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VALVE PIT 8 MONITORING WELL ABANDONMENT WORK PLAN NAS KEY WEST FL
09/10/2008
TETRA TECH NUS

Comprehensive Long-term Environmental Action Navy

CONTRACT NUMBER N62467-04-D-0055



Rev. 0
09/10/08

Valve Pit # 8 Monitoring Well Abandonment Work Plan

Naval Air Station Key West
Key West, Florida

Contract Task Order 0122

September 2008



Southeast

NAS Jacksonville

Jacksonville, Florida 32212-0030

**VALVE PIT NO. 8
MONITORING WELL
ABANDONMENT WORK PLAN**

**NAVAL AIR STATION
KEY WEST, FLORIDA**

**COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT**

**Submitted to:
Naval Facilities Engineering Command
Southeast
NAS Jacksonville
Jacksonville, FL 32212-0030**

**Submitted by:
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**CONTRACT NUMBER N62467-04-D-0055
CONTRACT TASK ORDER 0122**

September 2008

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ACRONYMS

ABB	ABB Environmental Services, Inc.
AIMD	Aircraft Intermediate Maintenance Department
AOC	Area of Concern
AST	above-ground storage tank
AVGAS	aviation gasoline
BB&L	Blasland, Bouck & Lee, Inc.
BCTF	Boca Chica Tank Farm
bls	below land surface
BRAC	Base Realignment and Closure
B&RE	Brown and Root Environmental, Inc.
DDT	dichlorodiphenyl trichloroethane
DOD	Department of Defense
DRF	Discharge Reporting Form
FAC	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
ft	foot
G&M	Geraghty & Miller
IR	Installation Restoration
IT	IT Coporation
NA	Not Available
NAS	Naval Air Station
NAVFAC SE	Naval Facilities Engineering Command Southeast
NL	Not Located
PCB	polychlorinated biphenyls
POL	Petroleum Oil and Lubricant
PVC	Polyvinyl Chloride
SAR	Site Assessment Report
SFWMD	South Florida Water Management District
SOP	Standard Operating Procedure
SouthDiv	Southern Division, Naval Facilities Engineering Command
SWMU	Solid Waste Management Unit
TtNUS	Tetra Tech NUS, Inc.
USCG	United States Coast Guard
USDA	U.S. Department of Agriculture
UST	underground storage tank

1.0 INTRODUCTION

Tetra Tech NUS, Inc. (TtNUS), has been contracted by the Department of the Navy, Naval Facilities Engineering Command Southeast (NAVFAC SE) to abandon selected monitoring wells at two Naval Air Station (NAS) Key West sites located on Key West, Fleming Key, and Boca Chica Key, Florida. This Work Plan is being prepared under Contract Number N62467-04-D-0055, Contract Task Order Number 0122.

1.1 PURPOSE

NAS Key West has several Solid Waste Management Units (SWMUs), Areas of Concern (AOCs), and Installation Restoration (IR) sites located on various areas of the base. This Work Plan identifies monitoring wells to be abandoned at Valve Pit No. 8 and Building 1280 describes the abandonment method required.

2.0 SITE BACKGROUND

NAS Key West is in southern Monroe County, Florida, approximately 150 miles southwest of Miami Florida, and consists of several installations in the lower Florida Keys. Most of these are on Key West or Boca Chica Key. The Overseas Highway (U.S. Highway No. 1) connects Key West and Boca Chica Key to the mainland. Figure 2-1 presents a regional map showing the location of Key West, Boca Chica, and Fleming Keys within the Florida Keys. The entire NAS complex encompasses approximately 5,000 acres. Boca Chica Key is approximately 3 miles wide and 3 miles long and the air station encompasses 3,250 acres of the Key. With the exception of filled areas underlying the Overseas Highway, elevations of Boca Chica Key are less than 5 feet above mean sea level (msl) as cited by IT Corporation (IT, 1994).

At present, NAS Key West maintains several aviation operations, a research laboratory, communications intelligence, counter-narcotics air surveillance operations, a weather service, and several other related activities. In addition to activities and units, other Department of Defense (DOD) and Federal agencies at NAS Key West include the U.S. Air Force, the U.S. Army, and the U.S. Coast Guard (USCG).

There are many SWMU, IR, and AOC sites throughout the various facilities at NAS Key West. Each site contains groundwater monitoring wells that are the Navy's responsibility. The sites addressed in this well abandonment Work Plan are depicted on Figure 2-2; a brief description of each site is presented below.

