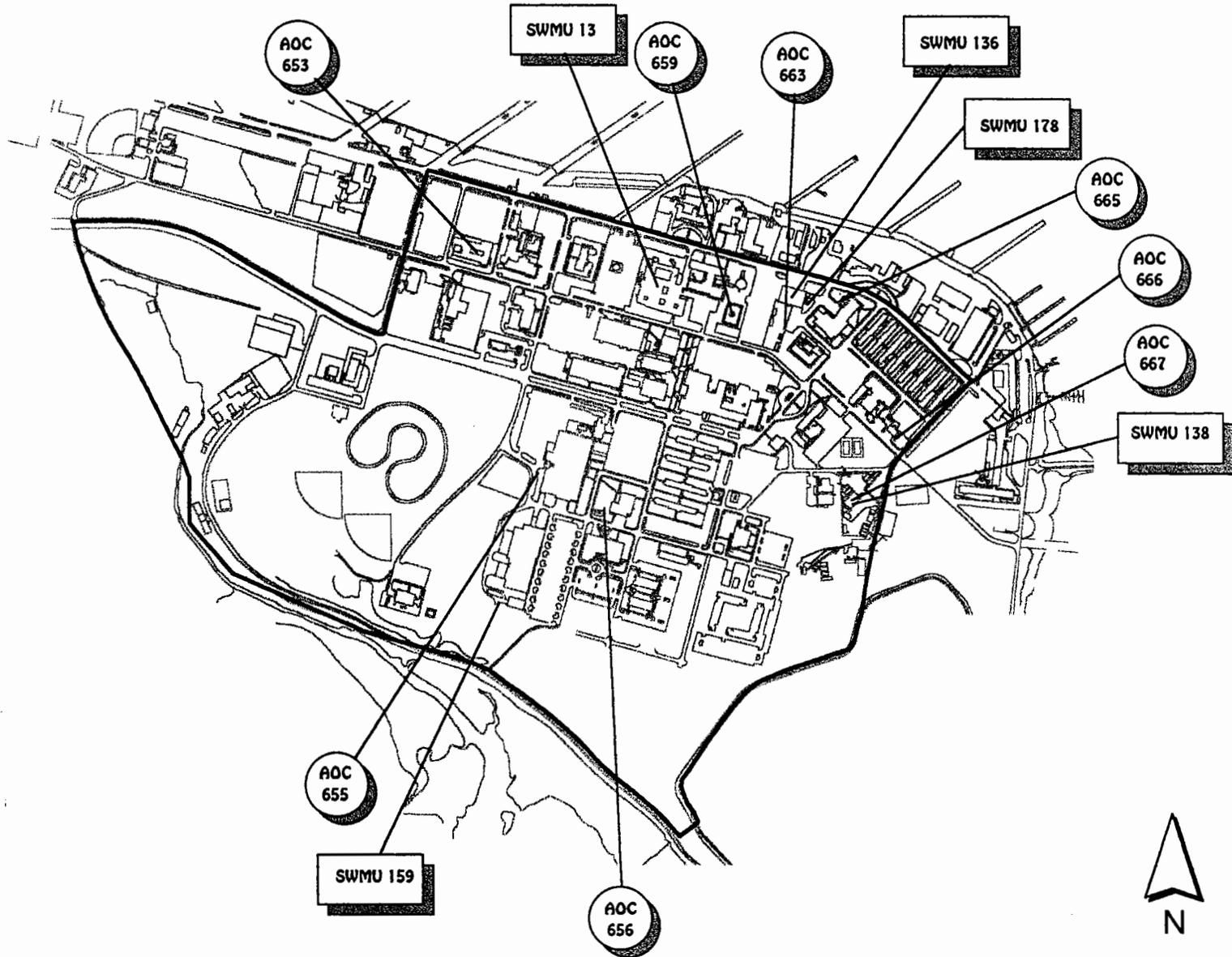
**Soil:**  
Arsenic  
Benzo(a)pyrene Equivalents  
Beryllium  
Copper  
Polychlorinated Biphenols (PCBs)

**Groundwater:**  
Aluminum  
Benzidine  
Chloroform  
Hexachlorobenzene  
Manganese  
Thallium  
Vinyl chloride

- Soil Boring
- ⊕ Monitoring Well
- Temporary Monitoring Well
- ~ Trench



# Grouping 2 - Petroleum Sites



## Grouping 2 - Petroleum Sites

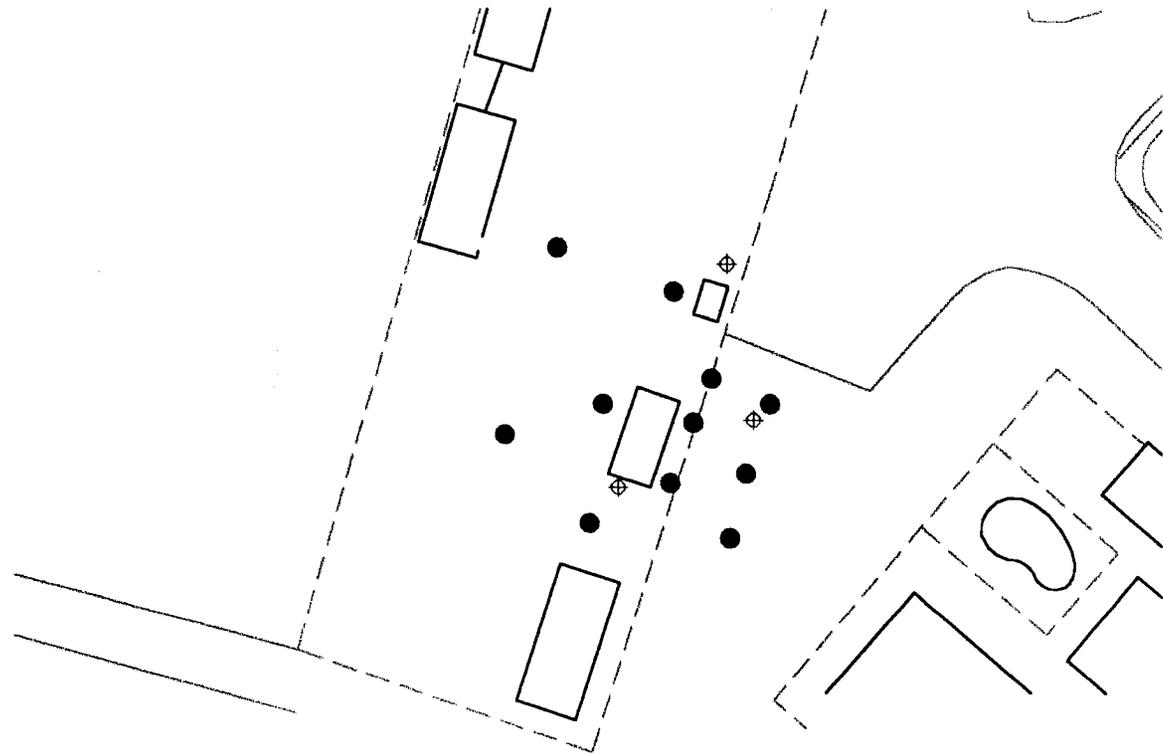
| Site #   | Site Description                             | Samples Collected                           |
|----------|--|---|
| SWMU 13  | Current Fire Fighter Training Area           | Soil (49) Groundwater (9)                   |
| SWMU 136 | Bldg. NS-53 - Satellite Accumulation Area 19 | Soil (14)<br>Groundwater (3)                |
| AOC 663  | Gas/Diesel Pumping Station - Bldg. 851       |   |
| SWMU 138 | Satellite Accumulation Area - Bldg. 1776     | Soil (14)<br>Groundwater (2)                |
| AOC 667  | Vehicle Maintenance Area - Bldg. 1776        |   |
| SWMU 159 | Satellite Accumulation Area - Bldg. 665      | Soil (19) Sediment (2)<br>Surface Water (1) |
| SWMU 178 | Site of Apparent Transformer Fire            | Soil (12) Groundwater (2)                   |
| AOC 653  | Hobby Shop - Bldg. 1508                      | Soil (14) Groundwater (2)                   |
| AOC 655  | Oil Spill Area - Bldg. 656                   | Soil (21) Groundwater (3)                   |
| AOC 656  | Petroleum Spill between Bldgs. 602 and NS-71 | Soil (18) Groundwater (3)                   |
| AOC 659  | Diesel Storage - Bldg. 14                    | Soil (8)                                    |
| AOC 665  | Pyrotechnic Storage - Bldg. 159              | Soil (8)                                    |
| AOC 666  | Fuel Storage - Bldg. NS 45                   | Soil (13) Groundwater (2)                   |

