

Previous Investigations

SCA Associates was initially asked to review the Navy's investigation of ground water contamination associated with former jet-engine testing operations at the plant. The purpose of that review was to help the RAB community members understand the results of the investigation and conclusions about the nature and extent of contamination, and to identify any short-comings, errors or additional actions that should be considered before moving forward with remediation.

I determined that the previous investigation approach, methods, analyses and interpretations were generally acceptable and reasonable. Some uncertainties and data gaps existed, however, and further study appeared warranted to confirm the nature and extent of contamination to enable selection of an effective remedial strategy to mitigate the ground water contamination. These uncertainties can be summarized as follows:

- Significant ground water contamination (i.e., VOCs exceeding state standards) was documented on-site at one location to a depth of about 200 feet below ground surface (bgs). The down-gradient extent of this contamination, however, was not known. No other samples were obtained from the corresponding depth/geologic strata at down-gradient locations.
- Significant migration could have been occurring in deep strata without the investigators' knowledge. Leakage of VOCs from the shallow water-bearing zone into deeper strata could have occurred, and once in the deep zone, significant migration could have resulted.
- A lack of data from deep strata in locations between the source area and the runway ponds, and between the runway ponds and sportsmen club, precluded ruling out the possibility that other areas of highly-contaminated ground water were present.
- Conditions could have been different than had been assumed since it had been three to six years since ground water samples were collected. Most of the data represented only a single sample event for each test well/boring. Contaminant concentrations, distributions and extent of free-phase petroleum could have changed due to water table fluctuations, dilution, and degradation processes.

Based on those considerations, I made the following suggestions for the Navy to consider as it planned further study and identification of potential remedial alternatives.

- Gather additional data on contaminant concentrations, distribution and transport in deep strata near the on-site source areas and down-gradient site to resolve uncertainty about the extent of deep ground water contamination.
- Establish and sample key ground water monitoring points to determine actual contaminant distribution and ground water flow conditions at all depths.

In June 2004, along with the RAB members and regulatory agency representatives I reviewed a draft work plan for further investigations. The final work plan addressed the comments we made on the proposed work; field work commenced in September 2004 after the work plan was approved.

Recent Investigations and Nature and Extent of Contamination

Extensive investigations were conducted at the site from September 2004 through the summer of 2005 to determine the extent of deep ground water contamination at the source area, to delineate the extent of off-site contamination, and to determine if ground water discharges into and/or migrates beneath the Peconic River (located more than one mile southeast of the fuel calibration area). The investigations (with numbers of borings or samples noted) are summarized below:

- Soil Borings with soil sampling and geophysical logging to determine stratigraphy;
- Vertical Profile Borings (11) with ground water samples at 20-foot intervals (105);
- Piezometer (2-inch diameter well) installation (24), ground water sampling, and water level measurement;
- Ground water sampling from existing monitor wells (10);
- Surface water sampling in the Peconic River (2);
- Laboratory analysis of ground water samples; and
- Evaluation and interpretation of all data.

The investigation activities and results were documented in the report *Data Summary Report for Site 6A – Fuel Calibration Area and Southern Area* dated September 2005. Based on review of the report, it appears that all work was performed according to the approved work plan, and consistent with current industry standards. Two deviations from the work plan occurred, however. One boring/piezometer planned for near the Peconic River was not constructed because the area was inaccessible, and a surface water sample planned for that area also could not be collected due to the inaccessible terrain.

The results of the recent investigation confirmed that contaminants of concern (VOCs) are present in the study area, but their concentrations are generally lower than previously observed. In general, the highest levels of contaminants exist on-site at the source areas.

In 2000, solvent VOC concentrations there totaled as much as 6,600 ug/L, or parts per billion (ppb). Fuel VOCs (benzene, toluene, ethylbenzene, and xylenes, or BTEX) were present there at up to 780 ppb. Levels of total solvent and fuel VOCs found in the recent investigation (2005) were 62 ppb and 22 ppb, respectively. In the past, free-phase petroleum was observed in that area; it was not observed to be present in 2005.