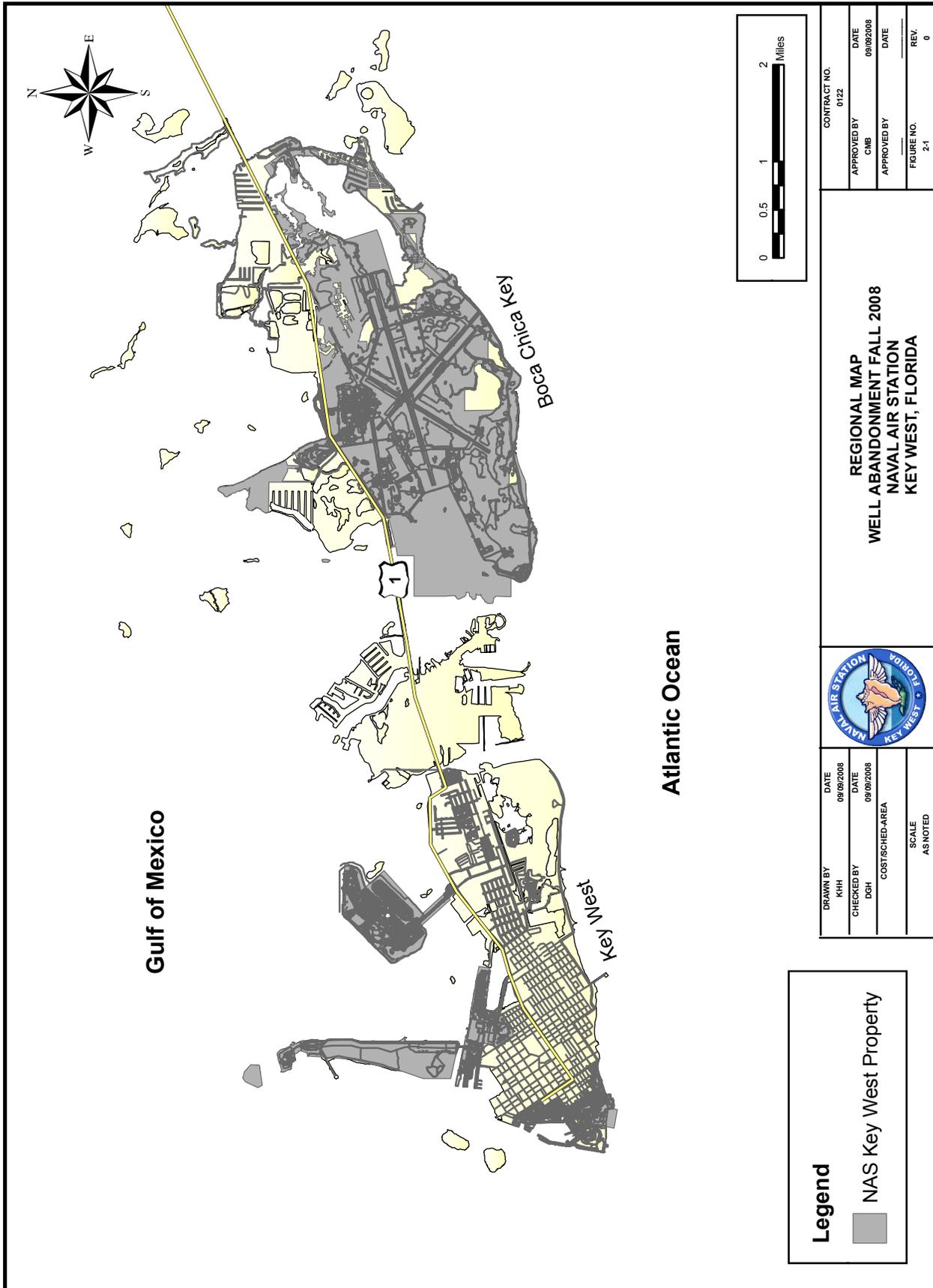
2.1 BUILDING 1280

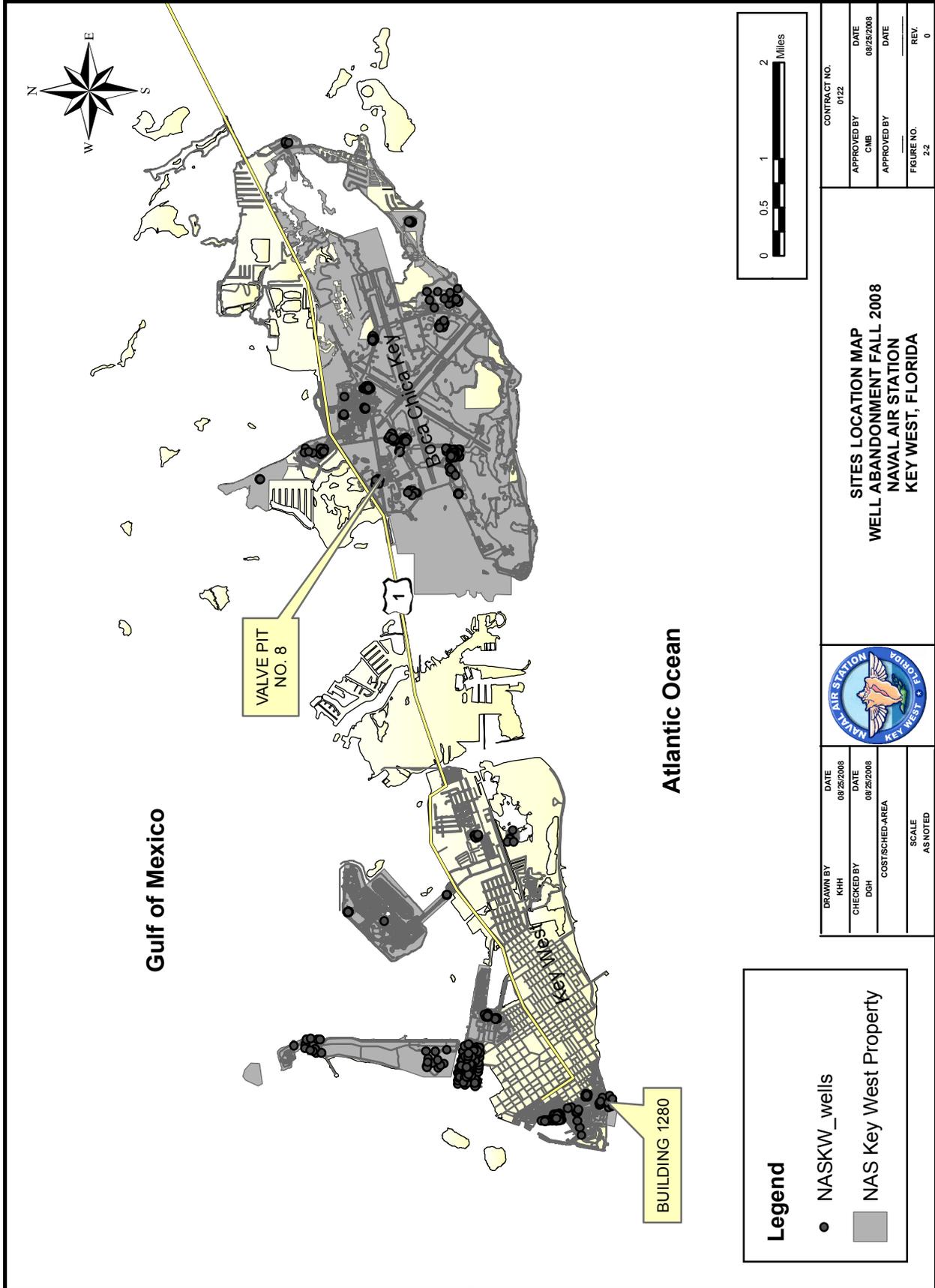
A detailed site description or well installation construction details could not be located for this site. Building 1280 is located north of IR 1 and is a secured site. This site is a former petroleum site that received a Site Rehabilitation Completion Order on October 18, 2000 (TtNUS, 2007).

2.2 VALVE PIT NO. 8

Valve Pit No. 8 is located on the Boca Chica Key aircraft parking apron at NAS Key Wes. On June 18, 1998, the 6-inch inner bulk fuel line running from the Boca Chica Truck Fill Stand to the Boca Chica Tank Farm failed a line tightness test. The line was taken out of service and an investigation of the line was initiated. Later that same day, free product was discovered in Valve Pit No. 8, and approximately 25 gallons of jet propellant fuel (JP-5) and water was pumped out of the valve pit into a tanker truck. The vent cap on the valve pit was found to be loose. The cap was tightened and the line passed the tightness test, as sited by Blasand Bouck and Lee, Inc. (BBI, 2000). On June 22, 1998, free product was again reported to be in the valve pit. The valve pit was drained and approximately 250 gallons of product and water were pumped into a tanker truck. A Discharge Reporting Form (DRF) was filed with the Florida Department of Environmental Protection (FDEP). On June 25, 1998, free product was once again found in the valve pit and subsequently pumped out and disposed. The Navy estimated that approximately 150

