Groundwater Monitoring Plan to Support HNP License Termination Plan

Connecticut Yankee Atomic Power Company

Haddam Neck Plant

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1.0 Purpose

The purpose of this groundwater monitoring plan is to define the requirements for verifying that groundwater contamination conditions at Connecticut Yankee Atomic Power Company's (CYAPCO) Haddam Neck Plant (HNP) meet the closure requirements as defined in the License Termination Plan (LTP) (Haddam Neck Plant License Termination Plan). The LTP specifies a minimum 18-month period of groundwater monitoring (to include two spring/high water seasons) to verify the efficacy of remedial actions at the facility. The monitoring period is to follow completion of sub-water table remedial actions and must be completed prior to license termination. The groundwater monitoring program is required to demonstrate that groundwater contaminant conditions are below the established LTP closure criteria (a maximum dose rate of 25 mrem/yr for all exposure pathways, and conformance to the Derived Concentration Guideline Levels, or DCGLs) and exhibit either stable or decreasing trends.

This document describes the groundwater monitoring plan that will be implemented to support license termination at the Haddam Neck Plant. The following sections describe the elements of the plan:

- Scope and Objectives
- Groundwater Monitoring Plan Requirements
- Groundwater Monitoring Well Network
- Groundwater Sampling and Analysis Requirements
- Quality Assurance
- Groundwater Monitoring Plan Implementation Schedule and Deliverables

A separate groundwater monitoring plan will be developed to demonstrate compliance with the State of Connecticut Department of Environmental Protection (CTDEP) Remediation Standards Regulation (RSR) Criteria in order to reach site closure under the Property Transfer program.

2.0 Scope and Objectives

The scope and objectives of the groundwater monitoring plan for license termination are described in this section.

2.1 Scope

The scope of this groundwater monitoring plan is confined to the portion of the Haddam Neck Plant site that either has historically exhibited plant-related groundwater contamination or may potentially exhibit plant-related groundwater contamination following decommissioning of plant facilities. The Haddam Neck Plant site is divided into the following functional areas (see Figure 2-1):

- The Industrial Area and Upper Peninsula. This portion of the site includes the former power reactor and generating station facilities, cooling water facilities, related waste processing and treatment facilities, former spent and new fuel storage facilities, maintenance shops, warehouses, and administrative facilities. These facilities occupied the major portion of the developed part of the site, including the upper (i.e., plant north) part of the peninsula that separates the cooling water discharge canal from the Connecticut River. This portion of the plant has historically exhibited plant-related groundwater contamination by radioactive constituents and is the primary focus of this groundwater monitoring plan.

- The Parking Lot and Emergency Operations Facility. This portion of the site includes the primary parking area, former warehouses, the storm-water retention pond, and the former emergency operations facility (EOF). No radioactive plant-related constituent release areas are located in this generally upgradient portion of the plant. Some selected wells in this area, however, will be monitored under this groundwater monitoring plan to ensure that contaminant plumes are bounded.

- The Lower Peninsula. The lower (plant southern) part of the peninsula between the discharge canal and the Connecticut River. The lower peninsula has exhibited very low-level, discontinuous detections of plant-related radionuclides in the northern-most portion. One well, MW-117, will be monitored under this plan to ensure that closure criteria are not exceeded in this area.

The functional areas of HNP identified below are not subject to the 18-month license termination groundwater monitoring activity:

- The Independent Spent Fuel Storage Installation (ISFSI). The ISFSI includes the spent fuel storage area and associated support facilities, and some former ancillary activity areas (i.e., the former shooting range and a bulky waste disposal area). Both the shooting range and bulky waste disposal areas are included on a request to release from the license (part of the Phase 2 release area). In addition, the release records stated that there are no detectable contaminants in the wells in those areas. The same release record set submitted indicated that the survey areas on which the ISFSI facilities were built are suitable for release from the license and that only a small part of the surveyed areas containing the ISFSI will be retained in the license. This remaining area is not subject to license termination at this time and is, therefore, not subject to groundwater monitoring in support of license termination.

- The Undeveloped Area of the Site ("Backlands"). The backlands includes the balance of the Haddam Neck Plant property not described above and is the majority of the total land area. Although some surface effects from historical stack releases may have occurred, the backlands are located upgradient from the HNP, and no apparent potential for groundwater contamination is identified.

2.2 Objectives

The objectives of this plan are two-fold:

1) to define a process by which groundwater radiological contamination conditions at the Haddam Neck Plant will be measured and documented during the monitoring period required for license termination; and

2) to provide a structure for groundwater monitoring activities that will ensure that the process is implemented appropriately and that the information generated will verify that groundwater conditions meet the specified closure conditions.