# Grouping 2 - AOC 663/SWMU 136

**Primary Contributors to Risk/Hazard**

**Soil:**  
Aluminum  
Arsenic  
Benzo(a)pyrene Equivalents  
Polychlorinated Biphenols (PCBs)  
4,4'-DDE

**Shallow Groundwater:**  
2,3,7,8-TCDD Equivalents

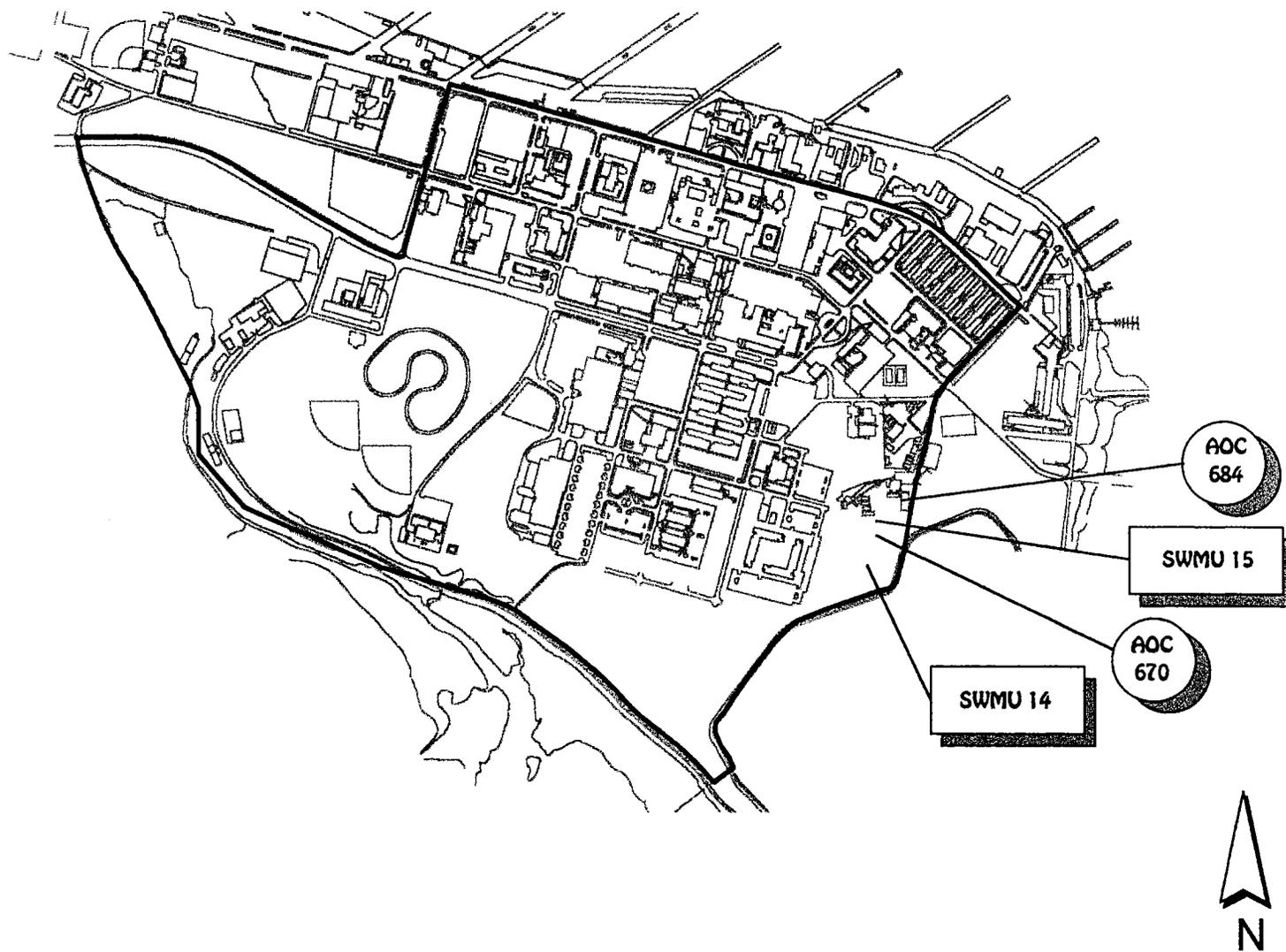


- Soil Boring
- ⊕ Monitoring Well



# Grouping 3 - Chemical Disposal Area

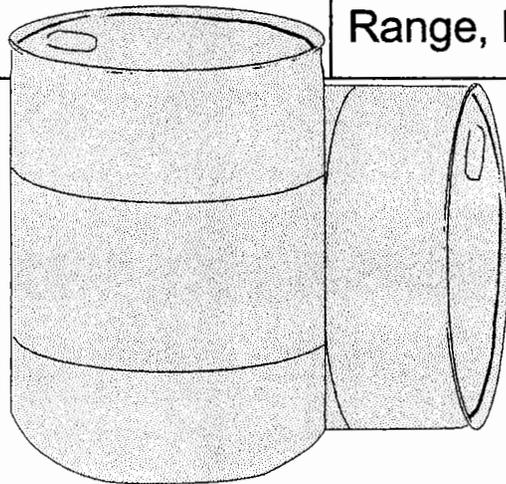
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# Grouping 3 - Chemical Disposal Area

---

| Site #  | Site Description                           | Samples Collected   |
|---------|--|---|
| SWMU 14 | Chemical Disposal Area                     | Soil (175)<br>Sediment (4)<br>Groundwater (10)<br>Surface water (1) |
| SWMU 15 | Incinerator                                |   |
| AOC 670 | Former Skeet Range,<br>South of Bldg. 1897 |   |
| AOC 684 | Former Outdoor Pistol<br>Range, Bldg. 1888 |   |



# Grouping 3 - SWMU 14



**Primary Contributors to Risk/Hazard**

**Soil:**  
Arsenic  
Benzo(a)pyrene Equivalents  
Beryllium

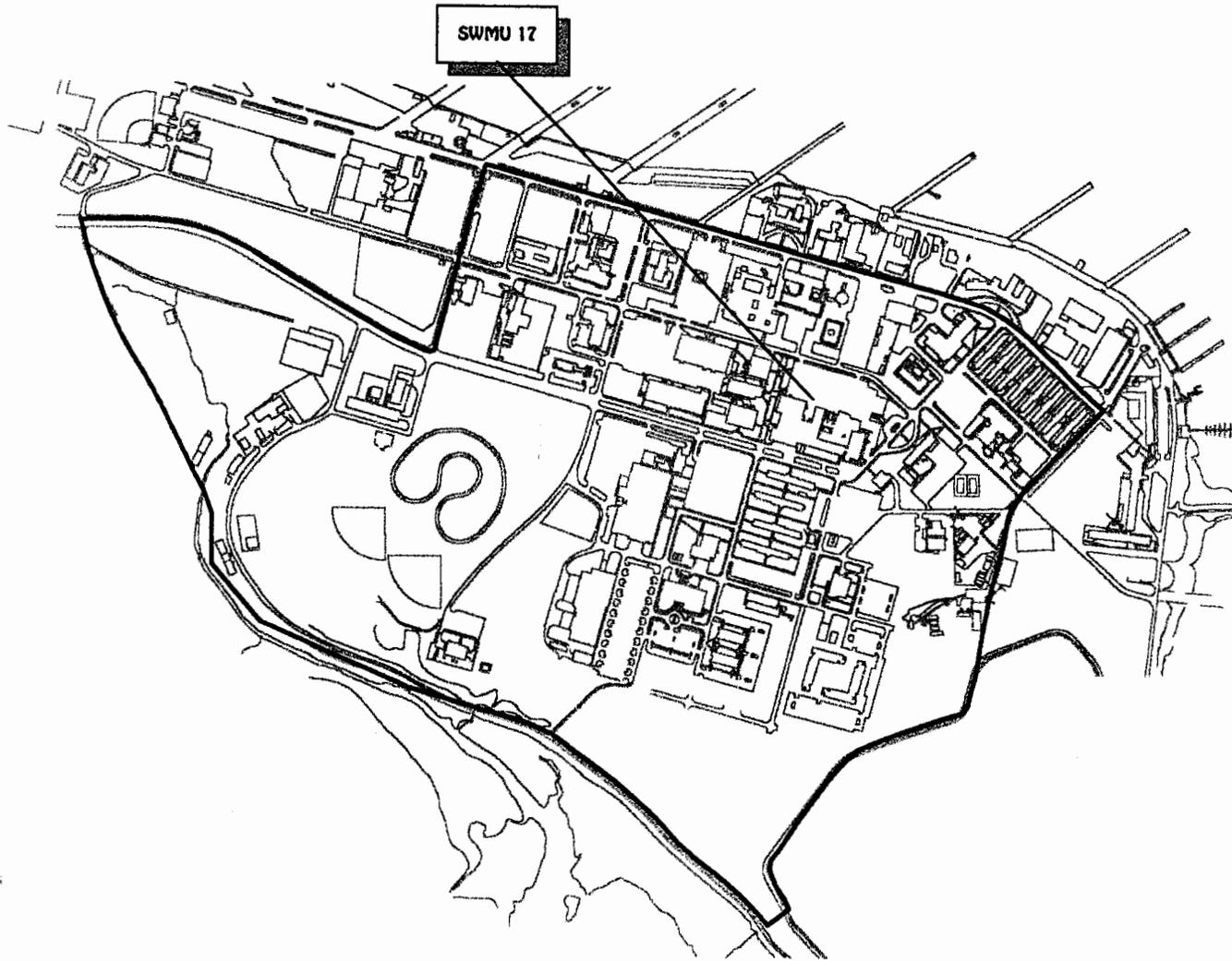
**Groundwater:**  
Aluminum  
BEHP  
2,3,7,8-TCDD Equivalents  
Heptachlor epoxide

