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MCRD PARRIS ISLAND
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LETTER OF TRANSMITTAL, GEOLOGIST CERTIFICATION AND APPENDIX B LETTER WORK PLAN ADDENDUM FOR MONITORING WELL INSTALLATION AT SITE 45 DRY CLEANING FACILITY SPILL AREA MCRD PARRIS ISLAND SC
9/13/2001
TETRA TECH NUS

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PITT-09-1-019

September 13, 2001

Project Number: N0502

Commander, Southern Division
Naval Facilities Engineering Command
ATTN: Mr. Arthur Sanford (ES322)
2155 Eagle Drive - 29406
North Charleston, South Carolina 29406

Reference: CLEAN Contract No. N62467-94-D-0888
Contract Task Order No. 0127

Subject: Site/SMWU 45 - MWR Dry Cleaners Work Plan
Appendix B - Permanent Monitoring Well Installation
MCRD Parris Island, South Carolina

Dear Mr. Sanford:

Please find two copies of the subject plan for your use. This work plan were developed in accordance with discussions during the MCRD Parris Island Partnering Team meeting in July 2001 and a summary table distributed to the team in August 2001. We would like to start well installation on approximately October 2, 2001 and request quick review/concurrence from the Partnering Team. Copies have been distributed as indicated below.

If you have any questions or require additional information, please call me at (412) 921-8375.

Sincerely,

David D. Brayack
Task Order Manager

DDB/db
Enclosure

Cc: Mr. T. Dillon, NOAA (Electronic Copy - EC)
Ms. D. Duncan, USFWS (EC)
Mr. D. Ewing, CH2MHILL (EC)
Mr. D. Hargrove, SCDHEC (EC)
Mr. T. Harrington, MCRD PI (Paper Copy (5) -PC, EC)
Mr. D. Keefer, Parallax (EC)
Mr. M. Perry/File, TtNUS (PC)
Mr. R. Pope, USEPA (PC, EC)
Mr. J. Stamps, SCDHEC (PC, EC)
Ms. P. Wendt, SCDNR (EC)
Ms. D. Wroblewski, TtNUS (w/o attachment)

CERTIFICATION PAGE

REGISTERED SOUTH CAROLINA PROFESSIONAL GEOLOGIST CERTIFICATION

By affixing my seal to this report, I certify that the geologic data and interpretations stated in this *Draft Letter Work Plan Addendum for Monitoring Well Installation at Site/SWMU 45, MWR Dry Cleaning Facility, MRCD Parris Island, South Carolina,* are true and accurate to the best of my knowledge. I further certify that I am registered to practice geology in the State of South Carolina and that it is within my professional expertise to verify the correctness of this information.

Keith W. Henn

Keith W. Henn, P.G.
Registration Number 2242

9/13/01
Date

APPENDIX B
LETTER WORK PLAN ADDENDUM FOR MONITORING WELL INSTALLATION AT SITE/SWMU 45 MWR DRY CLEANING FACILITY MCRD PARRIS ISLAND, SOUTH CAROLINA

1.0 INTRODUCTION

Groundwater contamination has been found in surficial monitoring wells installed above peat and clay units found at a depth of approximately 20 feet below ground surface (bgs) at Site/SWMU (Site) 45. As a result, up to five deep monitoring wells are to be installed at Site 45 at MCRD Parris Island to determine groundwater quality conditions below the peat/clay units, which have a combined average thickness of about 5 feet at the site. A shallow monitoring well may also be installed adjacent to one of the deep monitoring wells. In addition, three shallow piezometers are to be installed near the Site 45 extraction wells, to provide drawdown data during the upcoming Site 45 shallow aquifer testing program.

2.0 FIELD ACTIVITIES

The field activities will include well drilling and installation, well development, and the disposal of investigation-derived waste (IDW). Each of these activities is described below. In addition, the wells will be used for aquifer testing activities, which are described in a separate work plan.

2.1 Well Locations

The approximate locations of the new monitoring wells and piezometers, along with the rationale for each well/piezometer, are described in Table 1 and shown on Figure 1. After construction, a licensed South Carolina surveyor will survey the new monitoring wells.

2.2 Well/Piezometer Drilling and Installation

The monitoring wells and piezometers will be installed and constructed in accordance with applicable state of South Carolina regulations (e.g., Code of Laws of South Carolina 1976, Regulation 61-71 Well Standards) and Volume II of the Master Work Plan (B&R Environmental, 1998). A formal request letter will submitted to South Carolina Department of Health & Environmental Control prior to advancement of the wells/piezometers, and a monitoring well record will be submitted within 30 days after completion. This work plan constituents the formal request letter for monitoring well/piezometer installation. The piezometers and any shallow wells will monitor the surficial aquifer, and the deep wells will monitor the

upper portion of the groundwater flow unit that directly underlies the peat/clay layer that is present at a depth of approximately 20 – 25 feet.