gallons of free product were removed, along with nearly 1,000 gallons of water. The free product found in the valve pit subsequent to tightening the vent line cap was presumed to be residual from the initial leak. Valve Pit No. 8 has since been removed and replaced by solid pipeline (BBL, 2000). A Site Assessment Report (SAR) prepared for the site in 2000 concluded that dissolved petroleum constituents in the groundwater on site met Chapter 62-777, Florida Administrative Code (F.A.C.), Table V, Natural Attenuation Default Source Concentrations (BBL, 2000). The SAR included a Natural Attenuation Monitoring Plan. In addition, the SAR recommended the installation of monitoring wells at previous direct-push sampling locations.





3.0 MONITORING WELLS TO BE ABANDONED

This section lists the sites where monitoring wells are to be abandoned. Following well abandonment activities, a well abandonment report will be prepared documenting all wells abandoned, summarizing the abandonment procedures, methodologies, and any other pertinent information obtained during the abandonment event. It is anticipated that a total of 14 wells will be abandoned at Building 1280 and Valve Pit No. 8. Additional sites and wells may be added as time permits. The precise number, location and identification of wells, length of abandonment, type of surface completion, and need for complete abandonment (i.e. if the well can be located), will be determined by the field operations leader during the field activities. The typical depth of the shallow wells is between 10 and 12 feet below ground surface. Most wells are flush-mounted with 2-inch diameter PVC well risers and screens. Note that some of the wells may require manual abandonment techniques due to terrain, access, or any other circumstances. Abandonment procedures are described in Section 4.0.

3.1 BUILDING 1280

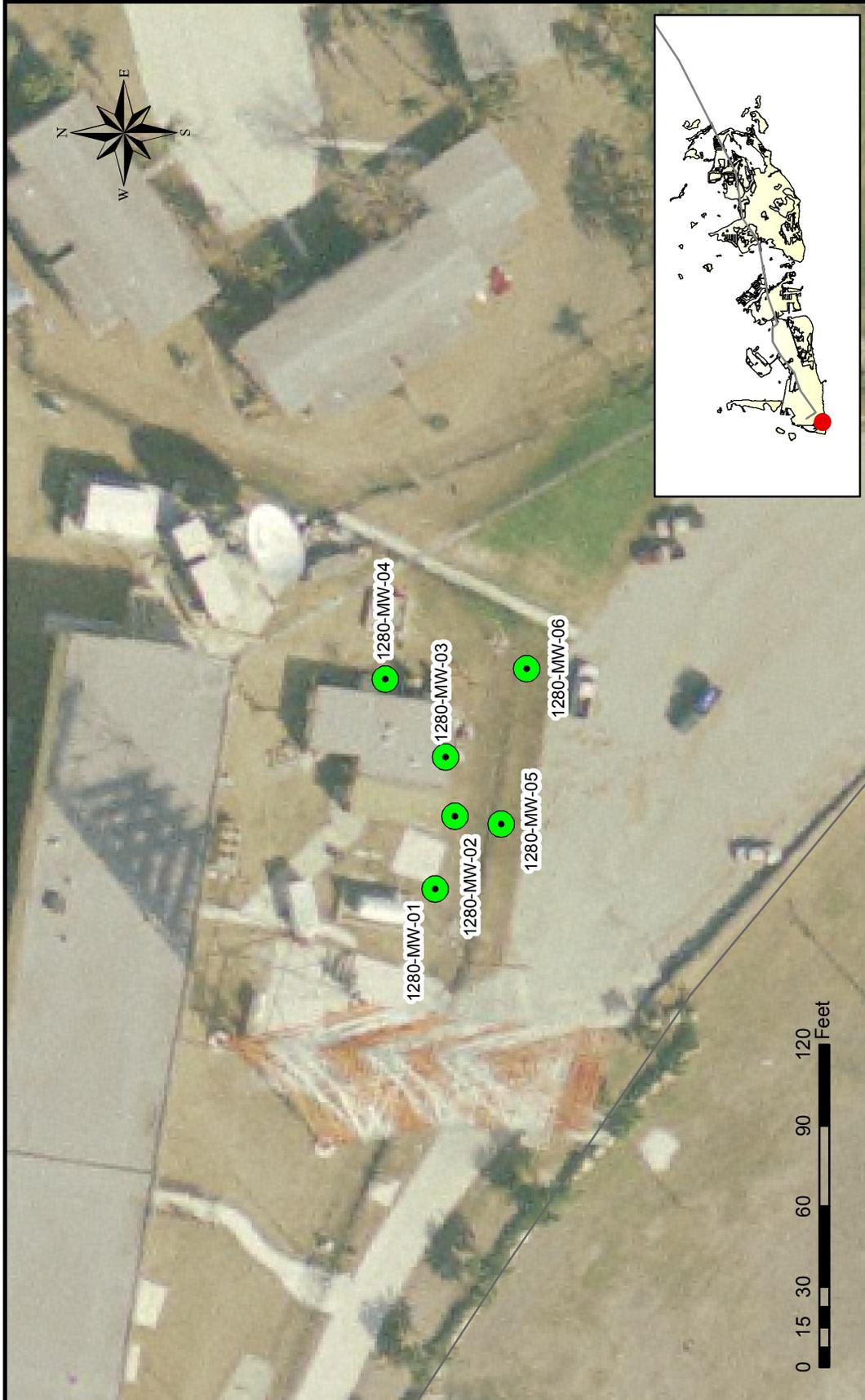
Six wells are eligible for abandonment at Building 1280. Figure 3-1 shows the locations of the wells.

