Naval Air Station South Weymouth
South Weymouth, MA

Environmental Baseline Survey for Transfer (EBST)
Nomans Land Island

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Introduction

This EBST is based upon a Phase I report which was finalized in November 1996. The findings presented in the November 1996 survey have been updated where applicable to reflect additional information and actions concerning the current conditions at Nomans Land Island. This March 1998 update provides the environmental status of the island for transfer to the Department of the Interior (DOI)/US Fish and Wildlife service (USFWS) by documenting all known conditions and remaining environmental concerns. The Navy will continue to address the remaining environmental concerns and the EBS will be further updated at the conclusion of the Navy's environmental actions.

Findings are presented in the order of the predominant features on the island according to information from the visual surveys, information from interviews, document reviews, and review of aerial photographs. A brief summary of the environmental condition, including areas of concern, is provided at the beginning of the Description of Findings section. A full discussion of the areas of environmental concern is provided in the Review Item Summary section.

This document supercedes all previous versions of the EBS for Nomans Land Island.

Description and Activity Summary

Nomans Land Island is an island located 2.7 miles southwest of Martha's Vineyard, Massachusetts. (Figure 1). The U.S. Government has used the island as a target range to train military pilots since 1943. No civilians have lived on the island since 1943. The military has designated the island as Restricted Area R-4105 (Commander Fleet Air Quonset, 1972). Because the island was used as an active military target range, civilians were not permitted to visit the island without a military escort. Despite warnings posted on shore and nautical charts, trespassing is known to occur on the island.

The U.S. Navy began leasing the island in November 1943 for use as a practice bombing site. At the conclusion of World War II, the island contained large numbers of unexploded ordnance (UXO) and craters. The Navy retained control of the island and continued training exercises substituting inert dummy ordnance for the live ordnance used during the war. The Navy purchased the island from the Crane Estate in 1952. Use of the island for target practice ceased in the summer of 1996.

The Fish and Wildlife Service and environmental groups requested that the military protect the island as a key nesting area for migratory birds in the late 1960s. In 1970, the Navy and Department of Interior (DOI) agreed to protect wildlife on the island. In 1975, the DOI signed a Joint Management Agreement of Nomans Land Island with the Department of the Navy. The agreement included continued military use of the island and management of portions of the island for migratory birds and other wildlife (TAMS, 1990). As a result of this agreement, the Navy designated the eastern third of the island as a wildlife sanctuary that was managed by the Department of the Interior's Fish and Wildlife Service. Figure 2 shows the area that was protected as a wildlife refuge by the 1975 Joint Management Agreement. There has been no military use of the island since the cessation of target actives in 1996 which has created a de facto wildlife refuge over the entire island.

The island is approximately 628 acres. East to west, the island is 1.6 miles long and slightly more than 1.0 miles wide, north to south. Two large freshwater ponds and several smaller ponds dot the island (Figure 2). Ben's Pond lies just west of the center of the island and is approximately 1,000 feet east to west and about 500 feet north to south. Rainbow Pond lies on the east end of the island and is approximately 625 feet east to west. Two arms of the pond extend to the north and northwest. The island is heavily vegetated and dominated by rolling hills. Fifty-foot high cliffs rise along the eastern shoreline and continue along the entire southern portion of the island. The highest point on the island, 110 feet above sea level, is on the southern half of the island, near the island's north-south axis.

Large placards along the shoreline warn boaters to stay clear of the island because of its use as a military target range. The remains of a wooden pier jut into the small cove on the northern shore. The remains of two concrete block

buildings and another concrete pad (building foundation) sit on a small hill overlooking the pier. It is presumed these structures were associated with activities of the Navy Construction Battalion (Seabees) to maintain the military target facilities on the island during World War II (1940-1950) (Parson, 1991). Other signs of the Navy's use noted during the October 1995 site visit include, wooden poles across the middle of the island, target buoys on the western half of the island, a jet target (fuselage) on the south side of the island, evidence of a landing strip and trails, plywood silhouette targets and numerous small and large practice ordnance rounds. Several low stone walls on the northern side of the island and a wood and stone cistern near the center of the island provide evidence of habitation on the island before 1943.

Several branches of the active and reserve military forces formerly used the island as a practice target range. Air operations at the Naval Air Station, South Weymouth (NAS SOWEY) coordinated the daily use of the island. All target activities ceased in September 1996. It was reported that the practice ordnance used contained a spotting device that discharged a colored smoke plume that provided pilots with an indication of the precision of their targeting efforts. These spotting devices occasionally ignited brush fires. Tracer bullets and solid rocket propellant used on some practice rounds also caused brush fires. Military personnel also used the fuselage of a former A-4 fighter jet (minus working systems and fluids) located on the western end of the former airstrip as a target. The Navy Seals also used the island for practice maneuvers. Site visits in 1996 and 1997 noted that the A-4 aircraft and buoy targets had been removed from the island. A sweep of ordnance occurred in 1997, which removed, or rendered safe all UXO present above ground on Nomans Land Island.

Description of Findings

Stone & Webster and Navy personnel conducted a site survey on two days: October 24 and 25, 1995. At the time of the October 1995 site visit, the island had UXO present on the surface of the island. The UXO was in many cases obscured by the heavy vegetation present on the island. The survey team walked as much of the island as was physically accessible and deemed safe to access. In addition, the Army helicopter that transported the team circled the island several times at a low altitude. This aerial survey provided an opportunity to inspect areas that were not possible to access from the ground due to potential UXO concerns and heavy vegetation. Use of ground vehicles on the island was prohibited due to the potential presence of subsurface UXO.

The visual survey conducted from the ground and helicopter overflight, provided the most information about the environmental condition of the island. This was supplemented with information from subsequent Navy site visits (Barney, 1997). The NAS SOWEY environmental files and public works files contained historical newspaper clippings and government documents. These clippings and documents provided general information on the past use of the island, but provided no records of hazardous materials use or storage on the island. Interviews provided some background to the island's past and current uses. Since the only aerial photos available were from 1982, historical Navy photos provided only limited information to the EBS. However, newspaper photographs supplemented this resource. Navy personnel have revisited the island numerous times since October 1995. Observations from these visits have been compiled and this information was used to update the findings and observations of the original EBS report of November 1996 . Field notes and reports from activities taken since the October 1995 EBS site visit are available in the CSO office (Barney, 1997).

Information from Visual Surveys

Overview

On inspection in October 1995, the island's appearance was consistent with its reported use as a practice ordnance target range. Except for the eastern and northeastern portions of the island protected under the DOI and Navy Joint Agreement (Figure 2), there were numerous practice ordnance rounds, ordnance casing fins, and small arms ammunition casings or craters on the island. Most of the ordnance discovered during the two-day site survey was believed to be inert, although the blue stripe signifying a dummy round may have weathered off many of the visible ordnance casings. (Photograph 1) Evidence of small arms ammunition use and evidence of past live bombing craters were observed. All of the craters found on the island were completely overgrown and in some cases were filled with soil, indicating that they were very old. This is expected since live bombing of the island was stopped in the 1950s.

Crater sizes ranged from approximately three feet in diameter and three feet deep, to ten or more feet in diameter and five feet deep. (Photograph 2)

A Fish and Wildlife approved prescribed burn was conducted in 1997 by the Navy to facilitate a safety sweep of UXO items on the island. The sweep that was completed in April 1997 removed or rendered safe all UXO items found on the surface of the island at that time. The Department of Defense Explosives Safety Board (DDESB) approved the workplan that specified the criteria for addressing UXO safety. The workplan was created specifically to address future use of the island as an uninhabited wildlife habitat. All ordnance items noted from the October 1995 site visit have been addressed by the UXO sweep. It is noted that future frost heaves, erosion or other surface disturbances can expose subsurface ordnance that may need to be addressed in the future.

The October 1995 site visit noted that wildlife on the island appeared to be flourishing. The survey team found a fox den, and other animal tracks on the island (Coburn, 1995). Vegetation over much of the island appears healthy and thriving. (Photograph 3, Photograph 4) Site visits in 1996 and 1997 confirm the observations of wildlife noted from the October 1995 site visit. Field notes and trip reports are on file with the Caretaker Site Office at NAS South Weymouth from past U.S. Fish and Wildlife Service visits to the island to survey the wildlife (Barney ,1997).

