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SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL  
COMMENTS RESOURCE CONSERVATION AND RECOVERY ACT FACILITY  
INVESTIGATION REPORT ADDENDUM AREA OF CONCERN 550 (AOC 550) ZONE E CNC  
CHARLESTON SC  
9/24/2002  
SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL



MEMORANDUM

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**TO:** Jerry Stamps, Engineer Associate  
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Bureau of Land and Waste Management

**FROM:** Jo Cherie Overcash, Hydrogeologist  
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Bureau of Land and Waste Management

*JCO*

**DATE:** 23 September 2002

**RE:** Charleston Naval Complex (Navy)  
SC0 170 022 560  
Charleston County

*RFI Report Addendum Area of Concern 550, Zone E*  
Dated July 2002; Received July 25, 2002

Site Visit September 4, 2002, Mr. Rob Harrell and DHEC's CNC Team

As requested, the *RFI Report Addendum Area of Concern 550* referenced above has been reviewed with respect to the requirements of R.61-79.264 Subpart F of the South Carolina Hazardous Waste Management Regulations (SCHWMRs), the Environmental Protection Agency's (EPA) RCRA Facility Assessment guidance document dated October 1988, and the revised EPA Region IV Environmental Compliance Branch Standard Operating Procedures and Quality Assurance Manual (SOP/QAM) dated May 1996, the CNAV Final Comprehensive Sampling and Analysis Plan dated 30 August 1994, and CERCLA 120(h) as amended.

According to the RCRA Facility Assessment (RFA), area of concern (AOC) 550 was a boiler house for the Marine Corps from 1927 to 1941. This boiler house has been identified as Building 1111. The RFA recommended confirmatory sampling at AOC 550 due to the potential of past releases, the numerous migration pathways and associated exposure potential. During the investigation it was learned that Building 1111 was a transportable boiler house and that it had been located both north and south of Building 62. The Division of Hydrogeology has concerns regarding AOC 550, as follows.

### Site Visit:

1. According to the facility's geographic information system (GIS) database, there are four monitoring wells in the vicinity of AOC 550; grid wells GDEGW22 and GDEGW22D are depicted at the northern AOC 550 while E550GW001 and E550GW002 are depicted at the southern AOC 550. However, neither grid well GDEGW22D nor E550GW002 exists in the field. Moreover, there is no data in the database from these wells. The Navy should clarify this discrepancy.

### Concerns:

2. The RCRA Facility Investigation, of which confirmatory sampling is the first step, was conducted under the assumption that this area of the Base would remain industrial. However, the Navy has requested a "no further action" (NFA) decision for this unit, which would be based on unrestricted land use. The surface and subsurface soil data generated during the RFI must be screened against residential values (EPA Region III Risk-Based Concentration Table, October 2000) in order to determine whether there are constituents of concern for unrestricted land use.
3. In Section 2.2.1, Shallow Groundwater Results, the Navy states that no volatile organic compounds (VOCs) nor semi-volatile organic compounds (SVOCs) were detected at AOC 550 in concentrations above the laboratory detection limit. These statements are inaccurate in that the GIS database clearly lists detections of certain VOCs and SVOCs. For example, acenaphthene, dibenzofuran, fluorine, 2-methylnaphthalene, naphthalene, phenanthrene and 2,4-dimethylphenol are listed as "=" or "J" qualifiers. The Navy should acknowledge the presence of these VOCs and SVOCs in shallow groundwater. Please note that the tap water value for dibenzofuran is 2.4 micrograms per liter ( $\mu\text{g/L}$ ) at a hazard index of 0.1 for a non-carcinogen. The reported values for this parameter are: 21=  $\mu\text{g/L}$ , 8J  $\mu\text{g/L}$ , 15=  $\mu\text{g/L}$ , 21=  $\mu\text{g/L}$ . The Navy must revise the text and address the presence of dibenzofuran in shallow groundwater.
4. The RFI identified arsenic as a constituent of concern in shallow groundwater at AOC 550 because arsenic exceeded the maximum contaminant level (MCL) of 50 micrograms per liter ( $\mu\text{g/L}$ ) in two of four sampling events at shallow well E550GW001. Arsenic was reported at concentrations of 18.5  $\mu\text{g/L}$ , 19.9  $\mu\text{g/L}$ , 55.9  $\mu\text{g/L}$  and 93.2  $\mu\text{g/L}$ . The Navy further states that the arsenic concentrations at AOC 550 are less than the maximum concentration of 316 micrograms per liter ( $\mu\text{g/L}$ ) reported for Zone E shallow background as listed on Table 3 entitled Statistical Summary of the Analytical Results for Shallow Groundwater Background Samples by Zone for CNC Main Base of the CNC Team Notebook. However, the mean concentration reported on Table 3 for arsenic in Zone E is 36  $\mu\text{g/L}$ . **Please note that the Department has not approved these background ranges.** Furthermore, one should remember that the mean concentration of arsenic in Zone E is considerably less than the concentration detected at AOC 550.