Well Number	Well Identification
1280-MW-01	BLDG 1280 MW-01
1280-MW-02	BLDG 1280 MW-02
1280-MW-03	BLDG 1280 MW-03
1280-MW-04	BLDG 1280 MW-04
1280-MW-05	BLDG 1280 MW-05
1280-MW-06	BLDG 1280 MW-06

3.2 VALVE PIT NO. 8

Eight wells are eligible for abandonment at Valve Pit # 8. Figure 3-2 shows the locations of the wells.

Well Number	Well Identification
VP8-MW-01A	VALVE PIT NO. 8 MW-01A
VP8-MW-02	VALVE PIT NO. 8 MW-02
VP8-MW-03	VALVE PIT NO. 8 MW-03
VP8-MW-04	VALVE PIT NO. 8 MW-04
VP8-MW-05	VALVE PIT NO. 8 MW-05
VP8-MW-06	VALVE PIT NO. 8 MW-06
VP8-MW-07	VALVE PIT NO. 8 MW-07
VP8-MW-08	VALVE PIT NO. 8 MW-08



Legend

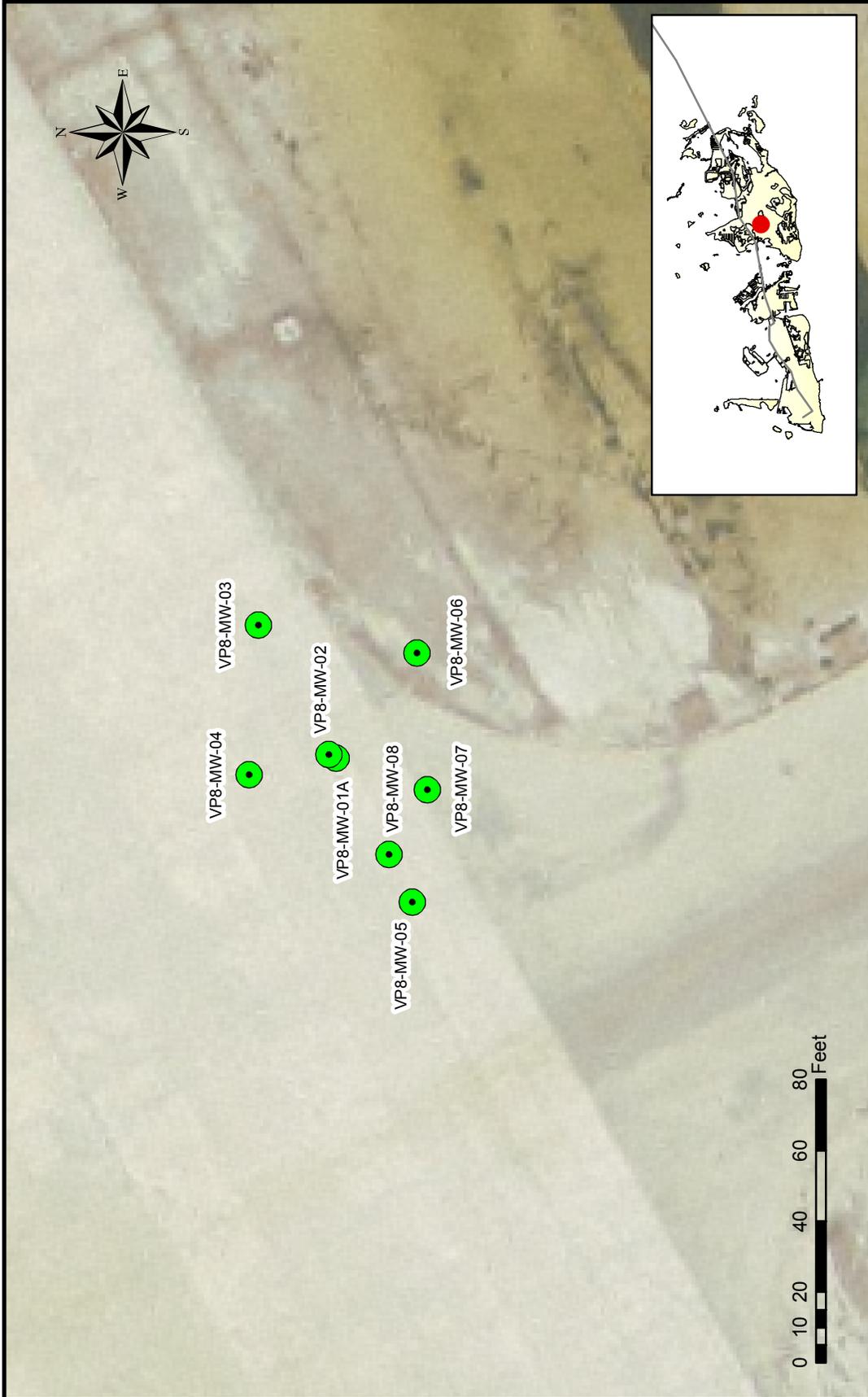
- Monitoring Wells

DRAWN BY KHH	DATE 09/09/2008
CHECKED BY DGH	DATE 09/09/2008
COST/SCHED AREA	
SCALE AS NOTED	



**BUILDING 1280
WELL ABANDONMENT FALL 2008
NAVAL AIR STATION
KEY WEST, FLORIDA**

CONTRACT NO. 0122	DATE 09/09/2008
APPROVED BY CMB	DATE
APPROVED BY	DATE
FIGURE NO. 3-1	REV. 0



Legend

 Monitoring Wells

DRAWN BY KHH	DATE 09/09/2008
CHECKED BY DGH	DATE 09/09/2008
COST/SCHED AREA	
SCALE AS NOTED	



**VALVE PIT NO. 8
WELL ABANDONMENT FALL 2008
NAVAL AIR STATION
KEY WEST, FLORIDA**

CONTRACT NO. 0122	DATE 09/09/2008
APPROVED BY CMB	DATE
APPROVED BY	DATE
FIGURE NO. 3-2	REV. 0

4.0 WELL ABANDONMENT PROCEDURES