Ordnance Debris

During the October 1995 site visit, evidence of the practice ordnance activities was apparent throughout the island. The survey team could not determine the full extent of practice ordnance and related debris because of the thick vegetation that covered portions of the island. However, it appeared that inert ordnance and related debris are prevalent throughout the western two-thirds of the island. The eastern third of the island, which was protected as a wildlife refuge, appeared to be free of ordnance and debris. Newspaper articles and military reports have reported that practice ordnance has been dropped in the No Fire Zone (Iseman, 1985), see Figure 2. The EBS investigation found one officially documented incident of practice ordnance being accidentally dropped in the USFWS managed zone. The newspaper article reported that other incidents had occurred, but provided no dates. These incidents seem to have occurred infrequently since the eastern third of the island was noted to be relatively free of debris.
According to newspaper reports, the Navy Seabees cleared the target area twice a year, while the island was used for target practice. The clearance consisted of cutting back grass and moving practice ordnance to a collection area (Parson, 1991). NAS SOWEY Public Works personnel indicated that the most recent sweep prior to the DDESB approved sweep was conducted during the summer of 1995. The October 1995 survey team did see a number of ordnance items collected in netting near the old landing strip. (Photograph 5) This inert ordnance was observed to still be present in the 1996 and 1997 site visits. A controlled burn of vegetation on the entire island in April 1997 allowed better visualization and access to formerly inaccessible areas to perform a UXO sweep of the island.

Before the ban on live bombing in the early 1950's, the military used various sizes of live ordnance which created craters ranging in size from approximately three feet in diameter to more than ten feet in diameter. The survey of the island on 24-25 October 1995 and subsequent visits in 1996 and 1997 have revealed no signs of recent "live" bombing.

As noted in the overview a DDESB approved sweep of UXO materials was accomplished in April 1997. Ordnance debris on the surface of the island, remaining as part of the inactive range, consists of inerted ordnance and metal fragments.

Ponds

The October 1995 site visit noted that the water in the two large ponds on the island, Rainbow Pond and Ben's Pond, appeared to be cloudy as noted in Photograph 6. In addition, practice ordnance and fins were visible in the ponds and along the shore. (Photograph 7) Previous site visits have reported that the water was "clear" (Lovewell, 1987). The use of the term "clear" is believed to refer to the clarity of the water, not coloration. The vegetation in and around the ponds and the wildlife appeared healthy.

Several of the smaller ponds on the island also were observed to contain evidence of ordnance. None of the smaller ponds appeared to contain cloudy water. The pond south of the old airstrip was dry during the October 1995 site visit. The survey team was able to walk across a dark caked mud pond floor. Several inert small ordnance rounds were found on the dry pond bed (Photograph 8).

The UXO sweep in April 1997 did not address the issue of ordnance in the ponds. Ordnance located on the dry pond beds was inerted or removed by the UXO sweep. Conditions noted during site visits in 1996 and 1997 were not significantly different from those noted during the October 1995 site visit.

Beaches

As noted in October 1995 the beaches were strewn with typical shore debris, and some ordnance. It is reported that the UXO sweep conducted in April 1997 removed some live ammunition cartridges from the beach area. Site visits in 1996 and 1997 documented debris (assumed to be litter from boaters and other islands) typically washing on and off the shore of the island (Photograph 9).

Structures

As reported from the October 1995 site visit, several deteriorating buildings are located on the island. The remains of two concrete block buildings and a concrete foundation are located on the north side of the island. (Photograph 10, Photograph 11) The concrete foundation appears to have been the floor of a third building. Heavy vegetation surrounds the building remnants, which made it difficult to get near one of the buildings. The building remnants include several long rusting pipes, and what looks like an oil heater and a pump assembly. (Photograph 12) The October 1995 survey team found no other signs of fuel or petroleum product usage.

The remains of a pier lie in a small cove north of the buildings. (Photograph 13) The pier's piles were just visible above the water. A rusting 4-inch metal pipe exits the shore bank near the pier. (Photograph 14) The former use of the pipeline is unknown. It appears to have run between the pier and the block buildings.

The October 1995 site visit identified that four large, rusting navigation buoys were present on the western half of the island. On the south side of the island, at the end of the old landing strip, a wingless fuselage shell of a former A-4 fighter jet was present. (Photograph 15, Photograph 16) There was no evidence of release from the fuselage. The four buoys were spaced approximately 300 yards apart along the jeep trail. Pilots had once used these items as targets. Site visits in 1997 have noted that the navigation buoys and A-4 jet have been since removed from the island.

Several wooden poles run across the center of the island. The Navy personnel that accompanied the survey team said that the poles were used for a communication system that was set up when the Navy had Quonset huts on the island during World War II. The survey team noted wires on the poles and cables on the ground between the poles. No transformers were noted on or around the area of the poles. (Foti, 1995).

During a site visit after the April 1997 prescribed burn , an underground storage tank (UST) was discovered on the island. It is not sure what the past use of the UST was. The vegetation previously on the island prevented visualization of the tank. The tank location is noted in Figure 2. It is believed that this UST was associated with the piping and mechanical equipment shown in Photographs 10 and 11. The UST was opened and examined during the site visit. No liquids were noted during the inspection, the tank contents consisted of sediments on the bottom of the tank. (Barney, 1997)

Vegetation Observations

The October 1995 site visit noted several areas of "stressed" vegetation. The use of the term "stressed" in describing areas of ongoing operations is somewhat misleading. These areas noted were of vegetation impacted by activities related to the target practice missions taking place at that time on the island. Such activities were associated with normal target activities on the island, and the impacted vegetation identified as "stressed" were burnt grasses from flares or other incendiary sources and flattened grasses from materials placed on the ground.

The November 1996 report identified a large area as "stressed" due to a fire which had burnt a large area on the southern half of the island near the A-4 target. The burnt area covered approximately 60,000 square feet, about the size of two football fields. This "stressed" area, and others mentioned were attributed to tracer ammunition, flares and other spotting devices associated with the target practice, capable of igniting dry flammable materials such as grass around the target areas.

As noted during the site visit in October 1995, tufts of green grass had sprouted in the areas observed to have been burned. Photograph 17, Photograph 18, and Photograph 19 all show examples of the nature and extent of the vegetation on the island.

Observations from subsequent site visits in 1996 and 1997 have shown that these impacts were of a temporary nature, and related to the target operations and Navy Seal drills on the island. A prescribed burn in April 1997, which was conducted by the Navy in coordination with the Fish and Wildlife Service, burned a majority of the vegetation on the island to facilitate the ordnance surface sweep. Since the prescribed burn, vegetation has been observed to be growing on the island.

Information from Document Survey

The document investigation of the Phase I EBS conducted during June 1996 found few federal, state or local documents that specifically addressed the environmental condition of the island since its use was established as an uninhabited, restricted access target range in the 1940's. Newspaper articles and government memorandums dating from the 1930s through the 1990s provided the most information on the past uses of the island. According to these documents, the Navy stationed Seabees on the island during World War II in eleven Quonset huts. The Seabees maintained the targets and spotted the accuracy of the practice ordnance drops (Iseman, 1985). The Seabees used the two concrete block structures on the north side of the island. One of the buildings contained large bay doors, apparently to store targets. The other structure included a two-story observation tower.

Table 1, was created from data in a 3 April 1987 press release (Kenyon report, 1987) by the NAS South Weymouth Public Affairs Office (PAO) which listed the practice ordnance and ammunition that the Navy had used during target practice at the Nomans Land Island target range. Other branches of the armed services coordinated with NAS South Weymouth for use of the island for target practice. Practice ordnance used by other services is assumed to be similar to those that the Navy was authorized to use.

The November 1996 EBS report identified EBS Review Item #81, the possibility that depleted uranium (DU) rounds were used on the island. The Naval Sea Systems Command Radiological Affairs Support Office (RASO) was contacted regarding the possible use and presence of DU as speculated in the Phase I EBS. An official Navy memorandum from RASO dated 4 March 1998, and other communications with that office and with the Department of Defense Explosives Safety Board (DDESB) provided the following information supporting the Navy's conclusion that DU was not used on Nomans Land Island.