The Navy references the hypothesis outlined in *An Overview of Arsenic Geochemistry, TEA Processes in Groundwater Systems, and Implications for the CNC Hydrogeologic Environment* (CH2M Jones, 2001) to explain the natural geochemical processes occurring at AOC 550. While geochemical processes may be occurring at AOC 550, the

Navy should substantiate their conclusion that the elevated concentration of arsenic in groundwater at AOC 550 is attributable to geochemical processes. The Navy should clarify terms like “elevated iron” and “iron-reducing conditions”. The Navy should more fully discuss the relationship among iron, manganese and arsenic as presented on Table 5-2 entitled Arsenic, Iron, and Manganese in Groundwater and as presented on Figure 5-1 entitled Arsenic Groundwater Detections. **Moreover it should be noted that the Division of Hydrogeology has not approved the referenced technical memorandum.**

While the highest concentration of arsenic in grid well EGDEGW022 (which should be included in the background data set) located at the northern AOC 550 has been estimated at 6.7 µg/L, the text does not discuss the relationship among arsenic, iron and manganese at this location either, nor does the text explain how it is that the concentration of arsenic at the northern AOC 550 is so much less than the concentrations found at the southern AOC 550.

The Navy should substantiate their conclusion that the elevated concentration of arsenic in groundwater at AOC 550 is attributable to geochemical processes. The Navy should provide additional data to support this conclusion. For example, the Navy should include groundwater pH values and an explanation of how pH may affect the mobility of certain metals, namely arsenic; the Navy could speciate arsenic to aid in determining whether the elevated values can be attributed to natural geochemical processes. It is important to note that the total dissolved solid (TDS) values recorded in the GIS database for these wells do not preclude this groundwater from being considered a potential source of drinking water.

5. In Section 6.3 the RFI Report Addendum states that there “are no data suggesting that there was an impact to the sanitary sewers from this site.” However, according to the facility’s geographic information system (GIS) database, elevated concentrations of metals were reported at a number of direct push technology (DPT) locations along the sanitary sewer in the vicinity of AOC 550. For example, DPT 037GP074E1 is located at the southeast corner of the northern AOC 550. At this location, the GIS reports arsenic at 216.0 µg/L, chromium at 226.0 µg/L, lead at 379.0 µg/L, thallium at 12.8 µg/L and zinc at 5.600 µg/L. Moreover, according to the GIS, lead was detected in DPT locations 037GP067E1, 037GP073E1, and 037GP075E1 in concentrations above the action level of 15 µg/L.