- Soil Boring
- ⊕ Monitoring Well



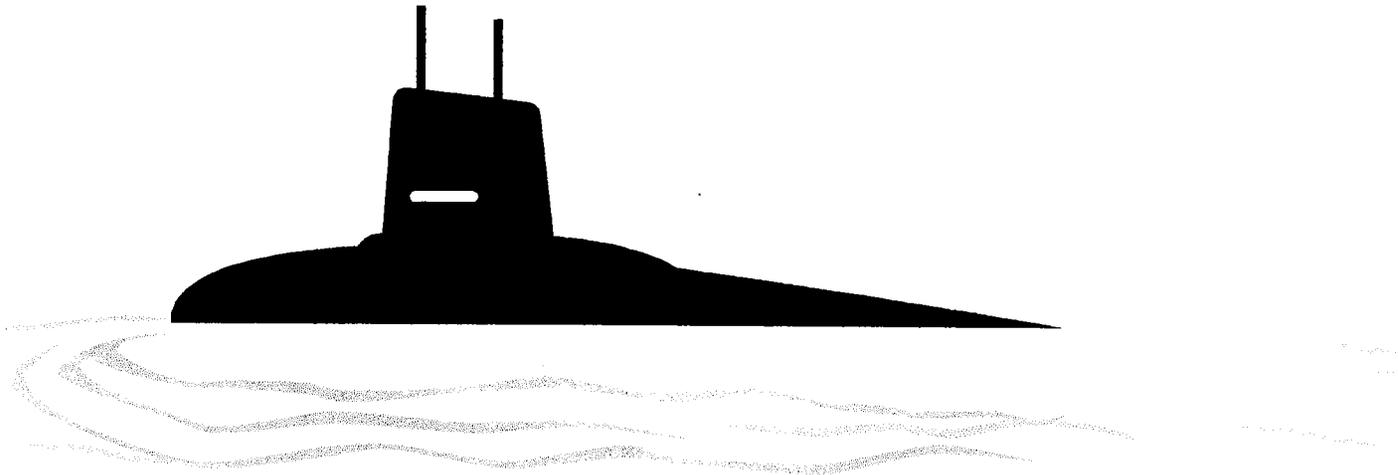
# Grouping 4 - Submarine Training Facility

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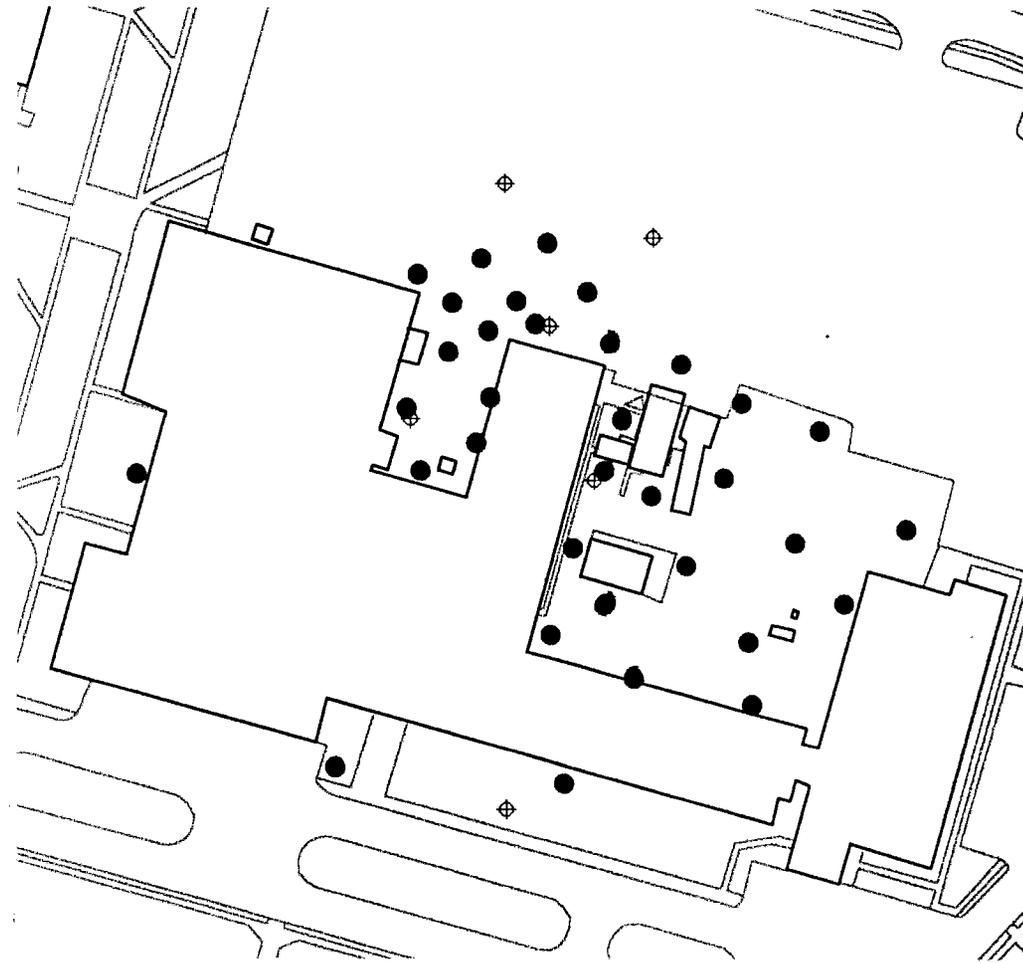
# Grouping 4 - Submarine Training Facility

---



| Site #  | Site Description | Samples Collected            |
|---------|------------------|------------------------------|
| SWMU 17 | Oil Spill Area   | Soil (65)<br>Groundwater (6) |

# Grouping 4 - SWMU 17



**Primary Contributors to Risk/Hazard**

**Soil:**  
Benzo(a)pyrene Equivalents  
Polychlorinated Biphenols (PCBs)

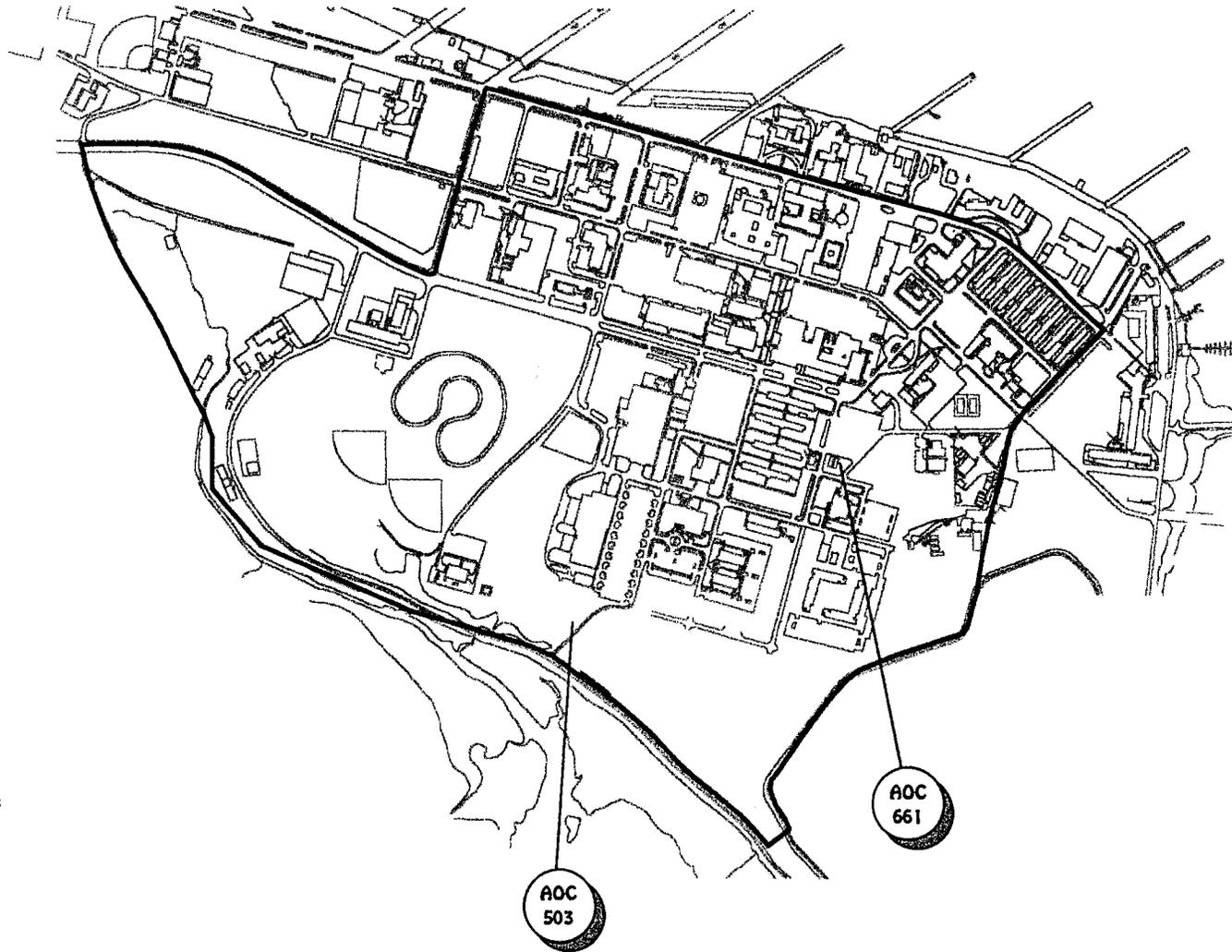
**Shallow Groundwater:**  
Benzidine  
Chlorobenzene  
1,4-Dichlorobenzene  
1,2,4-Trichlorobenzene