- DU ammunition can be authorized for use in combat. Non-combat use (such as training and testing) is limited by license/permit to specified firing ranges and to test firing at sea. Accidental firing is required to be reported through the chain of command to the Commander of Naval Operations (CNO)
- Nomans Land Island has never been an authorized or permitted DU range.
- No accidental firings of DU at Nomans Land Island have ever been reported.
- The standard DU penetrator used in the 20mm round is approximately 1.75 inches in length x 0.5 inches in diameter and weighs 70 grams.
- Review Item #81 was initiated to fill a data gap regarding the weight of 20 mm practice round reported in the 1987 Kenyon Report, found to be incorrectly reported as 4119 grams, and should have been reported as 4119 grains in weight. Table 1 of this report provides the corrected information on the weight of these practice rounds.
- Actual inventories of ordnance items found on the island during the UXO sweep provide a more accurate assessment of ordnance targeted at Nomans Land Island. This inventory does not include any DU ordnance.

Information from Interviews

None of the people who responded to the questionnaire used for the November 1996 EBS report provided information on Nomans Land Island. However, several NAS SOWEY Environmental Office personnel reported that they believed the Navy stationed personnel on the island to maintain the targets during World War II. The presence of stationed military personnel on the island indicates that fuel for energy, heating, and cooking was probably stored on the island.

Petroleum or hazardous material consistent with the mission needs such as paints, oil and grease, may also have been used during the years the Navy managed activities on the island. Some quantities may have been stored on the island as well. Based on the interviews there are no documents available to review to determine products or quantities which may have been used or stored; there are records of disposal or releases either.

Information from Aerial Photos

The only aerial photos of the island that were available came from the NAS SOWEY photograph archives. The photographs were taken in May 1982. The photos show the block buildings. In the photographs several walls were collapsed but the shape and sizes of the buildings are recognizable.

In these photographs the island appears less heavily vegetated than during the October 1995 site visit. Stone walls and several building foundations are visible in the aerial photograph. The aerial photographs indicate that the pre-1943 settlement of Nomans Land Island was concentrated on the northern coast around the small cove and pier. The pier and breakwater in the 1982 photographs also appear intact.

The 1982 photographs show the locations of the target buoys on the western side of the island. In 1982 these buoys look fully intact. In 1982, the photographs do not show the A-4 jet target noted during the October 1995 site visit. NAS SOWEY Environmental personnel indicate that the Navy added the A-4 target in 1993 and removed it in 1996.

Several newspaper photographs (non-aerial) and articles from the 1980s and 1990s provide additional information on the past uses of the island. A newspaper photograph, (date unknown) shows an intact two-story observation tower located between two low buildings. Since the aerial photographs from May 1982 do not show this tower, the tower must have collapsed or been removed before 1982. Another photograph from a 1987 *Boston Phoenix* article shows a sink attached to a crumbling concrete block wall of one of the two structures (Berman, 1987).

Review Item Summary

The U.S. Military has used Nomans Land Island as a target range for more than 50 years. Because of this use, related ordnance debris exists on the island. It is reported that the island supported ranchers and a small fishing community before the Navy leased the property in 1943. It had been reported that the Navy Seabees lived on the island to maintain the live target range from the late 1940s until the early 1950s. The EBS investigation found no records of hazardous materials having been stored on the island. A site visit in 1997 found an empty underground storage tank (UST). There are no other areas where suspected or known storage of fuel or hazardous materials occurred.

The November 1996 EBS investigation identified the following areas of concerns which have been designated as EBS Phase II Review Items 67 through 75 and 81. An additional review item, "UST" which is not numbered, was discovered in a site visit of 1997. Discussions of each of the review items are detailed in the following paragraphs.

Review Item # 67 - Areas of burnt vegetation

Observations of areas of stressed and burnt vegetation noted during the EBS site visit in October 1995 were shown to be a temporary impacts as a result of target actives. A prescribed burn of the island in April 1997 facilitated the UXO sweep. Subsequent site visits to the island have confirmed that vegetation is thriving on the island (Barney, 1997). No further actions are required relating to this Review Item.

Review Item # 68 - Ben's Pond

No human use or consumption of the pond water is planned under the current or future reuse scenarios. Due to the importance of the freshwater supply for support of the wildlife habitat the Navy plans to conduct an initial baseline assessment of the water quality and sediments of the ponds. Future assessments of the vegetation and wildlife will be conducted by the Fish and Wildlife Service.

Review Item # 69 - Debris on the shoreline

Debris from offshore sources has been found on the shoreline. The debris (except the removed ammunition cartridges) has not been identified to consist of hazardous materials. The Navy will take no further actions regarding debris on the shoreline of the island, unless newly discovered debris is determined to be a potential UXO item.

Review Item # 70 - Remains of Seabee buildings

Based upon the record searches and site investigations, the Navy believes that there are no hazardous materials at the remnants of the former Seabee buildings. The Navy intends to conduct a site visit in 1998 in conjunction with the Fish and Wildlife Service to note the condition of the building remnants. No further actions regarding the remnants of the Seabee buildings is intended based upon available information.

Review Item # 71 - Scrap metal northeast of Ben's Pond

Scrap metal debris will be removed as required.

Review Item # 72 – Ordnance and ordnance debris

The safety aspect of this review item has been addressed by a DDESB approved ordnance sweep for surficial UXO, which was designed to be consistent with the stated future use of the island as an uninhabited wildlife refuge. No actions have been taken with regards to potential UXO that lies underground or underwater. Subsurface UXO could potentially be anywhere on the island or immediately offshore. The Navy intends to take no actions regarding currently subsurface UXO on the island or offshore. The Navy takes responsibility for newly discovered surface UXO. There is no implied or explicit agreement for the Navy to perform subsurface UXO clearances in the event that an alternate use of the island is contemplated, i.e. a change from an uninhabited wildlife habitat to one of habitation or increased human use. The Explosives Safety Summary Document (March 1998), addresses such issues, should complement the information provided in this environmental document.

The environmental aspect of this Review Item is being addressed through ongoing actions in 1998 which will address piles of metal debris on the island. In order to minimize safety and environmental concerns for a transferring range, the Navy has conducted response actions that included surface sweeps for UXO. All materials found were inert or rendered wholly inert by the DOD Explosives Ordnance Detachment (EOD) team which conducted the sweep in 1997. The metal debris at the northeast of Ben's Pond, as well as other metal debris on the island that was assessable and able to be moved by hand, was gathered and accumulated into piles. The Navy plans to remove the metal debris in the piles from the island.

Review Item # 75 - Evidence of live ammunition and evidence of live bombing (e.g., craters)

Refer to Review Items #71 and #72. Target activities on Nomans Land Island were ceased in 1996, the Navy performed an ordnance (UXO) surface sweep of the island in 1997, and will continue to be responsible for addressing any newly identified surface UXO brought to the Navy's attention, in accordance with the DDESB management plan for addressing explosives safety.

Review Item # 81 - Possible use of depleted uranium (DU) as practice ammunition rounds

Based upon a review of the characteristics of the materials found on Nomans Land Island during the UXO sweep in 1997 and information provided by Naval Sea Systems Command Radiological Affairs Support Office (RASO), the Navy does not believe that DU rounds were used or are present on the island. The Navy does not intend to take any future investigative actions regarding this review item. However , the Navy does intend to address this issue as part of a community relations outreach initiative in conjunction with the USFWS.

Review Item # 73 - Vent pipe near the remains of the Seabee buildings; possible use and storage of fuel oil

No information is available to indicate whether this vent pipe is associated with a storage tank. The Navy will pursue further investigation, in conjunction with the Fish and Wildlife Service, to determine whether additional actions are required for this review item.

Review Item # 74 - An underground pipe near the Seabee dock

No information is available to document the use of this pipe. The Navy will be further investigate this pipe in conjunction with the planned actions for 1998 to close the underground storage tank (see UST Review Item).