Piezometer/shallow well borings will be drilled using hollow stem auger drilling methods, with split barrel sampling performed as follows: at locations where no boring logs are available, continuous split barrel sampling will be performed for the purpose of determining soil lithology and the depth to confining unit(s). At locations where wells have previously been installed and detailed boring logs are available, continuous soil sampling will only be performed below these depths.

Deep well borings will be advanced by drilling down into the peat/clay confining unit, using hollow stem auger or mud rotary drilling methods, with soil sampling performed as necessary based on the above discussion. Six-inch diameter permanent steel casing will be seated approximately 2-3 feet into the confining unit and grouted into place, using cement/bentonite grout placed under pressure using a tremie pipe. After the grout has set up in accordance with manufacturer's recommendations, the boring will be continued down to the final depth using mud rotary drilling methods and split barrel sampling. Drill cuttings generated will be containerized in roll-off dumpsters. Characterization and disposal of the cuttings is discussed in Section 2.5.

The wells will be constructed with certified clean well construction materials. Monitoring wells/piezometers will be constructed of 2-inch inner-diameter (I.D.), flush-threaded polyvinyl chloride (PVC) well screen and compatibly threaded PVC well casing riser. The PVC will meet National Sanitation Foundation (NSF) Standard 14 as specified in United States Environmental Protection Agency (U.S. EPA) Region 4 Environmental Investigations Standard Operating Procedure and Quality Assurance Manual (EISOPQAM - U.S. EPA, 1996). PVC is appropriate for the application because sorption and leaching are not of sufficient impact to affect the pipe, and PVC is expected to function properly for the expected duration of this project.

Well screens for piezometers and monitoring wells will be 10 feet long with 0.010-inch openings. A primary filter pack of clean silica sand (U.S. Standard sieve size No. 20-30) will be installed from 6 to 12 inches below the bottom of the well to a minimum of 2 feet above the top of the well screen. A minimum 2-foot-thick seal of 100 percent sodium bentonite pellets will be installed above the primary filter pack and allowed to hydrate in accordance with the manufacturer's recommendations. After installation of the bentonite seal, the seal will be hydrated with potable water. The annular space above the bentonite seal will be grouted with neat cement or a bentonite/cement mixture from the top of the bentonite seal to a point at least 2 feet bgs. The concrete used to form the pad will fill the remaining annular space.

All wells and piezometers will be labeled with well tags. The well tags will contain the following information:

- Well identification number
- Date of construction
- Drilling contractor and certification number
- Depth of well
- Screened interval
- Latitude and longitude of well location

The monitoring wells will be developed to remove formation cuttings (as well as any residual drilling fluids), as described in the Master Field Sampling Plan, Volume II (B&R Environmental, 1998). Each monitoring well will be equipped with a steel protective casing with a 3-foot by 3-foot concrete pad and bollards. The concrete pad will extend a minimum of 6 inches below the ground surface.

2.3 Well Development

Development of the groundwater monitoring wells will be performed using a surge block and electric pump with discharge tubing. The surge block is used to sweep the screen interval (and filter pack) several times throughout the development process. The well water will be pumped into 55-gallon drums or bulk containers, labeled as IDW, and sampled/analyzed for disposal as discussed in Section 2.5. Water will be collected for field monitoring in a stainless-steel beaker, and an Horiba U-10 will be used to measure field parameters consisting of temperature, specific conductance, pH, salinity, dissolved oxygen, and turbidity. At least three times the calculated well volume of water will be removed during development. If potable water is used to fill the augers during drilling to prevent sand from flowing into the augers, to remove a sand bridge during installation of the sand pack, or to flush the borehole and hydrate the bentonite seal, the amount of water used (measured in 5-gallon buckets) will be noted in the field book. Five times that amount will be removed before the minimum of three well volumes is removed. Readings will be collected until the field parameters, with the exception of dissolved oxygen, stabilize and the required removal volume of water for each well is removed.

A target turbidity of 5 to 10 NTUs will be used in an attempt to reduce the turbidity as much as possible during the development phase. Time pumped, volume of water pumped, and the turbidity of the water will be used to determine whether to suspend development once stabilization has been achieved.

2.4 Aquifer Testing

Slug tests will be performed at all newly installed monitoring wells and piezometers in accordance with the Master Field Sampling Plan, Volume II (B&R Environmental, 1998) and the Site 45 Aquifer Testing Plan. The data generated from these tests will be used to verify the local hydrologic characteristics. Selected wells will also be monitored during upcoming pumping test activities at Site 45.