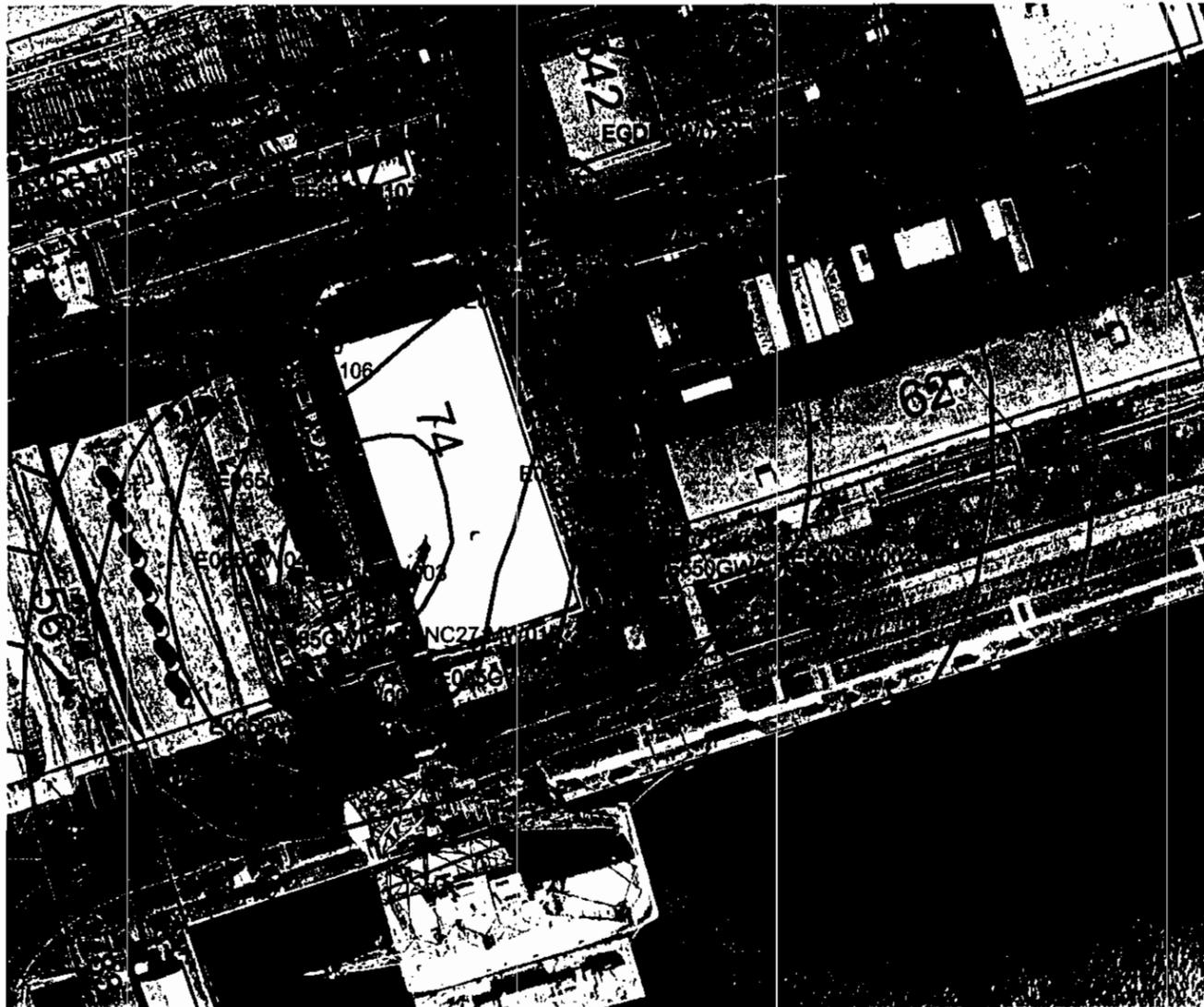
While the groundwater data collected from shallow permanent monitoring wells EGDEGW022 and E550GW001 do not indicate an adverse impact of these metals, neither of these wells is appropriately located to monitor groundwater quality at the southeast corner of the northern AOC 550. According to groundwater flow, the existing monitoring wells are sidegradient to this area of AOC 550. Based on available data, the Division of Hydrogeology concludes that groundwater quality has not been adequately delineated in this area of the Base. A permanent monitoring well in this vicinity is necessary in order to verify groundwater quality downgradient of the southern portion of the northern AOC 550 (see attached GIS figure). The Navy must propose to install a minimum of one additional permanent monitoring well to monitor groundwater quality at AOC 550.

In conclusion, the Navy should:

- Propose to install an additional monitoring well at the southern sector of the northern AOC 550.
- Analyze the groundwater samples from the newly installed well(s) for the full suite of RFI parameters.
- Include this additional groundwater data in a revised RFI Addendum.
- Revised the RFI Addendum Report to also address the concerns outlined above.

If you have any questions, please discuss them with me.

# CNC GIS: AOC 550, Zone E



- Zone E shallowcontours\_5-14-02.shp
- Samples: Groundwater Probe Samples
  - Groundwater Probe
- Samples: Groundwater Samples
  - Groundwater Well
- Fence
- Railroads
- Roads - Lines
- Roads - Text
- Annex Roads - Text
- Bridges
- Pavement
- Sidewalk
- Landfill
- Dredged Area
- Wetland
- Dike
- Golf Course
- Shoreline
- SWMU / AOC
  - AOC Boundary
  - SWMU Boundary
  - Buildings
  - Surrounding Area
- Zone Boundary