Review Item UST – Underground Storage Tank (UST) found after prescribed burn

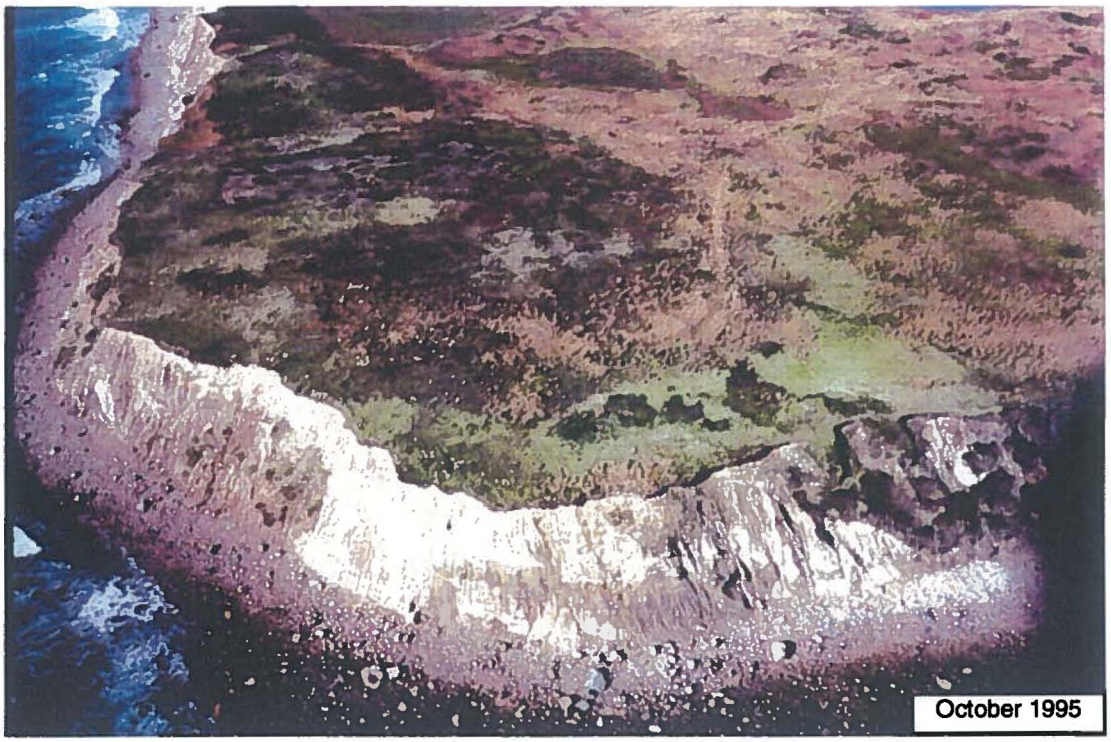
The capacity of the UST is estimated to be 10,000 gallons. The tank is dry and empty except for a small amount of sediments. The Navy will investigate this tank and plans to properly close the tank in 1998.

Table 1. – Practice Ordnance (Kenyon, 1987)

Nomenclature	Use	Weight	Length (in.)	Composition	Associated Components
CXU-3 spotting device	Produces smoke (no fire) installed inside practice bomb and smoke exits through hole in the shaft portion of bomb	-	6.0	3 gm smokeless powder 20 cc titanium tetrachloride	-
Practice Bomb MK76	Ordnance simulator	24.55 lb	24.7	Metal	CXU-3
Practice Bomb MK81	Ordnance simulator	250 lb	76.07	Metal with concrete filler	CXU-3
Practice Bomb MK82	Ordnance simulator	500 lb	90.29	Metal with concrete filler	CXU-3
Practice Bomb BDU-33 D/B	Ordnance simulator	25 lb	23.19	Metal	CXU-3
Practice Bomb MK106	Ordnance simulator	5 lb	18.50	metal	CXU-3
Round, Aircraft Gun 20 mm (Target Practice)	Aircraft gun practice	4119 grains	7.22	smokeless powder	dummy metal projectile
Round, linked 7.62 mm w/tracer	Aircraft gun ammunition f/gau-2b gun	388 gm	2.80	46.0 grams smokeless powder	bullet w/6.5 grains subignitor and ignitor comp.
Round, Aircraft Gun 30 mm	Aircraft gun practice	unknown	11.5	0.3310 grams smokeless powder	dummy metal projectile

Photograph 1 – Inert ordnance (addressed by April 1997 ordnance sweep)

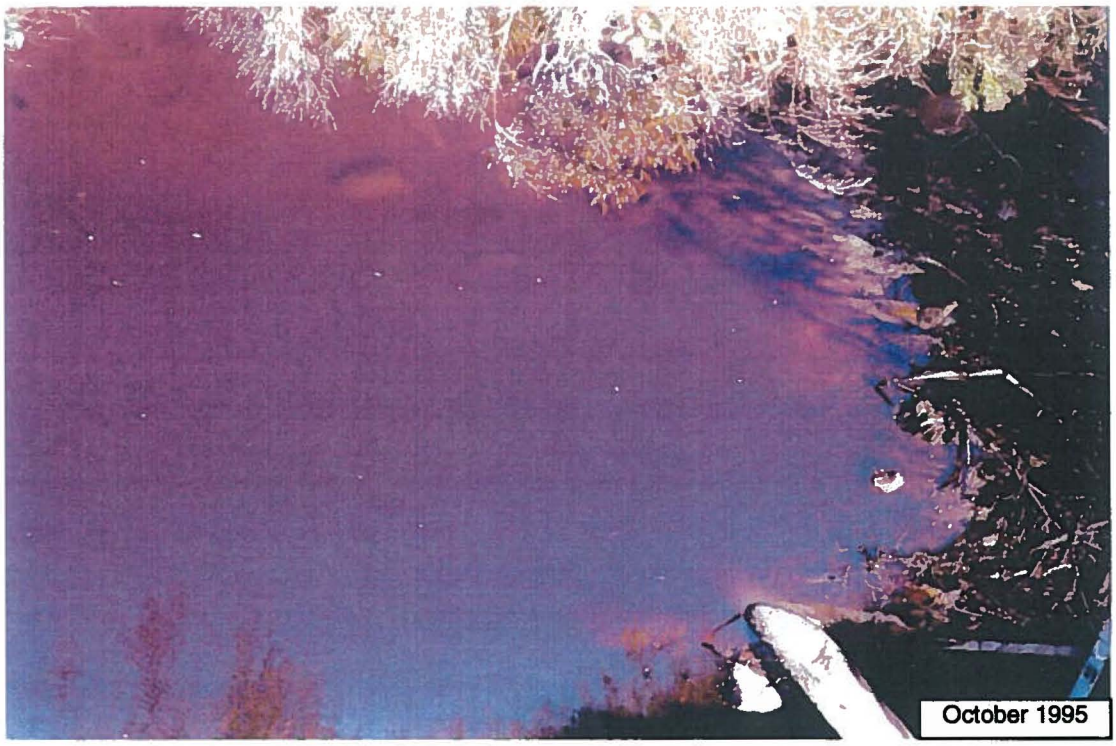
Photograph 2 – Typical crater



Photograph 3 – Aerial view showing vegetation coverage on western side of island

Photograph 4 – View of vegetation around Ben's pond

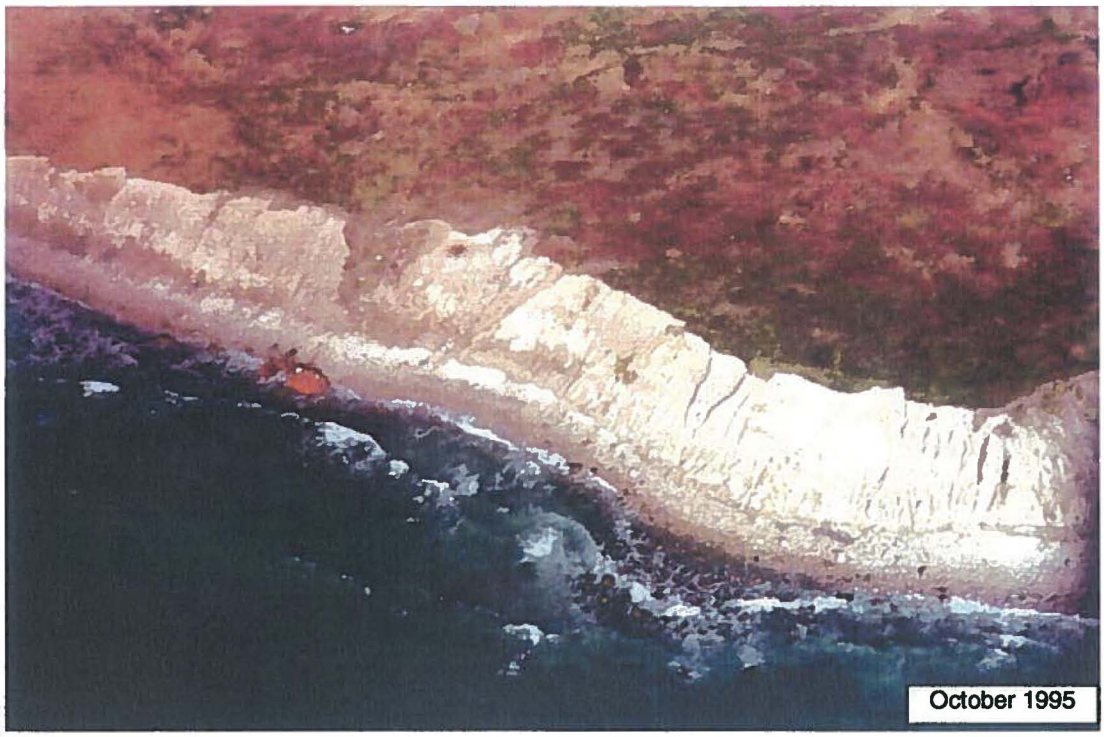
Photograph 5 – Inert ordnance in netting