A map that shows the extent of contamination based on the most recent data is attached; past and recent maximum concentrations of contaminants are shown in the following tables.

Summary of Maximum Concentrations of Contaminants Detected On-Site

<u>Contaminant</u>	<u>State Standard (ug/L)</u>	<u>Concentration at Fuel Calibration Area Past/Recent (ug/L)</u>
1,1,1-TCA	5	2200 / 24
1,1-DCA	5	3600 / 41
1,1-DCE	5	37 / 1.9
Chloroethane	5	720 / 26
TCE	5	6 / ND
Benzene	0.7	44 / 5
Ethylbenzene	5	81 / 105
Toluene	5	180 / 97
Xylene	5	570 / 680
Vinyl Chloride	2	ND / ND

Summary of Maximum Concentrations of VOCs Detected Off-site in Southern Area

<u>Contaminant</u>	<u>State Standard (ug/L)</u>	<u>Concentration at Southern Area Past/Recent (ug/L)</u>
1,1,1-TCA	5	94 / 21
1,1-DCA	5	220 / 292
1,1-DCE	5	21 / 22
1,2-DCE	5	13 / ND
vinyl chloride	2	2 / ND
xylene	5	18 / ND
benzene	1	ND / 1.4

Other findings of the recent investigations are summarized as follows:

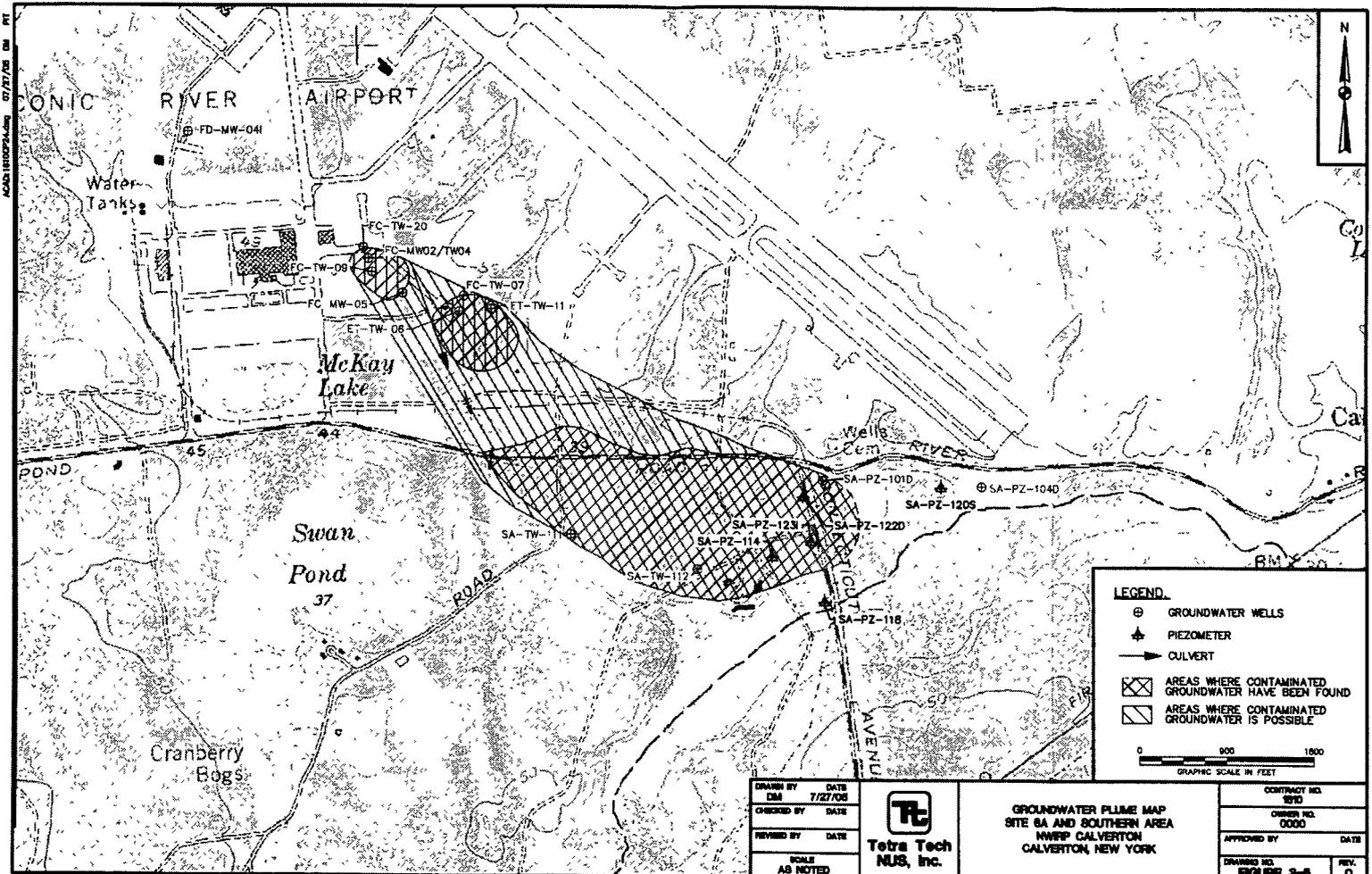
- Free-phase petroleum product extent was observed over a limited area and in small quantities.
- Downward vertical migration of VOCs is restricted by silty-clay strata that occur at about 60 feet bgs at the source area and at about 130 feet bgs downgradient in the Southern Area. VOC contamination was not observed below that depth, with the exception of one sample later determined to be invalid due to field or laboratory cross-contamination.