Monitoring wells will be abandoned according to the procedures outlined by TtNUS, the Florida Department of Environmental Protection (FDEP), and the South Florida Water Management District (SFWMD) in SOP GH-2.9, Regulation 62-532.440, and Chapter 40-E.531, respectively. These procedures are found in Appendix A, and will be performed by a licensed drilling contractor.

Well abandonment typically includes removal of the well cover, demolition and removal of the concrete pad (if present), overdrilling the active or abandoned well riser and screen, removal of all riser and screen materials from the ground, grouting the hole/well, and restoring the area to original conditions.

Note that abandonment will require PVC well casings to be completely removed from the ground by overdrilling the casing. The resulting hole will be filled from bottom to top with grout by either pressure grouting or pouring grout using a tremmie pipe. The existing well pad will be removed and disposed of by the subcontractor. Construction materials similar to the surrounding materials (i.e., concrete, asphalt, or soil) will be used to fill the space created by removing the well pad and will be finished to grade.

Abandonment activities will also include wells that had been previously abandoned in place. These wells will be completely removed from the ground by overdrilling. The associated concrete pads and manholes will be removed and disposed of appropriately.

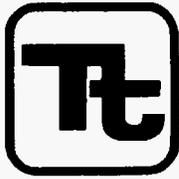
REFERENCES

BBL (Blasland, Bouck, & Lee, Inc.), 2000. Site Assessment Report (SAR), Valve Pit No. 8, Boca Chica, NAS Key West, Florida, January.