Photograph 6 – Cloudy water in Ben's Pond

Photograph 7 – Typical practice ordnance around ponds

Photograph 8 – Dry pond bed

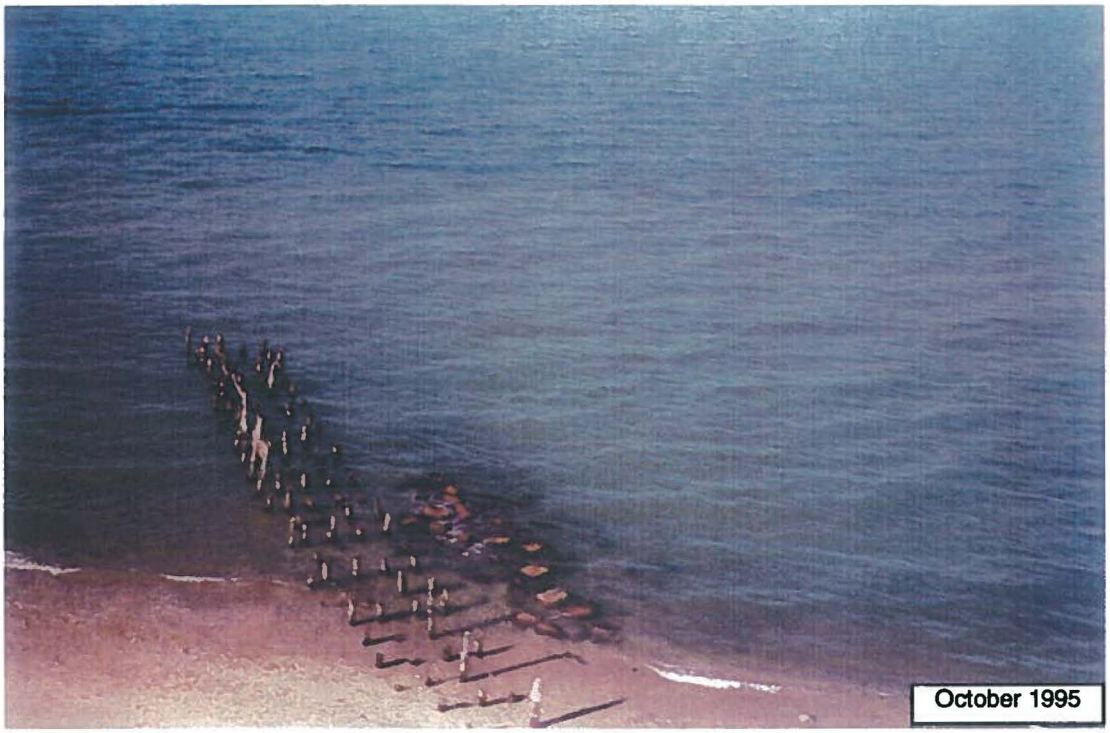


Photograph 9 – Aerial view of debris on shoreline (shipwreck)

Photograph 10 – Building remnants

Photograph 11 – Building remnants

Photograph 12 – Equipment in building remnants



Photograph 13 – Pier remnants

Photograph 14 – 4" pipeline near pier

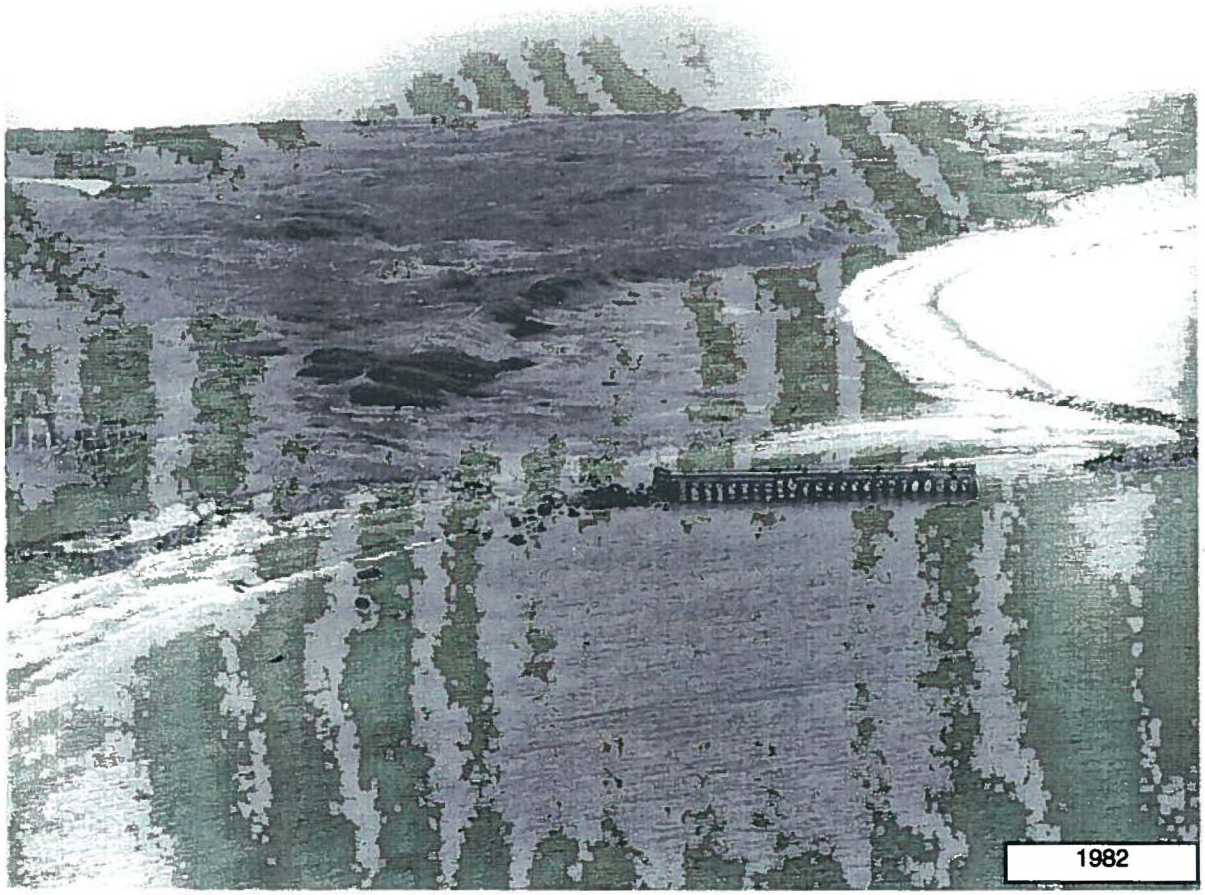
Photograph 15 – A-4 target (removed 1996)