- Soil Boring
- ⊕ Monitoring Well



# Grouping 5 - Unexploded Ordnance (UXO)

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## Grouping 5 - Unexploded Ordnance (UXO)

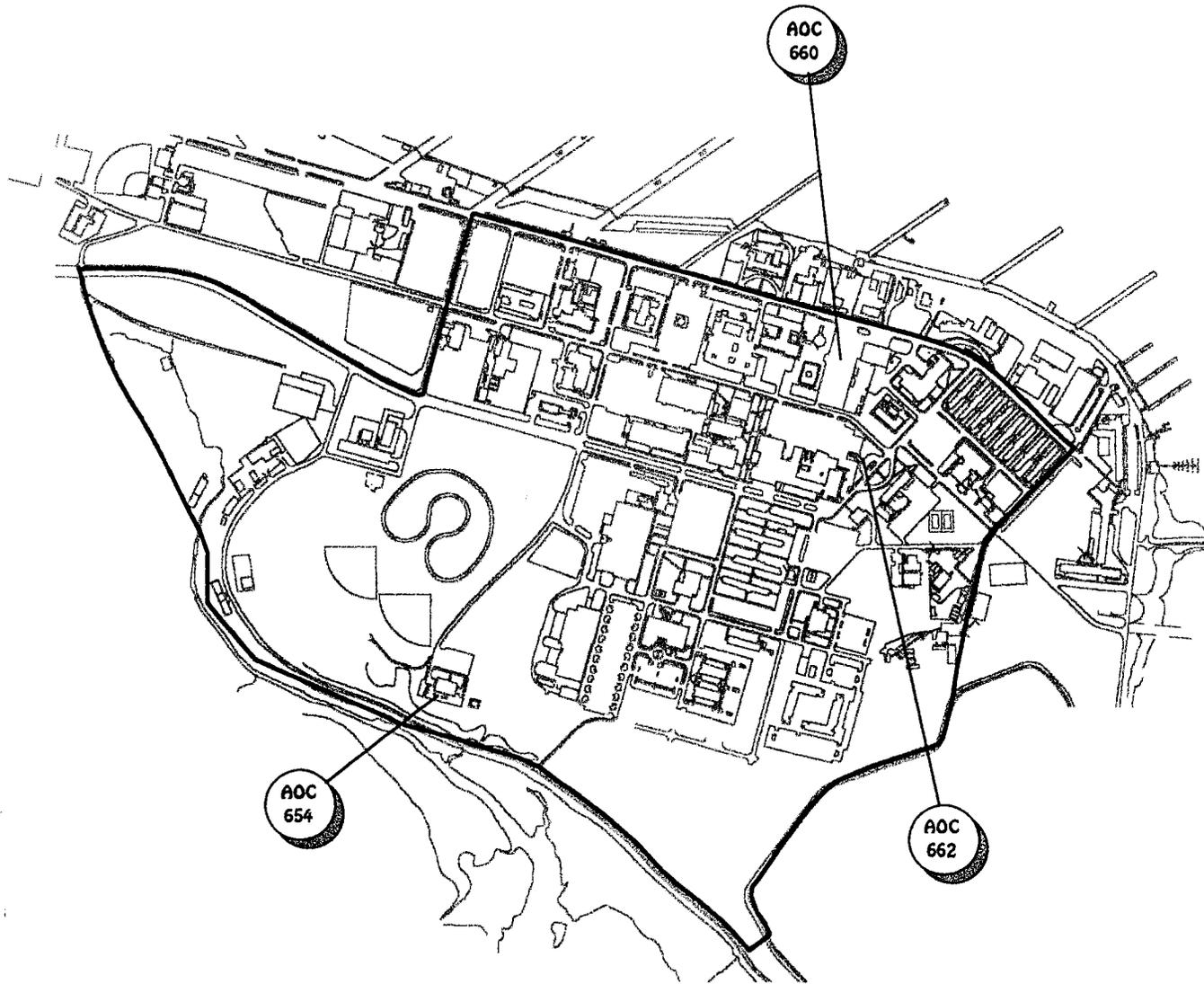
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| Site #  | Site Description            | Samples Collected |
|---------|-----------------------------|-------------------|
| AOC 503 | UXO Site South of Bldg. 665 | * None            |
| AOC 661 | Explosives Storage          | * None            |

\*Awaiting clearance by Navy Explosives Ordnance Disposal (EOD)

# Grouping 6 - Sites Recommended for No Further Action

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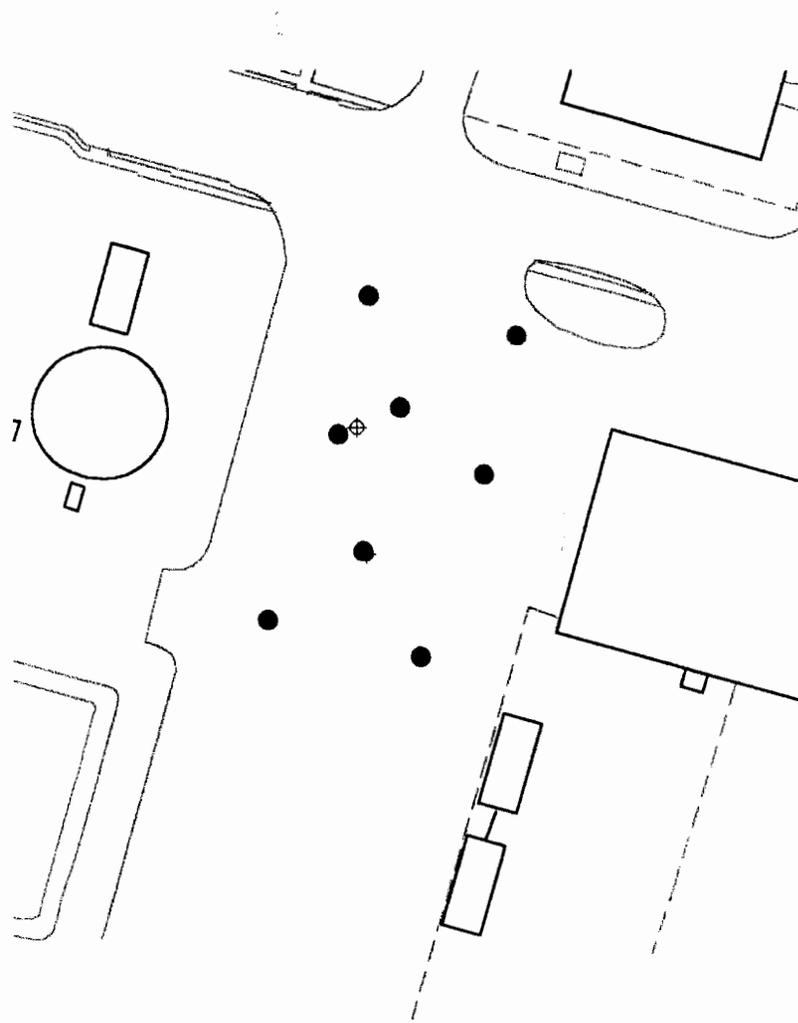


## **Grouping 6 - Sites Recommended for No Further Action**

---

| <b>Site #</b> | <b>Site Description</b>     | <b>Samples Collected</b>     |
|---------------|-----------------------------|------------------------------|
| AOC 654       | Septic Tank and Drain Field | Soil (11)                    |
| AOC 660       | Mosquito Control            | Soil (10)<br>Groundwater (2) |
| AOC 662       | Former Gasoline Station     | Soil (8)<br>Groundwater (2)  |