- No VOCs were detected in the surface water samples collected in the Peconic River.
- Ground water flow in the shallow strata in the study area was confirmed to be to the southeast. Ground water flow in the deeper strata, however, was found to be to the northeast (in uppermost deep strata) and to the east (in lowermost deep strata).
- Ground water in shallow strata (to a depth of 130 feet near the Peconic River) flows toward and discharges into the Peconic River. This includes ground water in areas south and east of the river. Deeper ground water may flow beneath the river.
- The nature and extent of ground water contamination is adequately delineated to enable the Navy to move forward with a Corrective Measures Study.

Conclusions and Recommendations

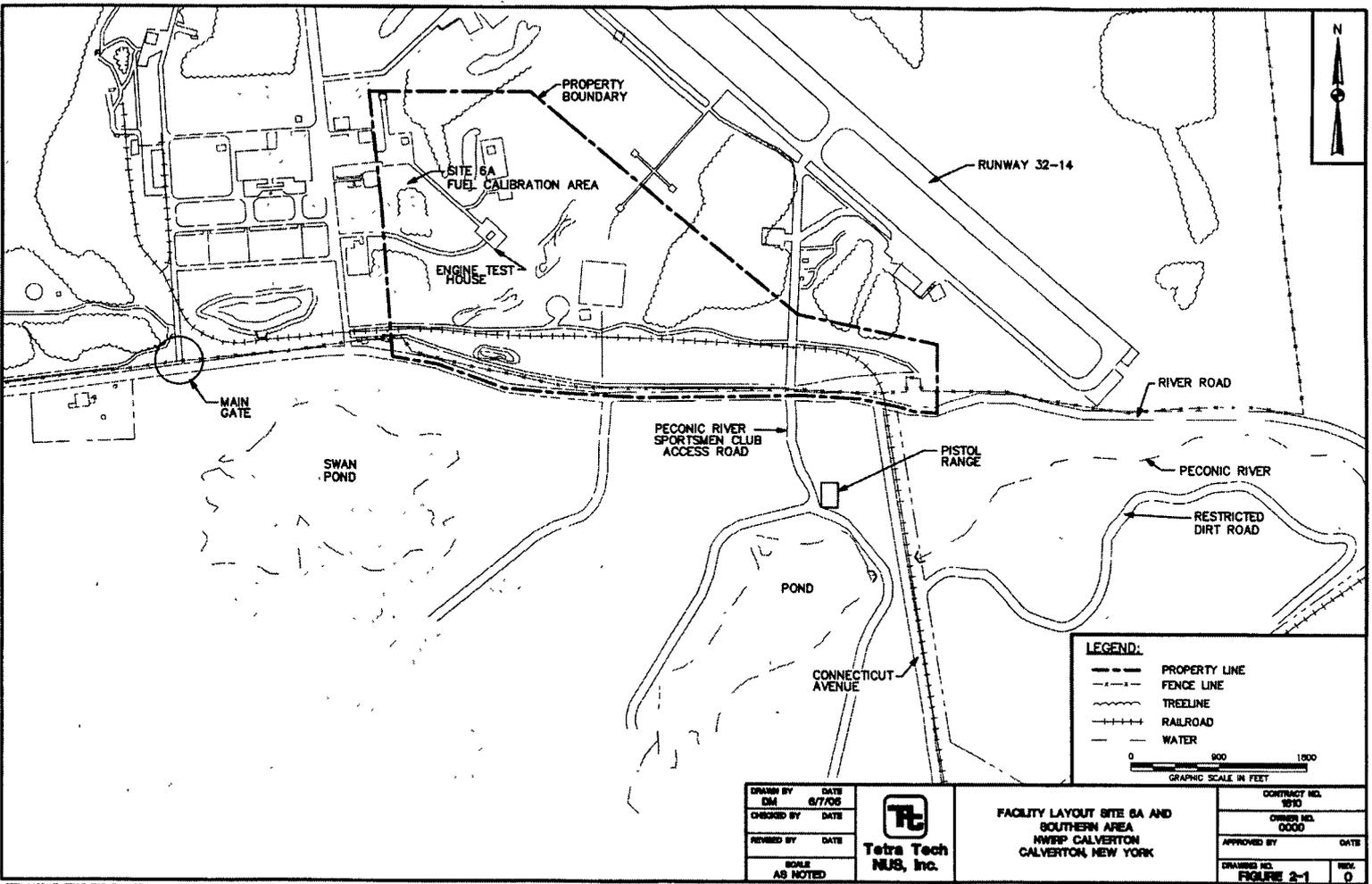
- In my opinion, the Navy conducted a thorough investigation of ground water contamination in the study area using appropriate techniques. The two deviations from the work plan (inability to access one planned ground water and one planned surface water sampling location) are minor and do not impair the study findings.
- The nature and extent of contamination in the study area is adequately delineated for the purposes of conducting a Corrective Measures Study to identify a remedy to manage actual and potential future risks to acceptable levels.
- The existing ground water contamination delineated by the investigations performed to date does not appear to result in unacceptable human health risks given the current situation as I understand it, which is:
 - The Peconic River appears to be the downgradient extent of contamination;
 - No one drinks or bathes or otherwise uses ground water recovered from the contaminated zones (the only known off-site well - at the Sportsmen's Club - has been shut down);
 - No structures exist over the contaminated ground water that are inhabited by people for significant periods of time for any duration (for example, a residence); and
 - Site-related contaminants are not in the Peconic River at detectable levels.
- Since deep ground water is now known to flow in different directions than shallow ground water, it may be prudent to consider including the deep ground water in any future ground water monitoring strategy to document that no site-related contamination exists on-site and/or is migrating off-site.

cc: James Colter



F081 CAD NO. TTR2-BUANG - REV 1 - 9/18/98

ACG:110021.dwg 07/28/06 DM RT



FROM LADD NO. 17145-BLPG - REV 1 - 8/28/98