TtNUS, 2007. Well Abandonment Plan for Various Sites. Prepared for the Department of the Navy, Southern Division, Naval Facilities Engineering Command, Aiken, South Carolina, August.

IT (IT Corporation), 1994. "RCRA Facility Investigation/Remedial Investigation, Final Report," NAS Key West, Boca Raton, Florida. Prepared for SouthDiv, North Charleston, South Carolina, June.

APPENDIX A
STANDARD OPERATING PROCEDURES



TETRA TECH NUS, INC.

STANDARD OPERATING PROCEDURES

Number GH-2.9	Page 1 of 5
Effective Date 09/03	Revision 2
Applicability Tetra Tech NUS, Inc.	
Prepared Earth Sciences Department	
Approved D. Senovich <i>ds</i>	

Subject
WELL ABANDONMENT

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1.0 PURPOSE

Well abandonment is that procedure by which any monitoring well is permanently closed. Abandonment procedures are designed to prevent fluids from entering or migrating within the monitoring well. Therefore, an abandoned monitoring well must be sealed in such a manner that it can not act as a conduit for migration of contaminants from the ground surface to the water table or between aquifers.

It is important that the appropriate state or local agency be notified of monitoring well abandonment. The application of and adherence to this SOP must be tailored to applicable state, local, and Federal regulatory requirements.

2.0 SCOPE

The methods described in this procedure shall be used for all projects requiring well abandonment where specific state, local, or Federal regulations are unavailable. An abandoned well shall be filled and sealed so that it will not act as a pathway for the interchange of water between the surface and subsurface or present a hazard to the environment.

3.0 GLOSSARY

Well - Any constructed access point to an aquifer, confined or unconfined, including, but not limited to, test borings, hydropunch holes, monitoring points, and production wells.

Abandon - To permanently discontinue the use of a well. Any well shall require abandonment when it is no longer serving as a monitoring point or is in such a state of disrepair that continued use for the purpose of obtaining groundwater is impracticable, or when it has been permanently disconnected from any water supply system or irrigation system.

4.0 RESPONSIBILITIES

Project Manager - It shall be the responsibility of the Project Manager and/or Project Hydrogeologist to determine the applicability of well abandonment, based on the established scope and objective of the project and program-specific requirements. It shall be the responsibility of the Project Manager (or designee) to ensure that the procedures established for well abandonment are thoroughly specified and/or referenced in the relevant project planning documents. It shall be the responsibility of the Project Manager to ensure that the Field Operations Leader is familiar with the proper procedures for well abandonment and confirm the supervising project geologist or the subcontractor performing the well abandonment are qualified to perform such activities.

Field Operations Leader (FOL) - It shall be the responsibility of the Field Operations Leader to ensure that all field technicians and/or drilling personnel are thoroughly familiar with this Standard Operating Procedure. It shall be the responsibility of the FOL to ensure that the procedures identified in this SOP are used during well abandonment.

5.0 PROCEDURES

5.1 General

Well abandonment is warranted when the project team has reason to believe, on the basis of local conditions, that the well is causing or is a potential source of pollution to an aquifer; is a production well that is producing water that is polluted; or does not have a certificate of potability, if required. Wells may

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also be abandoned once their designed purposes have been fulfilled and are determined to no longer be of use.

Well abandonment is conducted to eliminate physical hazards, prevent groundwater contamination, prevent intermixing of aquifer waters, and conserve aquifer yield and hydrostatic head.

Please note Federal, state, and local regulations concerning this activity may vary. Therefore, applicable regulatory requirements should be reviewed to determine the need for Licensed/Certified Well Drillers to complete/oversight this activity.

5.2 Material for Sealing

Acceptable sealing materials include concrete, portland cement grout, sodium-base bentonite clay, or combinations of these materials. These materials are defined as follows:

- Concrete may be used for filling the upper part of a well or water bearing formation, or plugging short sections of casing and filling large diameter wells.
- Portland cement grout is superior for sealing small openings, penetrating any annular space outside the casing, and for filling voids in the surrounding formation. Portland cement grout shall be composed of one bag of Type I cement per 6 to 8 gallons of water. Two parts sand to one part cement may be added.
- Bentonite clay, when applied as a heavy mud-laden fluid under pressure, has most of the advantages of cement grout, but under some conditions may be carried away into the surrounding formation. A bentonite clay mixture shall be composed of not less than 2 pounds of clay per gallon of water. Bentonite clay may not be used where it will come in contact with water of a pH below 5.0 or total dissolved solids (TDS) content greater than 1,000 mg/L or both. Bentonite may also be added to cement grout to add flexibility.