Photograph 16 – Aerial view of A-4 target near dummy airstrip

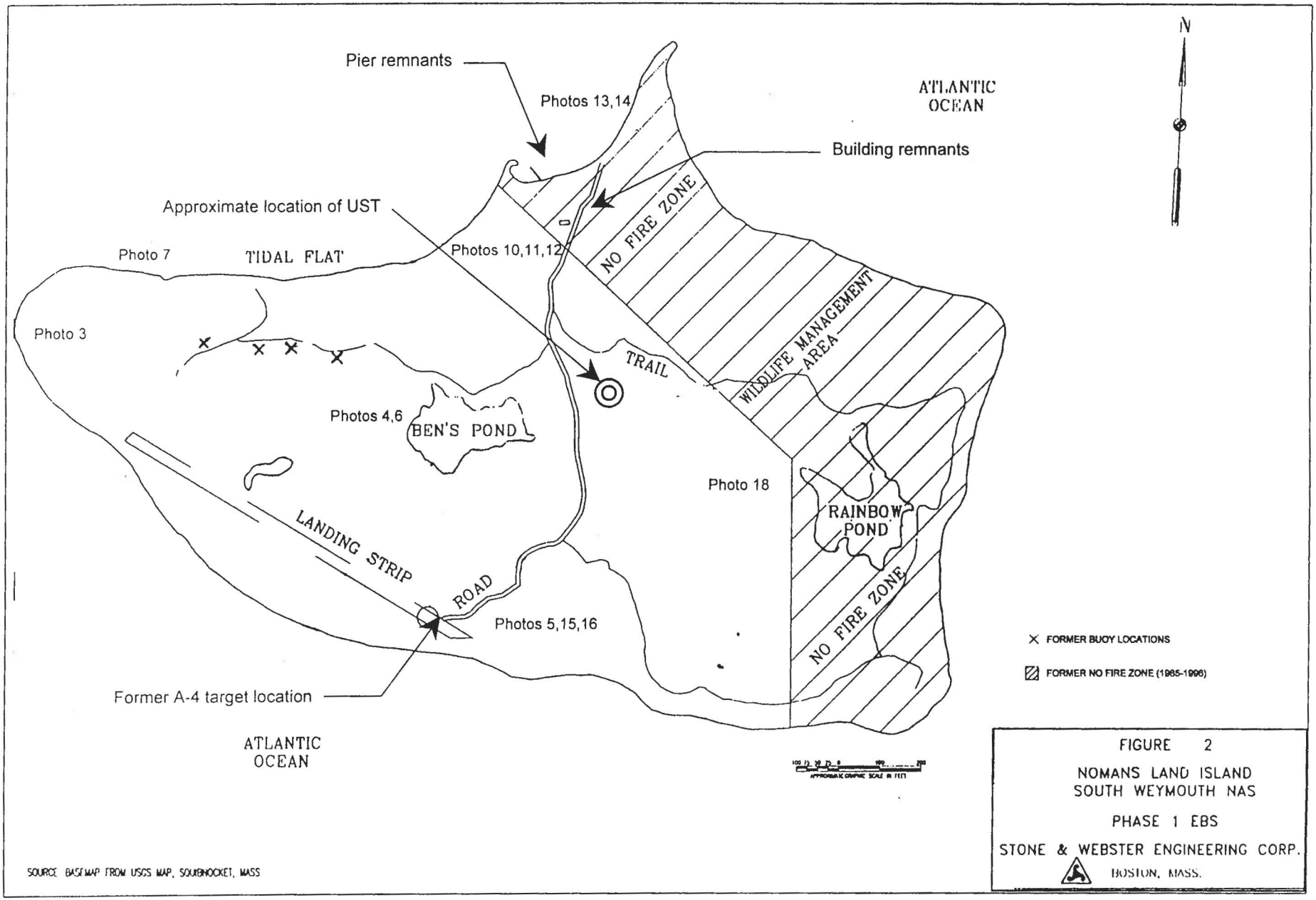
Photograph 17 – View of vegetation (October 1995)

Photograph 18 – Aerial view of pre-1940 settlement and surrounding vegetation

Photograph 19 – Typical vegetation



Photograph 20 – 1982 Aerial photograph of pier and building remnants


Pier remnants
Photos 13,14
ATLANTIC OCEAN
N
Building remnants
Approximate location of UST
NO FIRE ZONE
Photo 7
TIDAL FLAT
Photos 10,11,12
WILDLIFE MANAGEMENT AREA
Photo 3
TRAIL
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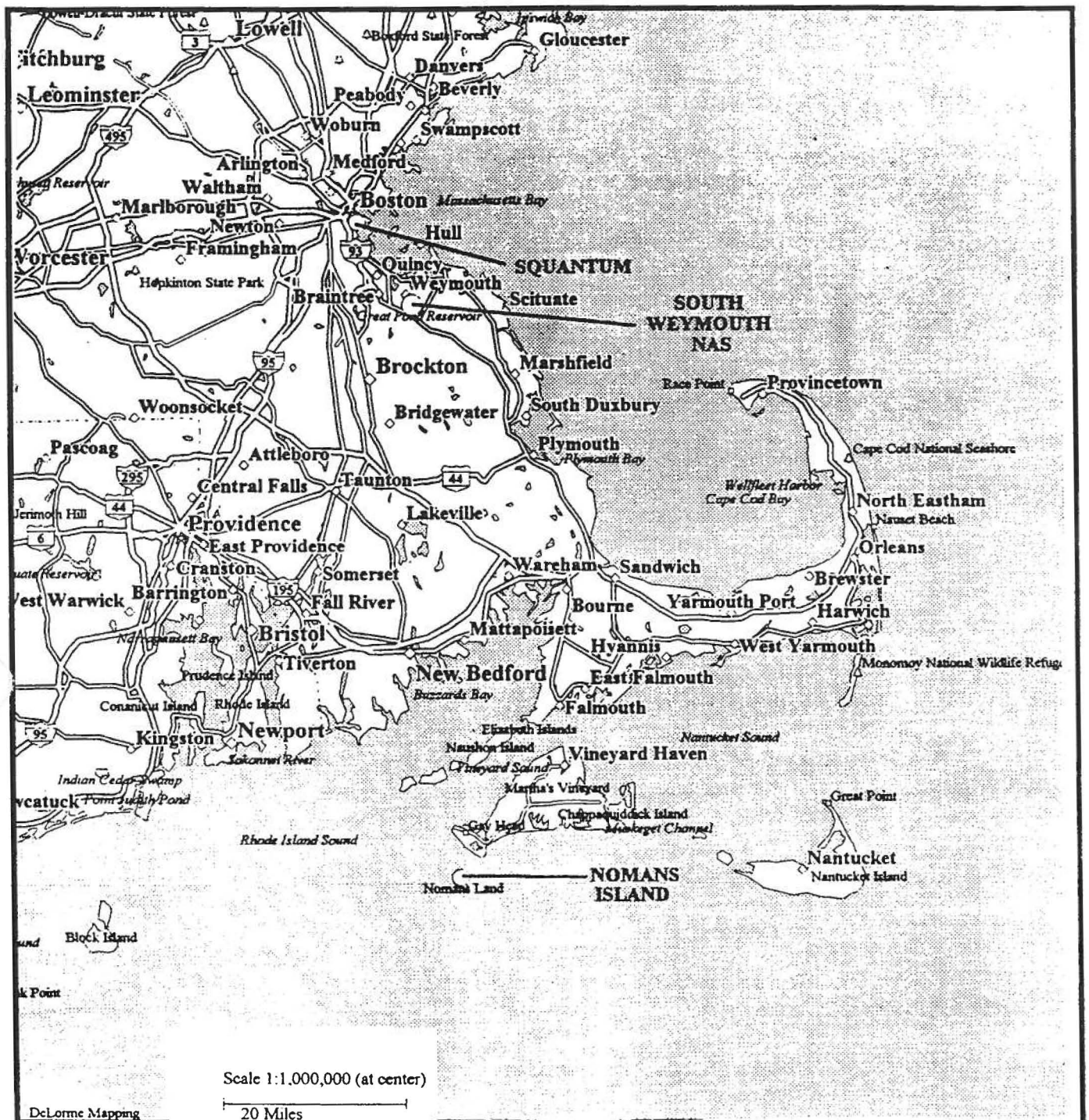
BEN'S POND
Photo 18
RAINBOW POND
LANDING STRIP
ROAD
Photos 5,15,16
NO FIRE ZONE
Former A-4 target location
ATLANTIC OCEAN
FORMER BUOY LOCATIONS
FORMER NO FIRE ZONE (1985-1998)
SOURCE: BASEMAP FROM USGS MAP, SOUTHWICKET, MASS
FIGURE 2
NOMANS LAND ISLAND
SOUTH WEYMOUTH NAS
PHASE 1 EBS
STONE & WEBSTER ENGINEERING CORP.
BOSTON, MASS.



DEPARTMENT OF THE NAVY NORTHERN DIVISION NAVFAC LESTER,PA PREPARED BY: STONE & WEBSTER ENVIRONMENTAL TECHNOLOGY & SERVICES	PHASE 1 ENVIRONMENTAL BASELINE SURVEY SOUTH WEYMOUTH NAVAL AIR STATION, MA NOMANS ISLAND LOCATION MAP	FIGURE 1

ATTACHMENT C

Developing DQOs and QA/QC Project Plan

1.0 DEVELOPING DATA QUALITY OBJECTIVES

Data Quality Objectives (DQOs) for this project were developed based on the Environmental Protection Agency (EPA) Guidance for the Data Quality Objectives Process, EPA-QA/G-4, September 1994. The process of developing DQOs is intended to provide projects with the data necessary to make decisions in an effective manner. The data categories and the process for developing DQOs are summarized in the following subsections. The steps that will be taken to measure and document data quality are described at the end of this section.