2.5 Investigation-Derived Waste (IDW) Disposal

The generated waste will be containerized as discussed above, sampled for disposal criteria, and stored at a temporary storage location until the results of the analytical data are available. The IDW will then be disposed of in an appropriate manner.

TABLE 1

ADDITIONAL PERMANENT MONITORING WELLS
SITE/SWMU 45 - MWR DRY CLEANING FACILITY
MCRD PARRIS ISLAND, SOUTH CAROLINA

Phase	Objective	Well ID/ Depth	Rationale
1. Deep Groundwater Evaluation	• Complete delineation of potentially impacted deep groundwater. • Determine the deep groundwater horizontal flow direction. • Determine the vertical hydraulic gradient. between surficial and deep groundwater	PAI-45-MW01D/ 32-42 feet bgs.	• Monitoring well is to be installed to determine vertical hydraulic gradient at MW01 cluster; and used in conjunction with other deep monitoring wells to determine horizontal gradient across Site 45. • Monitoring well will also be use to determine the quality of the deep groundwater. • This location is currently believed to be hydraulically up gradient of the Site.
		PAI-45-MW04D/ 32-42 feet bgs.	• Monitoring well is to be installed to determine vertical hydraulic gradient at MW04 cluster; and used in conjunction with other deep monitoring wells to determine horizontal gradient across Site 45. • Monitoring well will also be use to determine the quality of the deep groundwater. • This location is currently believed to be potentially hydraulically down gradient of the Site.
		PAI-45-MW05D/ 32-42 feet bgs.	• Monitoring well is to be installed to determine vertical hydraulic gradient at MW05 cluster; and used in conjunction with other deep monitoring wells to determine horizontal gradient across Site 45. • Monitoring well will also be use to determine the quality of the deep groundwater. • The location is currently believed to be hydraulically down gradient of the Site.
1A	• Delineate horizontal extent of deep fuel-contaminated groundwater associated with PAI-45-TW19.	PAI-45-MW09D/ 32-42 feet bgs.	• Monitoring well is to be installed down gradient of deep fuel-type contamination detected at PAI-45-TW19. The well is to be installed after wells PAI-45-MW01D, 04D, and 05D are installed, and the hydrostatic head in these wells contoured to better define groundwater flow directions.

TABLE 1 (Continued)
ADDITIONAL PERMANENT MONITORING WELLS
SITE/SWMU 45 - MWR DRY CLEANING FACILITY
MCRD PARRIS ISLAND, SOUTH CAROLINA

Phase	Objective	Well ID/ Depth	Rationale
1B	• Contingency well cluster in the event that the deep down gradient direction is not defined by the wells identified above.	PAI-45-MW10SU/ 3-13 feet bgs PAI-45-MW10D/ 32-42 feet bgs	• The need for these wells is contingent on the deep groundwater flow directions measured in wells PAI-45-MW01D, 04D, and 05D. If the deep groundwater flow direction is not through monitoring wells PAI-45-MW05D or -04D, then another deep down gradient well will be required. The location of this well cluster is to be determined. • If the deep monitoring well is installed, then a shallow monitoring well will also be installed to evaluate the vertical groundwater flow gradient.
2. Pump Tests	• Better define characteristics of the surficial aquifer at Site 45.	PZ095, 5-15 feet bgs	• Piezometer is to be installed approximately 5 feet south of existing groundwater extraction well RW1 to provide "near extraction well" drawdown data for pump tests.
		PZ115, 5-15 feet bgs	• Piezometer is to be installed between existing groundwater extraction wells RW2 and RW3 to provide drawdown data for pump tests.
		PZ105, 5-15 feet bgs	• Piezometer is to be installed approximately 5 feet south of existing groundwater extraction well RW2 to provide "near extraction well" drawdown data for pump tests.

The surficial aquifer at Site 45 is defined as groundwater from the water table surface down to the top of the clay/peat unit at a depth of approximately 15 to 20 feet below ground surface.
The deep aquifer at Site 45 is defined as groundwater from the bottom of the clay/peat unit at a depth of approximately 20 to 25 feet to approximately 55 to 70 feet below ground surface.
The monitoring wells installed in 1997 will be re-titled to reflect the site number (45) instead of the building number (193), and the "S" and "D" will be replaced with "SU" - surficial upper (5 to 10 feet bgs) and "SL" - surficial lower (11 to 20), respectively. Note that these wells are located in the surficial aquifer.