# Grouping 6 - AOC 660



**Primary Contributors to Risk/Hazard**

**Soil:**  
None

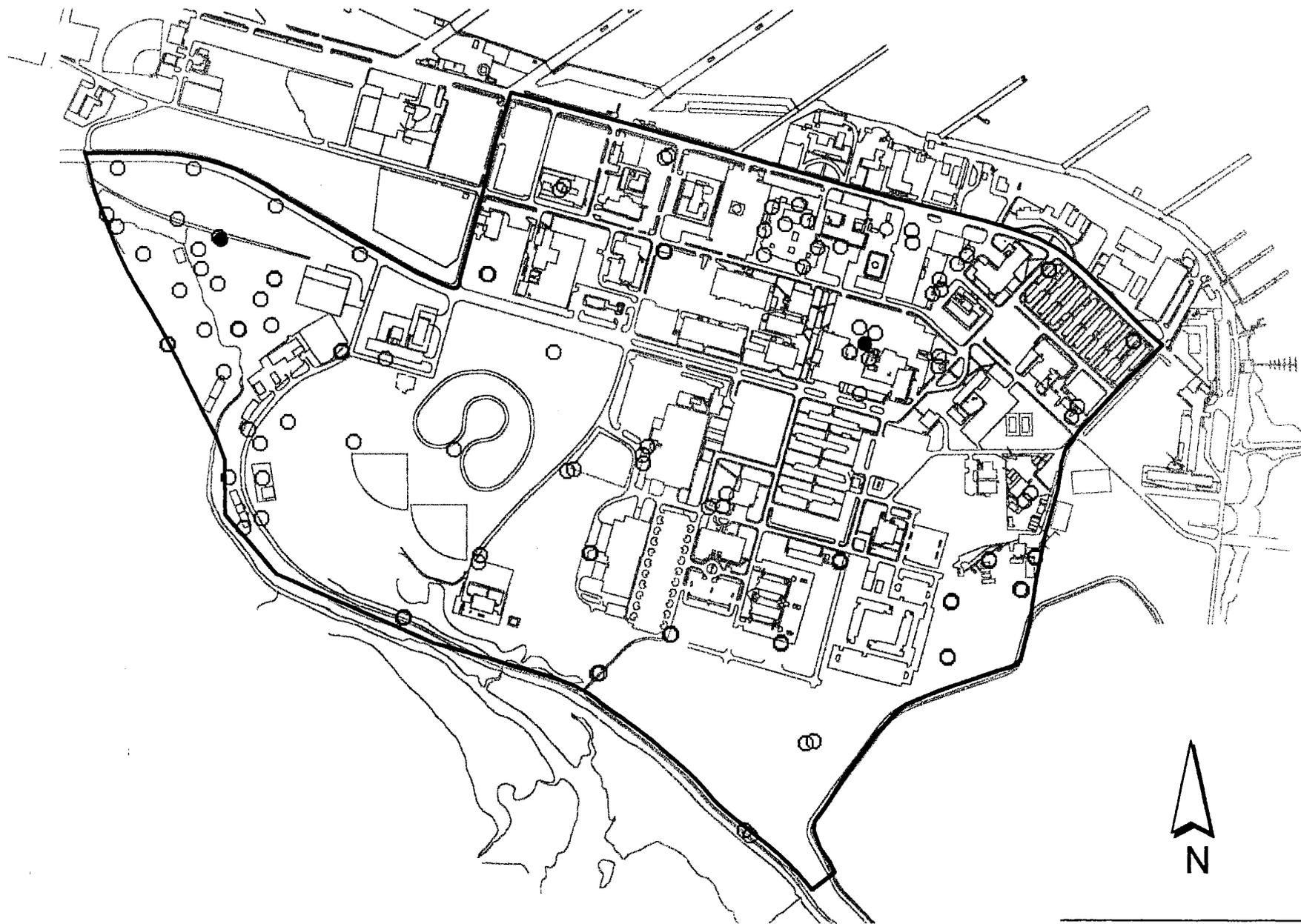
**Shallow Groundwater:**  
None

- Soil Boring
- ⊕ Monitoring Well



# Groundwater Monitoring Network

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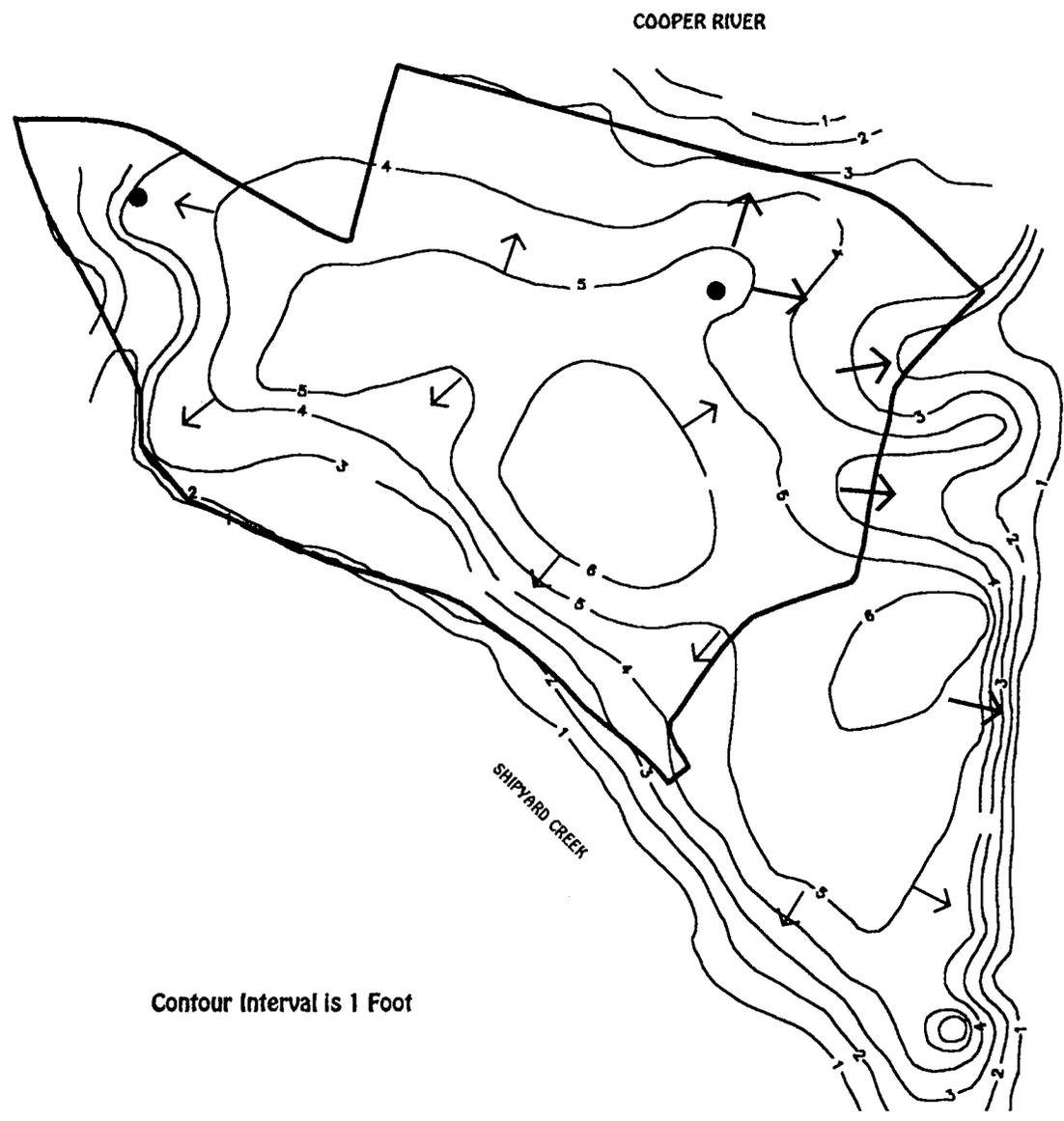
*Zone H Results - 2/13/96*

# Groundwater - COCs

---

| Area of Significant Impact | Site Description                                   | COCs Driving Risk   |
|----------------------------|--|---|
| SWMU 9                     | Closed Landfill                                    | Arsenic<br>Benzidine<br>Hexachlorobenzene<br>Vinyl Chloride                 |
| SWMU 17                    | Submarine Training Facility<br>(Site of Oil Spill) | Benzidine<br>Chlorobenzene<br>1,4-Dichlorobenzene<br>1,2,4-Trichlorobenzene |

# Zone H Groundwater Flow



Contour Interval is 1 Foot

COOPER RIVER



# Review of Risk

There is no such thing as **ZERO** risk.



## USE THIS SIMPLE PROCEDURE TO EVALUATE RISK

- STEP 1** . . . . . Hazard Identification  
*Collect samples. Analyze for type and concentration of contaminants.*
- STEP 2** . . . . . Exposure Assessment  
*Will people come into contact with the hazard? And if so, who? how? how often? and why?*
- STEP 3** . . . . . Toxicity Assessment  
*What is harmful about the chemical? Is it carcinogenic or non-carcinogenic?*
- STEP 4** . . . . . Risk Characterization  
*Determine if potential exposures are great enough to cause human health problems.*

## USE THIS SIMPLE PROCEDURE TO ASSESS RISK

- Question 1** . . . . Should cleanup be undertaken?
- Question 2** . . . . What should cleanup levels be?
- Question 3** . . . . What cleanup methods should, or can be used?

# Review of Risk (cont'd)

## Carcinogenic Risk

- ▲ Potential to cause cancer.
- ▲ Risk estimated as probability of getting cancer from exposure.
  - ✓ 1 in 10,000 risk =  $10^{-4}$  or 1E-4
  - ✓ 1 in a million (1,000,000) =  $10^{-6}$  or 1E-6

## Non-carcinogenic Risk (Toxicity)

- ▲ Health effects other than cancer.
- ▲ Risk is compared to a calculated value called a hazard index or hazard quotient.
  - ✓ 
$$\frac{\text{Intake}}{\text{Reference Dose}} = \text{Hazard Quotient (HQ)}$$
  - ✓ Sum of Hazard Quotients = Hazard Index (HI)

# Review of Risk (cont'd)

## Carcinogenic Risk

- ✓  $< 10^{-6}$  EPA/DHEC generally doesn't require action.
- ✓  $> 10^{-4}$  EPA/DHEC generally requires action.
- ✓ Risk Management: EPA/DHEC must consider many factors that may influence risk such as:
  - ▲ Who will be affected and how?
  - ▲ Future site use.
  - ▲ Existing features (e.g., buildings).
  - ▲ Probability of exposure.

## Non-carcinogenic Risk (Toxicity)

- ✓ A hazard index  $< 1$  indicates that no toxic effect is likely.
- ✓ A hazard index  $> 1$  indicates that a toxic effect is likely, typically in sensitive individuals.
- ✓ Example of a Conservative Assumption:
  - Chemical 1: HQ = 0.7 - lungs
  - Chemical 2: HQ = 0.2 - kidney
  - Chemical 3:  $\frac{HQ = 0.2}{HI = 1.1}$  - mucus membrane

(Although no organ specific HQ is  $> 1$ , assume an overall toxic effect is possible.)