Fill materials include clay, silt, sand, gravel, crushed stone, or a mixtures of these materials may be used as a filler in sealing a well when used in conjunction with the sealing materials described above. Organic material may not be used and fill material may be required to be disinfected or certified clean prior to use. Spent drilling muds or drill cuttings are not to be used to seal a well.

5.3 Procedures for Sealing Wells

5.3.1 Preliminary Considerations

Several factors should be considered to determine the appropriate well abandonment method. These factors include:

- Conditions of the well.
- Details of well construction, including casing material, diameter of casing, depth of well, and well plumbness.
- Obstructions within the well that may interfere with filling or sealing.
- Hydrogeologic setting.
- Level of contamination and the zone or zones where it occurs.
- Regulatory requirements.

Degraded wells may not permit casing removal by pulling. Also, the casing material may dictate whether a casing can be removed intact. Stainless steel will have a higher tensile strength than PVC and may hold

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together while pulling the casing; PVC well casing may break under pulling and may need to be overdrilled to remove it. The depth of the well and well plumbness may limit casing removal depending on whether a casing is pulled or overdrilled. In some cases, casings can be left in-place if they are properly filled with appropriate backfill.

The formation lithology influences the selection of casing removal. Unconsolidated materials can be drilled with hollow-stem augering techniques whereas consolidated materials cannot. Unconsolidated materials may also cave-in during well casing removal.

5.3.2 Filling and Sealing Procedures

Drilled wells (all wells not dug) shall be filled with sealing material or a combination of sealing material and fill material.

In some cases, well casing removal is necessary for well abandonment. If the borehole is unstable and may cave-in, sealing material will be emplaced simultaneously during casing removal. If the well is not grouted, casing may be pulled with hydraulic jacks or a drilling rig. It may also be pulled by sandlocking. Sandlocking consists of lowering a pipe wrapped with burlap approximately 2/3 of the well depth and filling the burlap wrap with sand. The pipe is slowly lifted and locks the sand, pulling the casing. Well casings can also be removed by overdrilling. Wells can be overdrilled with larger diameter hollow stem or solid stem augers or direct rotary techniques, using air or mud. Augers used for overdrilling should be at least 2 inches larger in diameter than the diameter of the well casing.

If well casing is in poor condition or is grouted in place, the casing may be ripped or perforated and filled and pressure grouted in place.

Abandoned wells shall be filled with the appropriate filling and sealing material placed from the bottom of the well upward. When Portland cement grout or concrete is used, it shall be placed in continuous operation using a tremie pipe. Sealing material shall be placed in the interval or intervals to be sealed by methods that prevent free fall, dilution, and/or separation of aggregates from cementing material.

A well constructed in unconsolidated material in an unconfined groundwater zone shall be filled and sealed by placing fill material in the well to the level of the water table, and filling the remainder of the well with sealing material. If the water table is at a depth greater than 40 feet, a minimum of 40 feet of sealing material shall be required.

A well which penetrates several aquifers or formations shall be filled and sealed in such a way as to prevent the vertical movement of water from one aquifer or formation to another. If the casing has been removed, sealing material shall be placed opposite the confining formations and from the surface down to the first confining formation. Sand and other suitable fill material may be placed opposite the producing aquifer. Ideally, the entire well can be filled with sealing material. If the casing has not been removed, the entire well shall be filled with sealing material.

A well penetrating creviced or cavernous rock shall be filled using coarse fill material opposite the cavernous or creviced rock portions of the well. Sealing material shall extend from the top of the unfractured rock portion of the well or base of the casing, whichever is deeper, to the surface. The minimum depth of sealing material may not be less than 10 feet.

In the case where wells penetrate specific aquifers where conditions necessitate the sealing of specific aquifers or formations, the annular space in the area of the specific aquifer or formation shall be sealed during the abandonment of the well.

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A dug well exceeding 24 inches in diameter shall be filled and sealed by placing fill material (excluding clay or silt) in the well to a level approximately 5 feet below the land surface, and placing a 3 foot plug of sealing material above the fill. The remainder of the well shall be back filled with soil material.

6.0 REFERENCES

Maryland Department of the Environment (MDE Regulations); Title 26, Subtitle 04; Regulation of Water Supply, Sewage Disposal, and Solid Waste; Chapter 4--Well Construction.

U.S. EPA, February 1990. Handbook of Suggested Practices for the Design and Installation of Ground-Water Monitoring Wells.