Analytical data can be classified into two descriptive categories, as summarized below.

- Screening Data: Screening data are generated by rapid, generally less precise methods of analysis with less rigorous sample preparation than conventional laboratory methods. Screening data provide analyte identification and quantitation, although the quantitation may be relatively imprecise. At least 10 percent of the screening data are confirmed using analytical methods and QA/QC procedures and criteria associated with definitive data.

- Definitive Data: Definitive data are generated using rigorous analytical methods, such as approved EPA referenced methods. Data are analyte specific with confirmation of analyte identity and concentration. Methods produce tangible raw data (e.g., chromatogram, spectra, digital values) in the form of paper printouts or computer generated electronic files. For the data to be definitive, either analytical or total measurement error must be determined.

  Definitive data includes measuring and reporting the following QA/QC elements:

  - sample documentation (location, date and time collected, batch, etc.);
  - sample Chain-of-Custody (COC) (when appropriate);
  - sampling design approach (systematic, simple, or stratified random, judgment, etc.);
  - initial and continuing calibration;
  - determination and documentation of detection limits;
  - analyte identification;
  - analyte quantitation;
  - QC blanks (trip, method, rinsate);
  - MS recoveries;
  - PE samples (when specified);
  - analytical error determination (measures precision of the analytical method); and
  - total measurement determination (measures overall precision of measurement system, from sample acquisition through analysis).

Project DQOs are developed using a seven-step process summarized below.

1. State the Problem

   This step defines the problem requiring new data. Identifying the problem may include the following:

   - describe the threat/risk to human health or the environment;
   - identify a list of the known and suspected contaminants in each medium, include estimated concentrations, variability, distribution, and location;
   - develop a conceptual site model and potential exposure pathways;
   - summarize the outcome and status of previous responses at the site, such as early actions or previous data collection activities; and
   - describe the physical and chemical characteristics that influence migration and associated human, environmental, and physical target(s).

2. Identify the Decision

   Identify each decision and establish the relationship among them and their order of priority. This step will accomplish the following:

   - a statement of the decision that will require the data provided by the investigation; and
   - a list of the actions that will be taken based on the outcome of the field investigation.

3. Identify the Inputs to the Decision

   Develop a basis for a realistic concentration goal to serve as an action level for the field investigation design and evaluation. Identify sources to provide necessary data to achieve the concentration goal. This may include identifying potential sampling techniques and associated equipment in addition to identifying potential analytical methods that will accomplish the concentration goal. This step identifies the new environmental data needed to make the decision.

4. Define the Boundaries of the Study

   Define the set of circumstances (boundaries) which will be covered by the decision. This step involves defining spatial boundaries and temporal boundaries defining where samples should be collected and the time frame the study will represent. This step should define the smallest area for decision making based on risk, technological and other considerations, such as practical factors or technological factors.

   This step produces the following:

   - a detailed description and/or physical representation of the geographic limits of each environmental medium within which the decision will be made;
   - a description of the characteristics that define the population of interest;
   - a definition of the time period during which samples will be taken and to which decisions will apply; and

- the appropriate scale of decision making for each medium of concern and a description of the practical constraints that may impede sampling.

5. Develop a Decision Rule

This step specifies the statistical parameter of interest (mean, median, proportion or maximum) and the action level for the decision. The rule will specify a decision based on whether action level criteria are met or exceeded.

6. Specify Limits on Decision Errors

This step quantifies the acceptable level of error in measurements used for the decision. Total study error includes all error in the processes (sampling, handling, laboratory preparation, and analysis data reduction). Errors are evaluated against a preliminary assumption or hypothesis (baseline or null hypotheses). Two potential types of error affect the use of the baseline hypothesis:

- false positive error - the data causes the baseline condition to be rejected although it is true; and
- false negative error - the data causes the baseline condition to be accepted although it is false.

Error is reduced by selecting a large enough number of samples and/or by analyzing in the laboratory several times to develop precision. The output of this step is to define acceptable error rates, based on the consequences of making an incorrect decision.

7. Optimize the Design

This involves identifying the most resource-effective sampling design that generates data which satisfy the DQOs and determining whether a probabilistic or judgmental sampling approach should be used (i.e., grid or transect samples vs. specific sampling locations) based on judgment (historical information or visual observation). This should lead to documentation of the following:

- the reason for selecting a non-probabilistic sampling approach;
- the reason for selecting specific sampling location; and
- the expected performance of the sampling design with respect to the qualitative DQOs.

Documenting the theoretical basis for the design will be used as a basis for making field changes necessary due to unforeseen problems.

The output from this step is the most effective sampling design, along with key assumptions underlying the design. The data collected are expected to be adequate for making the decision(s) identified in Step 2.

Following data collection, data will be validated to ensure its validity for project use. Once validated, data will be evaluated with respect to the "action levels" and baseline hypotheses established during the DQO process.

2.0 QUALITY CONTROL SAMPLE REQUIREMENTS

QA/QC samples are analyzed for the purpose of assessing the quality of the sampling effort and of the analytical data. QA/QC samples include field and referee duplicates, equipment rinsates, field blanks, and trip blanks, as described below (Section 2.1). Following Section 2.1, are sections describing sampling methodologies, sample frequencies and labeling and handling.

2.1 QA/QC Samples

2.1.1 Field Duplicate Samples

Field duplicate samples are two samples of the same matrix, which are collected, to the extent possible, at the same time, from the same location, using the same techniques and are analyzed at the same laboratory. Duplicate soil and sediment samples will be collected into a pan, homogenized (with the exception of volatile organic compounds or VOCs, and then apportioned into sample containers). Samples for VOCs will not be homogenized, duplicates will be aliquot from materials that appear similar and are contiguously located. Field duplicates will be handled, containerized, preserved, stored and transported in the same manner. Field duplicates will be collected at a frequency of 20% per sample matrix or one per day, whichever is more frequent. The off-site laboratory will analyze samples as "blind" duplicates to provide a measure of sampling variability.

2.1.2 Split Samples

Split samples are collected in the same manner as field duplicates (see above) and are analyzed by different methods and/or laboratories. For this project, split samples will be used to confirm on-site screening results. A fraction of the samples analyzed on-site using the immunoassay and XRF screening technique will be analyzed at an off-site laboratory using EPA approved analytical methods. Split samples will be collected at a frequency of approximately 50 percent for this project.

2.1.3 Referee Duplicate QA Samples

Referee duplicates are samples which are collected in the same manner as field duplicates (see above) and are analyzed by different laboratories. Referee duplicates may be sent to a referee QA laboratory if the Navy or regulatory agencies collect split samples or if a special problem occurs in sample collection or analysis. Referee duplicates are not anticipated for this project at this time.

2.1.4 Equipment Rinsates

Equipment rinsates are samples consisting of a reagent (analyte-free) water collected daily during a sampling event from a final rinse of sampling equipment after the decontamination procedure has been performed. The purpose of equipment rinsates is to determine whether the sampling equipment is causing cross contamination of samples. Equipment rinsates will be analyzed by the off-site laboratory only. Where equipment is decontaminated and reused, equipment rinsates will be collected at a frequency of one in twenty samples. Where equipment is disposable and not decontaminated, a single rinsate blank, serving to document that disposable equipment and sample containers are not contributing to sample contamination, will be collected for each analysis.

2.1.5 Trip Blanks

Trip blanks will be collected for volatile organic samples only. They consist of laboratory-grade distilled and/or de-ionized water and are used to detect contamination that may be introduced during sample handling and transport. These samples are prepared prior to field operations, brought out into the field, and returned to the laboratory unopened. A trip blank will be included with every sample shipment cooler sent to the laboratory for VOC analyses. VOC samples are not anticipated during this sampling program, accordingly, no trip blanks will be required.