Summary of Groundwater COCs  
 Naval Base Charleston Zone H  
 Charleston, South Carolina

| Chemical                              | SWMU<br>9 GROUP | SWMU<br>14 GROUP | SWMU<br>13 | SWMU<br>17 | AOC<br>663/<br>SWMU | AOC<br>667/<br>SWMU | SWMU<br>178 | AOC<br>653 | AOC<br>655 | AOC<br>656 | AOC<br>660 | AOC<br>662 | AOC<br>666 |
|---------------------------------------|-----------------|------------------|------------|------------|---------------------|---------------------|-------------|------------|------------|------------|------------|------------|------------|
|                                       |                 |                  |            |            | 136                 | 138                 |             |            |            |            |            |            |            |
| <b>Volatile Organic Compounds</b>     |                 |                  |            |            |                     |                     |             |            |            |            |            |            |            |
| 1,2,4-Trichlorobenzene                |                 |                  |            | 1,2        |                     |                     |             |            |            |            |            |            |            |
| 1,2-Dichlorobenzene                   |                 |                  |            | 1,2        |                     |                     |             |            |            |            |            |            |            |
| 1,2-Dichloroethane                    | 1,2             |                  |            |            |                     |                     |             |            |            |            |            |            |            |
| 1,2-Dichloroethene (total)            |                 |                  |            |            |                     |                     |             |            |            |            |            |            |            |
| 1,3-Dichlorobenzene                   |                 |                  |            | 1,2        |                     |                     |             |            |            |            |            |            |            |
| 1,4-Dichlorobenzene                   | 1,2             |                  |            | 1,2        |                     |                     |             |            |            |            |            |            |            |
| Benzene                               | 1,2             |                  |            |            | 2                   |                     |             |            |            |            |            |            |            |
| Bis(2-Chloroethyl)ether               | 1               |                  |            |            |                     |                     |             |            |            |            |            |            |            |
| Carbon disulfide                      | 1               |                  |            |            |                     |                     |             |            |            |            |            |            |            |
| Chlorobenzene                         | 1,2             |                  |            | 1,2        |                     |                     |             |            |            |            |            |            |            |
| Chloroform                            | 1               | 1                |            |            |                     |                     |             |            |            |            |            |            |            |
| Chloromethane                         |                 |                  |            |            |                     |                     |             |            |            |            |            |            | 1          |
| Ethylbenzene                          |                 |                  |            |            |                     |                     |             |            |            |            |            |            |            |
| Hexachlorobenzene                     | 2               |                  |            |            |                     |                     |             |            |            |            |            |            |            |
| Hexachlorobutadiene                   | 2               |                  |            |            |                     |                     |             |            |            |            |            |            |            |
| Hexachlorocyclopentadiene             | 1               |                  |            |            |                     |                     |             |            |            |            |            |            |            |
| Hexachloroethane                      | 2               |                  |            |            |                     |                     |             |            |            |            |            |            |            |
| Methylene chloride                    | 2               |                  |            |            |                     |                     |             |            |            |            |            |            |            |
| Trichloroethene                       |                 |                  |            |            |                     |                     |             |            |            |            |            |            |            |
| Vanadium                              |                 |                  |            |            |                     |                     |             |            |            |            |            |            |            |
| Vinyl chloride                        | 1,2             |                  |            |            |                     |                     |             |            |            |            |            |            | 1          |
| <b>Semivolatile Organic Compounds</b> |                 |                  |            |            |                     |                     |             |            |            |            |            |            |            |
| 2,4-Dimethylphenol                    | 1,2             |                  |            |            |                     |                     |             |            |            |            |            |            |            |
| 2-Methylphenol                        |                 |                  |            |            |                     |                     |             |            |            |            |            |            |            |
| 4-Methylphenol                        | 1,2             |                  |            |            |                     |                     |             |            |            |            |            |            |            |
| Azobenzene                            | 1               |                  |            |            |                     |                     |             |            |            |            |            |            |            |
| BEHP                                  |                 | 1                |            |            |                     |                     |             |            |            |            |            |            |            |
| Benzidine                             | 1               |                  |            | 1          |                     |                     |             |            |            |            |            |            |            |
| Pentachlorophenol                     | 1               |                  |            |            |                     |                     |             |            |            |            |            |            |            |
| <b>Chlorinated Pesticides</b>         |                 |                  |            |            |                     |                     |             |            |            |            |            |            |            |
| Chlordane                             |                 |                  |            |            |                     |                     |             |            | 1,2        |            |            |            |            |
| Heptachlor epoxide                    |                 | 1                |            |            |                     |                     |             |            |            |            |            |            |            |
| <b>Dioxins/Furans</b>                 |                 |                  |            |            |                     |                     |             |            |            |            |            |            |            |
| 2,3,7,8-TCDD equivalents              | 1               | 1                |            |            | 1                   |                     |             |            |            | 1          |            |            |            |
| <b>Metals</b>                         |                 |                  |            |            |                     |                     |             |            |            |            |            |            |            |
| Aluminum                              |                 | 1,2              |            |            |                     |                     |             |            |            |            |            |            |            |
| Antimony                              | 1               |                  |            |            |                     |                     |             |            |            |            |            |            |            |
| Arsenic                               | 2               |                  |            |            |                     |                     | 2           | 1,2        |            |            |            |            |            |
| Barium                                | 1,2             |                  |            |            |                     |                     |             |            |            |            |            |            |            |
| Beryllium                             | 2               |                  | 2          |            |                     |                     |             |            |            |            |            |            |            |
| Cadmium                               | 1,2             | 2                |            |            |                     |                     |             |            |            |            |            |            |            |
| Chromium (+III)                       |                 |                  |            | 2          |                     |                     |             |            |            |            |            |            |            |
| Copper                                |                 |                  |            |            |                     |                     |             |            |            |            |            |            |            |
| Lead                                  | 1               |                  |            |            |                     |                     |             |            |            |            |            |            |            |
| Manganese                             | 1,2             |                  |            |            |                     |                     |             |            |            |            |            |            |            |
| Thallium                              | 1               | 1                |            |            |                     |                     |             |            |            |            |            |            |            |
| Vanadium                              |                 | 1,2              |            |            |                     |                     |             |            |            |            |            |            |            |

NOTES:

1 indicates the COC was detected in first quarter samples.

2 indicates the COC was detected in second quarter samples.