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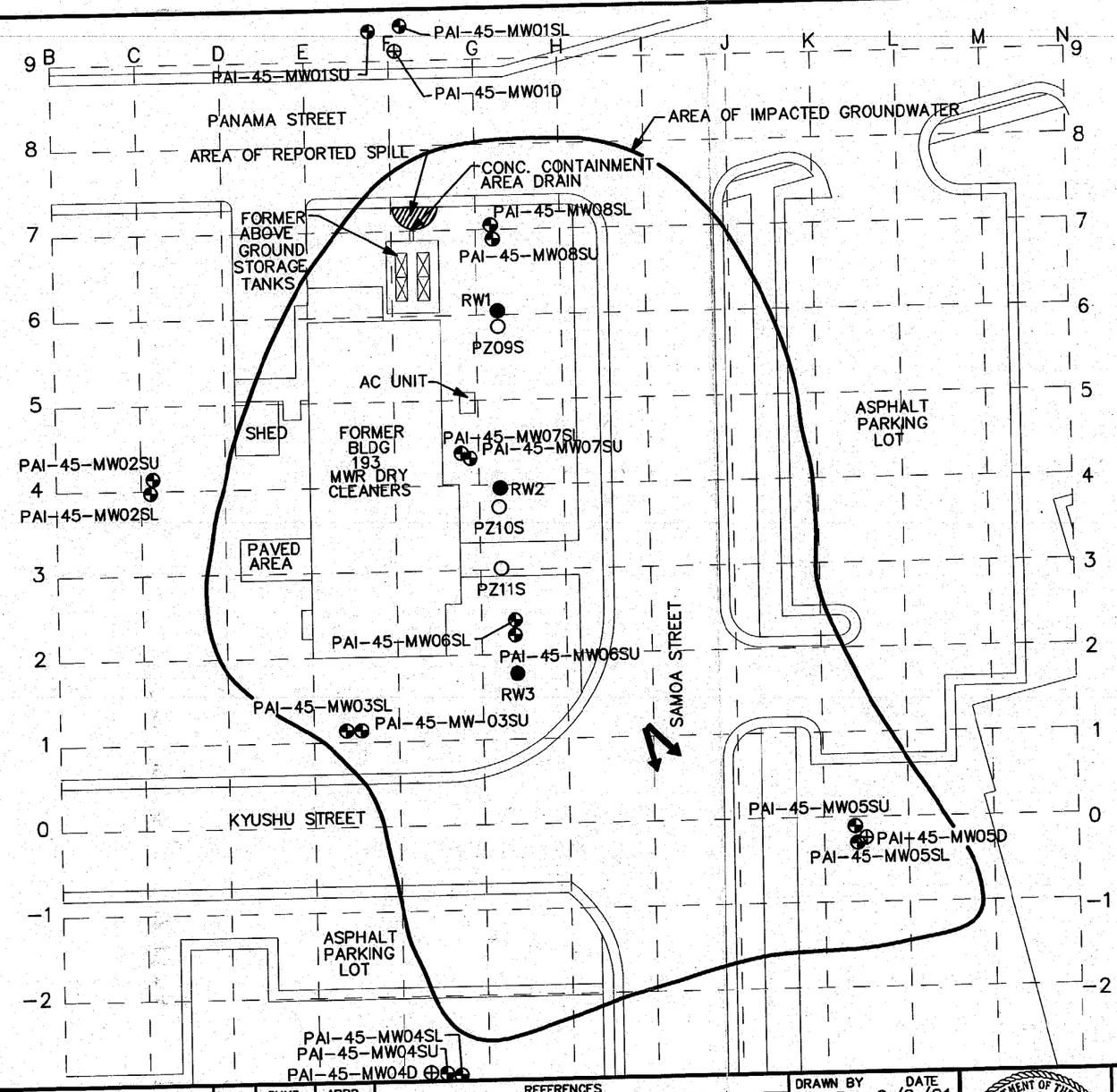

LEGEND:

- PZ11S — PLANNED PIEZOMETER FOR PUMP TESTING
- PAI-45-MW-SU — EXISTING PERMANENT MONITORING WELL
- RW1 — RECOVERY WELL
- PLANNED DEEP PERMENANT MONITORING WELL
- GROUNDWATER FLOW DIRECTION

NOTE:

DEEP MONITORING WELLS PAI-45-MW10SU/D AND PAI-45-MW09D LOCATIONS TO BE DETERMINED.

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SCALE IN FEET

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY HJP DATE 9/6/01
CHECKED BY DATE
COST/SCHED-AREA
SCALE AS NOTED

DEPARTMENT OF THE NAVY · SOUTHERN DIV FACILITIES ENGINEERING COMD

WELL LOCATIONS
SITE 45 – MWR DRY CLEANING FACILITY
MCRD PARRIS ISLAND
PARRIS ISLAND, SOUTH CAROLINA

CONTRACT NO. 0502
APPROVED BY DATE
APPROVED BY DATE
DRAWING NO. FIGURE 1
REV. 0

FORM CADD NO. SDIV_BH.DWG - REV 0 - 1/20/98

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