2.1.6 Matrix Spike and Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples (or spike and duplicate samples for inorganics) are collected as additional aliquots of sample to be used by the laboratory as QC samples. The samples are spiked in the laboratory by adding a predetermined concentration of target analytes into the sample prior to sample extraction/digestion and analysis. The concentration of the target analytes determined during analysis are compared to the known concentration of the added spiked compound (percent recovery) to provide a measure of the accuracy of the laboratory method. Laboratory precision is assessed by measuring the RPD between two spiked samples or, in the case of inorganics analyses, two un-spiked duplicate samples. For this project, additional sample will be designated for laboratory QC at a frequency of one per 20 samples or less per matrix.

2.1.7 Temperature Blanks

A temperature blank consisting of potable water will be included in each cooler to document cooler temperature upon receipt at the laboratory.

2.2 Equipment Decontamination Procedures

Wherever possible, disposable equipment will be used for this event and decontamination will not be required. Should non-disposable sampling equipment be used, it will be decontaminated prior to collecting each sample. The following sequence will be used:

- Remove all visible contaminants using laboratory detergent and potable water.
- Rinse with potable water.
- Rinse with deionized water.
- Rinse with methanol. For inorganic sampling equipment, rinse with 10% nitric acid in water,
- Followed by deionized water.

Decontamination fluids generated will be collected and stored on site for later disposal.

2.3 Sample Identification and Labeling

The sample identification system that will be used for this project will assign a unique sample identifier to each sample collected. Data management will be consistent with this sample identification system. The protocols for assigning field sample numbers are described below. Each sample collected will have its own identifier, which will apply for the duration of the project. The sample identifier will consist of an alpha-numeric code that will identify the site designation, sample number, and QC sample designation (if applicable). The QC sample identifier will also consist of an alpha-numeric code that will identify the QC sample designation, sampling date, and sample number (if applicable). Note: all sample identifiers

and their corresponding locations will be carefully logged in the field notebook and may be identified on figures or drawings.

Soil samples will be identified based on the location within the 60 meter UXO grid. Sample IDs will include the UXO grid areas (Axx), where xx denotes the grid number. Locations within the grid will be identified as XY coordinates, X being east to west and Y being north to south, indicating the number of feet from the UXO grid boundary separated with a "-". For example, sample ID A18-180-060 indicates a sample collected from UXO grid #18, 180 feet from the western grid line and 60 feet south of the northern grid line.

Pond surface water and sediment samples will be designated by the sample matrix and the pond they are collected from. Where more than one sample is collected from the larger ponds, the samples will be numbered sequentially and the locations recorded in the field logbook and on a site map. The following letters will be used to label samples:

W	=	Surface water
M	=	Sediment
B	=	Ben's Pond
R	=	Rainbow Pond
Px	=	Unnamed pond #x, where x denotes the number assigned to that pond

For example, sample MB-02, indicates the second sediment sample collected from Ben's Pond.

QC samples will be identified using the following:

TB	=	Trip Blank
ER	=	Equipment Rinsate
RD	=	Referee Duplicate
MS/MSD	=	Matrix Spike/Matrix Spike Duplicate

Where appropriate, QC sample designations will be followed by the date collected. For example, the Trip Blank collected on August 12, 1998 would be TB081298.

Sample labels will be completed by field personnel in indelible ink. Labels will include the project identification, sample identification, date and time of collection, sampler's initials, sample matrix, type of sample (grab or composite), analyses to be performed, and preservative used (if applicable).

2.4 Sample Chain of Custody

To maintain and document sample possession, chain of custody (COC) procedures will be implemented. These procedures are necessary to insure the integrity of samples from the time of collection through data reporting. The COC protocol provides the ability to trace possession and handling of samples. A sample is considered under custody if it is/was:

- in a person's possession;
- in a person's view after being in possession;
- in a person's possession and locked up; or
- in a designated secure area.

Personnel collecting samples are responsible for the care and integrity of those samples until they are properly transferred or dispatched. Therefore, the number of people handling a sample will be kept to a minimum.

COC records will be completed by the sampler and shall accompany the samples at all times. The following information shall be indicated on the COC record:

- Project identification;
- Signature of sampler(s);
- Sample identification, sample matrix, date and time of collection, grab or composite sample designation, number of containers corresponding to that sample identification, analyses required, remarks or sample location (if applicable), and preservation method(s);
- Signature of the individual relinquishing the samples; and
- Name of the individual(s) receiving the samples and air bill number, if applicable.

The COC preparer will then check the sample label and COC record for accuracy and completeness.

2.5 Sample Handling, Preservation, and Container Requirements and Holding Times

For the purposes of this section, the term "sample handling" includes the field-related considerations connected with the selection of sample containers, preservative types, allowable sample holding times, and the analyses to be requested. Table 2-1 provides requirements for sample handling, containers, preservatives, and holding times.

Table 2-1
Sample Containers Preservatives, and Holding Times

Analysis	Matrix	Method	Container	Preservatives	Holding Times
Explosives (Nitroaromatics and Nitramines)	Soil	8330	6 oz. glass	cool 4°C	14 days to extraction / 40 days to analysis
	Water	8330	1 L glass	cool 4°C	7 days to extraction / 40 days to analysis
Priority pollutant (13) metals	Soil	6010 / 7000 series	6 oz. glass	cool 4°C	Hg = 28 days, others 6 months
	Water	6010 / 7000 series	1 L HDPE	HNO_3 pH < 2, cool 4 C	

Samples for off-site laboratory analysis will be shipped via courier or by Federal Express for same day or overnight delivery in waterproof coolers using the following procedures. In general, the samples taken for this project will be considered low-level or environmental samples for packaging and shipping purposes. Samples will not be shipped off-site if field screening indicates concentrations of explosives greater than 10 percent. The sample packing procedures for low level samples are listed below.

1. After filling out the pertinent information on the sample label, cover the label with clear tape and put the sample in the bottle or vial and screw on the lid.

2. Place about three inches of inert cushioning material such as vermiculite or bubblepack in the bottom of the cooler.

3. Enclose the bottles in clear plastic bags through which sample labels are visible, and seal the bag. Place bottles upright in the cooler in such a way that they do not and will not touch during shipment.

4. Put in additional inert packing material to partially cover sample bottles (more than halfway). Place bags of ice around, among, and on top of the sample bottles. Chemical ice should not be used.

5. Fill cooler with cushioning material.

6. Put paperwork (chain-of-custody record) in waterproof plastic and tape to the inside lid of the cooler.

7. Tape the drain shut.

8. Secure lid by taping. Wrap the cooler completely with strapping tape at a minimum of two locations. Do not cover labels.

9. Attach completed shipping label to top of the cooler.

10. Affix two signed and dated custody seals on opposite corners. Cover seals with wide, clear tape.

Prior to shipping, samples will be stored on ice and a trip blank will be placed with any VOC samples from the time of sample collection.

2.6 Field and Site Logbooks

Detailed, bound, weatherproof field logbooks with numbered pages shall be maintained by the field representative to record information related to sampling or field activities. This information will be written in ink and will include the following:

- date and time of site visit;
- climatic conditions;
- key personnel on-site;
- health and safety levels of protection;
- description of field activities, including any approved work changes and/or deviations from approved project plans;
- comments to/from government party representatives;
- sampling location and identification;
- sampling sequence and time of each sample collection;
- types of sample bottles used and sample identification numbers;
- parameters requested for analysis;
- field observations during sampling event, including a visual description of sample (color, odor, etc.);
- name of sample collector(s);
- QA/QC data for field instruments;
- any problems encountered;

- description of all sampling equipment used, including trade names, model number, diameters, material composition, etc.; and
- description of all instrument calibration procedures and results.

2.7 Photographs

Photographs may be taken to document site activities. The associated field logbook entries will include the name of the photographer, dates, site location, and photograph description, including orientation of photograph. Photographs will be maintained in a photograph logbook.

LEGEND:

- INTERMEDIATE CONTOUR
- 50 — INDEX CONTOUR
- WETLAND
- WATER BODIES

NOTE: CONTOUR INTERVAL IS 10 FEET

SOURCE:
BASE MAP WAS DERIVED AND DIGITIZED FROM USGS 7.5 MIN. TOPOGRAPHIC MAP QUARDRANGLE: SQUIBNOCKET, MA, DATED 1972, PHOTOINSPECTED 1977.

0 400 800 1200 1600 2000
SCALE IN FEET

FIGURE 1-2

NOMANS LAND ISLAND
CHILMARK, MASSACHUSETTS

SITE PLAN

SCALE: AS SHOWN

CADDFILE: NOMANS01.DWG