**Summary of Surface Soil COCs**  
**Naval Base Charleston Zone H**  
**Charleston, South Carolina**

| Chemical                              | SWMU 9 GROUP |         |          |         |         |         | SWMU 14 GROUP |         |         |         | SWMU 13 | SWMU 17 | AOC 663/ | AOC 667/ | SWMU 159 | SWMU 178 | AOC 653 | AOC 655 | AOC 656 | AOC 659 | AOC 660 | AOC 662 | AOC 665 | AOC 666 |   |
|---------------------------------------|--------------|---------|----------|---------|---------|---------|---------------|---------|---------|---------|---------|---------|----------|----------|----------|----------|---------|---------|---------|---------|---------|---------|---------|---------|---|
|                                       | SWMU 19      | SWMU 20 | SWMU 121 | AOC 649 | AOC 650 | AOC 654 | SWMU 14       | SWMU 15 | AOC 670 | AOC 684 |         |         | SWMU 136 | SWMU 138 |          |          |         |         |         |         |         |         |         |         |   |
| <b>Volatile Organic Compounds</b>     |              |         |          |         |         |         |               |         |         |         |         |         |          |          |          |          |         |         |         |         |         |         |         |         |   |
| 1,1-Dichloroethene (soil to air)      | X            |         |          |         |         |         |               |         |         |         |         |         |          |          |          |          |         |         |         |         |         |         |         |         |   |
| 1,2,3-Trichloropropane (soil to air)  |              |         |          |         |         |         | X             |         |         |         |         |         |          |          |          |          |         |         |         |         |         |         |         |         |   |
| <b>Semivolatile Organic Compounds</b> |              |         |          |         |         |         |               |         |         |         |         |         |          |          |          |          |         |         |         |         |         |         |         |         |   |
| Benzo(a)pyrene Equiv.                 | X            | X       | X        | X       | X       |         | X             | X       | X       | X       |         | X       | X        | X        | X        | X        |         | X       | X       |         |         |         |         | X       | X |
| N-Nitroso-di-n-propylamine            |              |         |          |         |         |         |               |         |         |         |         |         |          |          |          |          |         |         |         |         |         |         |         |         | X |
| <b>Polychlorinated Biphenyls</b>      |              |         |          |         |         |         |               |         |         |         |         |         |          |          |          |          |         |         |         |         |         |         |         |         |   |
| Aroclor-1248                          |              |         | X        |         |         |         |               |         |         |         |         |         |          |          |          |          |         |         |         |         |         |         |         |         |   |
| Aroclor-1254                          | X            |         | X        |         | X       |         |               |         |         |         |         | X       |          |          |          |          | X       |         |         |         |         |         |         |         |   |
| Aroclor-1260                          | X            |         | X        |         |         |         |               |         |         |         | X       |         |          |          |          | X        |         |         |         |         |         |         |         |         | X |
| <b>Chlorinated Pesticides</b>         |              |         |          |         |         |         |               |         |         |         |         |         |          |          |          |          |         |         |         |         |         |         |         |         |   |
| 4,4'-DDE                              |              |         |          |         |         |         |               |         |         |         |         | X       |          |          |          |          |         |         |         |         |         |         |         |         |   |
| Dieldrin                              |              |         |          |         |         |         |               |         |         |         |         |         |          |          |          |          | X       |         |         |         |         |         |         |         |   |
| <b>Metals</b>                         |              |         |          |         |         |         |               |         |         |         |         |         |          |          |          |          |         |         |         |         |         |         |         |         |   |
| Aluminum                              |              |         |          |         |         |         | X             |         | X       |         |         | X       |          |          |          |          |         |         |         |         |         |         |         |         |   |
| Antimony                              | X            |         | X        |         |         |         |               |         | X       | X       |         |         |          |          |          |          |         |         |         |         |         |         |         |         |   |
| Arsenic                               | X            |         | X        |         |         |         | X             | X       | X       | X       |         | X       |          |          |          |          |         |         |         |         |         |         |         |         | X |
| Beryllium                             | X            |         | X        |         |         |         | X             |         | X       |         |         |         |          |          |          |          |         |         |         |         |         |         |         |         |   |
| Cadmium                               |              |         |          |         |         |         |               |         |         |         |         | X       |          |          |          |          |         |         |         |         |         |         |         |         |   |
| Chromium                              |              |         | X        |         |         |         | X             |         |         |         |         |         |          |          |          |          |         |         |         |         |         |         |         |         |   |
| Copper                                | X            |         | X        |         | X       |         |               |         |         |         |         |         |          |          |          |          |         |         |         |         |         |         |         |         |   |
| Lead                                  | X            |         | X        |         |         |         | X             |         | X       |         |         |         |          |          |          |          |         |         |         |         |         |         |         |         |   |
| Manganese                             |              |         | X        |         |         |         |               |         |         |         |         | X       |          |          |          |          |         |         | X       |         |         |         |         |         |   |
| Mercury                               |              |         | X        | X       |         |         |               |         |         |         |         |         |          |          |          |          |         |         |         |         |         |         |         |         |   |
| Nickel                                | X            |         | X        |         |         |         |               |         |         |         |         |         |          |          |          |          |         |         |         |         |         |         |         |         |   |
| Thallium                              |              |         | X        |         |         |         |               |         | X       | X       |         |         |          |          |          |          |         |         |         |         |         |         |         |         |   |
| Vanadium                              |              |         | X        |         |         |         | X             |         |         |         |         | X       |          |          |          |          |         |         |         |         |         |         |         |         | X |
| Zinc                                  | X            |         | X        |         |         |         |               |         |         |         |         |         |          |          |          |          |         |         |         |         |         |         |         |         |   |
| <b>General Petroleum Products</b>     |              |         |          |         |         |         |               |         |         |         |         |         |          |          |          |          |         |         |         |         |         |         |         |         |   |
| Total Petroleum HC                    | Y            |         | Y        | Y       | Y       |         | Y             | Y       | Y       | Y       | Y       | Y       | Y        | Y        | Y        | Y        | Y       | Y       | Y       | Y       |         |         | Y       | Y       |   |

**NOTES:**

X indicates the chemical was identified as a COC in surface soil.

Y indicates petroleum hydrocarbons were detected in soil at concentrations exceeding 100 mg/kg.

**Summary of Risk and Hazard Projections  
Naval Base Charleston Zone H  
Charleston, South Carolina**

| Site                 | Matrix              | ILCR   |           |        | Hazard Index |     | TPH | Primary Contributors to Risk/Hazard                   |
|----------------------|---------------------|--------|-----------|--------|--------------|-----|-----|---|
|                      |                     | < 1E-6 | 1E-6/1E-4 | > 1E-4 | < 1          | > 1 |     |   |
| <b>SWMU 9 GROUP</b>  |                     |        |           |        |              |     |     |   |
| SWMU 19              | Soil                |        | R,W       |        | W            | R   | YES | PCBs, Arsenic, BaP, Copper                            |
| SWMU 20              | Soil                |        | R,W       |        | R,W          |     |     | BaP   |
| SWMU 121             | Soil                |        | W         | R      | W            | R   | YES | PCBs, Arsenic, BaP, Beryllium, Copper                 |
| AOC 649              | Soil                | W      | R         |        | R,W          |     | YES | BaP   |
| AOC 650              | Soil                |        | R,W       |        | R,W          |     | YES | BaP, PCBs   |
| AOC 654              | Soil                | R,W    |           |        | R,W          |     |     | None  |
| SWMU 9               | Shallow Groundwater |        | R,W       |        |              | R,W |     | Benzidine, Arsenic, Vinyl chloride, Hexachlorobenzene |
| SWMU 9               | Deep Groundwater    |        | R,W       |        |              | R,W |     | Thallium(1), Manganese, Chloroform(1)                 |
| <b>SWMU 14 GROUP</b> |                     |        |           |        |              |     |     |   |
| SWMU 14              | Soil                |        | R,W       |        | W            | R   | YES | Arsenic, BaP, Beryllium                               |
| SWMU 15              | Soil                |        | W         | R      | W            | R   |     | Arsenic, BaP  |
| AOC 670              | Soil                |        | R,W       |        | W            | R   | YES | Arsenic, BaP  |
| AOC 684              | Soil                |        | R,W       |        | R,W          |     | YES | Arsenic, BaP, Beryllium                               |
| SWMU 14              | Shallow Groundwater |        | R,W       |        | W            | R   |     | BEHP, TCDD, Aluminum                                  |
| SWMU 14              | Deep Groundwater    |        | W         | R      |              | R,W |     | Heptachlor epoxide, TCDD, BEHP                        |
| SWMU 13              | Soil                | W      | R         |        | R,W          |     | YES | BaP   |
|                      | Shallow Groundwater |        | R,W       |        | R,W          |     |     | Beryllium   |
| SWMU 17              | Soil                |        | W         | R      | R,W          |     | YES | PCBs, BaP   |
|                      | Shallow Groundwater |        |           | R,W    |              | R,W |     | Benzidine, Chlorobenzene, 1,4-DCB, 1,2,4-TCB          |
| SWMU 159             | Soil                | R,W    |           |        | R,W          |     | YES | None  |
|                      | Sediment            | R,W    |           |        | R,W          |     |     | None  |
| SWMU 178             | Soil                | W      | R         |        | R,W          |     | YES | BaP   |
|                      | Shallow Groundwater | R,W    |           |        | R,W          |     |     | None  |
| AOC 653              | Soil                |        | R,W       |        | R,W          |     | YES | BaP   |
|                      | Shallow Groundwater |        |           | R,W    |              | R,W |     | Arsenic   |
| AOC 655              | Soil                |        | R,W       |        | R,W          |     | YES | PCBs, BaP, Dieldrin                                   |
|                      | Shallow Groundwater |        |           | R,W    |              | R,W |     | Arsenic, Chlordane                                    |
| AOC 656              | Soil                | W      | R         |        | R,W          |     | YES | BaP   |
|                      | Shallow Groundwater |        | R,W       |        | R,W          |     |     | TCDD  |
| AOC 659              | Soil                | R,W    |           |        | R,W          |     | YES | None  |
| AOC 660              | Soil                | R,W    |           |        | R,W          |     |     | None  |
|                      | Shallow Groundwater | R,W    |           |        | R,W          |     |     | None  |
| AOC 662              | Soil                | R,W    |           |        | R,W          |     |     | None  |
|                      | Shallow Groundwater | R,W    |           |        | R,W          |     |     | None  |
| AOC 663/SWMU 136     | Soil                |        | W         | R      | W            | R   | YES | Arsenic, BaP, PCBs, 4,4'-DDE, Aluminum                |
|                      | Shallow Groundwater |        | W         | R      |              | R,W |     | TCDD  |
| AOC 665              | Soil                | W      | R         |        |              |     | YES | BaP   |
| AOC 666              | Soil                |        | W         | R      | W            | R   | YES | Arsenic, BaP, PCBs, Mercury, Vanadium, NNPA           |
|                      | Shallow Groundwater |        | R,W       |        | R,W          |     |     | Vinyl chloride, Chloromethane                         |
| AOC 667/SWMU 138     | Soil                | R,W    |           |        | R,W          |     | YES | BaP   |
|                      | Shallow Groundwater | R,W    |           |        | R,W          |     |     | None  |

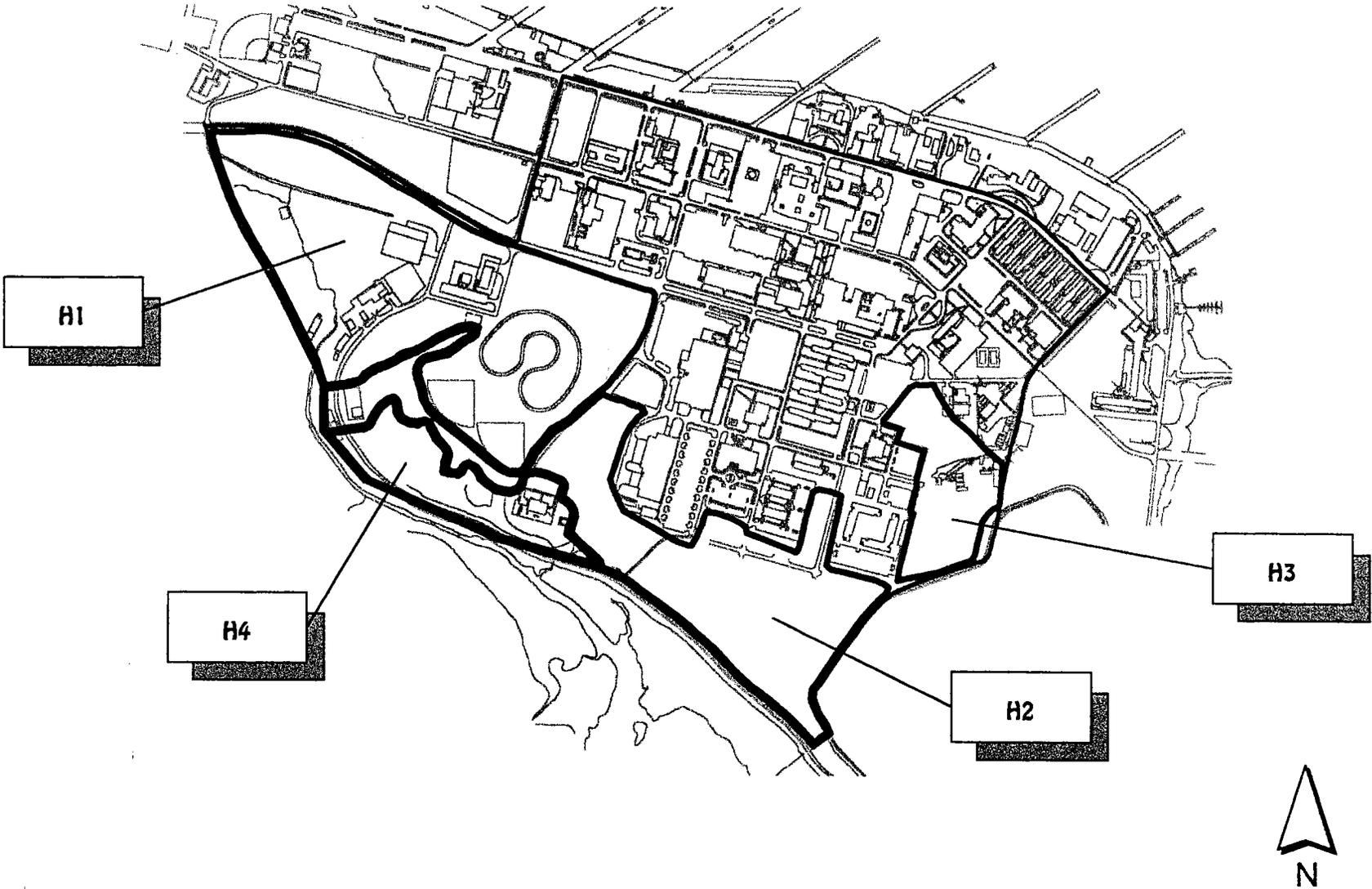
**NOTES:**

R indicates the resident projections fell within the corresponding risk/hazard range.

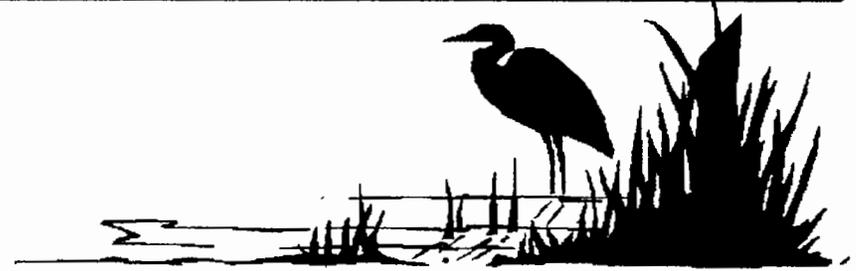
W indicates the site worker projections fell within the corresponding risk/hazard range.

(1) indicates that the chemical was detected exclusively in first quarter groundwater samples.

# Ecological Impact Areas

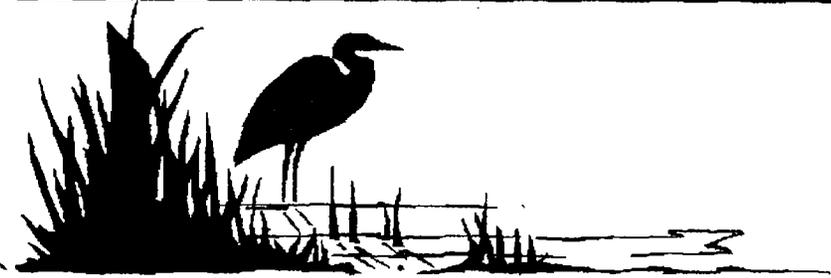


# Ecological Impacts



| Ecological Zone | Description                                      | Sites Contributing to Impact          |
|-----------------|--|---------------------------------------|
| H-1             | Terrestrial<br>Grass fields with low shrub cover | SWMUs 9, 19, 20<br>AOCs 649, 650, 651 |
| H-2             | Terrestrial<br>Densely forested                  | SWMU 121                              |
| H-3             | Terrestrial<br>Grass fields bordered by shrubs   | SWMUs 14, 15<br>AOCs 670, 684         |
| H-4             | Aquatic<br>Marshy area north of Least Tern Lane  | SWMUs 9, 20                           |

# Ecological Impacts (cont'd)



| Species                                | Impacted SubZones | Chemicals Contributing to Impact    |
|--|-------------------|-------------------------------------|
| Terrestrial Wildlife<br>(Rabbit/Robin) | H-2               | Metals                              |
| Aquatic Wildlife                       | H-4               | Metals/Organics<br>(Sediment)       |
| Invertebrates                          | H-1<br>H-2<br>H-3 | Organics<br>Metals<br>Lead/Organics |
| Vegetation<br>(Seedlings)              | H-2               | Lead/Zinc                           |

# Recommendations

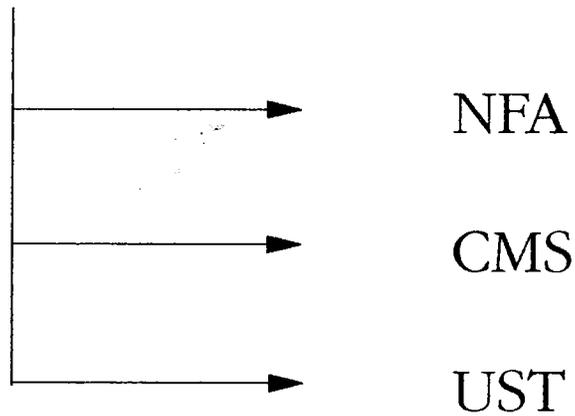
| Site #             | Site Description                               | NFA | Further Action                |     |
|--------------------|--|-----|-------------------------------|-----|
|                    |  |     | TPH                           | BRA |
| SWMU 9             | Closed Landfill                                |     |                               | ✓   |
| SWMU 13            | Current Fire Fighter Training Area             |     | ✓                             | ✓   |
| SWMU 14            | Chemical Disposal Area                         |     | ✓                             | ✓   |
| SWMU 17            | Oil Spill Area                                 |     | ✓                             | ✓   |
| SWMU 19            | Solid Waste Transfer Station                   |     | ✓                             | ✓   |
| SWMU 20            | Waste Disposal Area                            |     |                               | ✓   |
| SWMU 121           | Satellite Accumulation Area                    |     | ✓                             | ✓   |
| SWMU 136           | Satellite Accumulation Area                    |     | ✓                             | ✓   |
| SWMU 138           | Satellite Accumulation Area                    |     | ✓                             |     |
| SWMU 159           | Satellite Accumulation Area                    |     | ✓                             | ✓   |
| SWMU 178           | Apparent Transformer Fire Site                 |     | ✓                             | ✓   |
| AOC 649            | Storage Area                                   |     | ✓                             | ✓   |
| AOC 650            | Storage Area                                   |     | ✓                             | ✓   |
| AOC 651            | Storage Area                                   |     | ✓                             | ✓   |
| AOC 653            | Hobby Shop                                     |     | ✓                             | ✓   |
| AOC 654            | Septic Tank and Drain Field                    | ✓   |                               |     |
| AOC 655            | Oil Spill Area                                 |     | ✓                             | ✓   |
| AOC 656            | Petroleum Spill                                |     | ✓                             | ✓   |
| AOC 659            | Diesel Storage                                 |     | ✓                             |     |
| AOC 660            | Mosquito Control                               | ✓   |                               |     |
| AOC 662            | Former Gasoline Station                        | ✓   |                               |     |
| AOC 663            | Gas/Diesel Pumping Station                     |     | ✓                             | ✓   |
| AOC 665            | Pyrotechnic Storage                            |     | ✓                             | ✓   |
| AOC 666            | Fuel Storage                                   |     | ✓                             | ✓   |
| AOC 667            | Vehicle Maintenance Area                       |     | ✓                             |     |
| AOC 503<br>AOC 661 | Unexploded Ordnance Site<br>Explosives Storage |     | To be addressed by Navy's EOD |     |

► SWMU 14 includes SWMU 15 and AOCs 670 and 684

# Next Steps

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- ▲ Regulatory Review
- ▲ Public Comment
- ▲ Permit Revision



DATE: 13 Feb 96

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Jane Settle  
Bob Veronee

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