3.0 Groundwater Monitoring Requirements

Several conditions are identified in the License Termination Plan as precursors to starting the 18-month groundwater monitoring activity. These conditions are identified below:

- Complete the development of a groundwater model and conduct particle tracking under a variety of scenarios;
- Identify and finalize monitoring well locations and install monitoring wells;
- Allow areas on site where groundwater had been suppressed to recharge to seasonal norms; and
- Complete remediation, backfill, and radiologic assessment activities in the Tank Farm area, and any other radiological remediation needed below the water table.

As an additional enhancement in support of groundwater sampling, CYAPCO will require a minimum of five days between termination of monitoring well development activities and initiation of groundwater sampling for all newly installed monitoring wells.

These precursors have been completed and monitoring well locations have been finalized and all wells are installed, developed and the waiting period expired prior to initiation of sampling the newly constructed monitoring wells. Remediation of the Tank Farm area is complete and backfill and final radiological assessment activities have been completed in December 2005.

The groundwater table in the soil and bedrock remediation areas has recharged to seasonal norms. Active dewatering to support deep soil remediation and structure demolition was discontinued in August 2005. This included termination of operation of the containment foundation mat dewatering sump, which had operated almost continually throughout the HNP operation. Nine monitoring wells were selected for weekly water level measurement to assess water level recovery and include:

- MW-101S,
- MW-102S,
- MW-131S,
- MW-130,
- MW-508D,
- MW-109S,
- MW-106S,
- MW-107S, and
- MW-110S.

In addition, the water level in the mat sump was measured weekly to evaluate recovery. The observed water levels in these wells were contoured using a commercial data contouring software (Surfer™) and the resulting water level elevation contours were plotted over a site map indicating the well locations, location of remaining subsurface structures, and soil removal areas.

The contoured water elevations for 17 August 2005 revealed the expected groundwater depression in the central industrial area, immediately after stopping dewatering activities. The water level recovered to seasonal norms within 30 days of termination of dewatering, as indicated by the water elevation contours for 11 September 2005, and continued to rise as rainfall increased during September and October. Water level contour maps for the unconfined aquifer in August, September, and December and shown in Figures 3-1, 3-2, and 3-3, respectively. At this time, no residual effects of dewatering are observable on the groundwater levels at the site. Data-logging pressure transducers will be maintained in the nine monitoring wells used for this assessment and in the Connecticut River during the 18-month monitoring period to evaluate long-term water level changes.

Following completion of the precursor activities, the 18-month groundwater monitoring has commenced. The requirements for groundwater monitoring in support of license termination are described in this section. The general categories of requirements are as follows:

- Groundwater monitoring well network;
- Groundwater sampling and analysis requirements;
- Quality Assurance Requirements; and
- Groundwater Monitoring Deliverables.

These topics are discussed in subsections 3.2 through 3.5.

In support of the 18-month Groundwater Monitoring Plan, a summary of the hydrogeologic conceptual model for the HNP site and the contaminant distribution in groundwater are provided in Section 3.1 below.

3.1 Summary Overview of HNP Hydrogeologic Conceptual Model

A hydrogeologic Conceptual Site Model (CSM) was developed for the Haddam Neck Plant based on both the regional geologic setting and hydrogeologic and chemical data collected at the site (CH2M HILL, 2005). The hydrogeologic CSM developed for the HNP describes a complex, leaky, multi-unit aquifer system exhibiting hydraulic interconnection between the perched, unconfined, and confined aquifers as delineated at the facility. Groundwater occurs under unconfined, semi-confined, and confined conditions in the subsurface at the HNP.

A localized perched aquifer consisting of wetland fluvial deposits and fill material is situated beneath the parking lot area (Figure 2-1). An organic silt layer that extends throughout the outline of this former wetland exhibits aquitard properties and serves as a low-permeability flow barrier, allowing the perched water table to exist. Plant-related radionuclides have not been detected in the perched aquifer.

The water table or unconfined aquifer beneath HNP consists of the unconsolidated sediments interconnected with shallow weathered and/or intensely fractured bedrock. This aquifer system exhibits porous media flow characteristics. Groundwater flow properties within the native sediments are essentially the same regardless of lithology and grain size.

The confined aquifer beneath HNP consists of a complex network of interconnected fractures in crystalline bedrock that were developed in response to local and tectonic stresses. The crystalline rock matrix has negligible effective porosity or permeability. Therefore, groundwater flow in the bedrock is controlled by the secondary porosity and permeability developed within the fractures. The geometric distribution and openness, or aperture, of individual fractures controls groundwater flow and contaminant migration. Bedrock characterization data indicate groundwater flows beneath the HNP mainly along sub-vertical fractures, which are generally along strike of the foliation trends, and along sub-horizontal fractures associated with glacial unloading.

Groundwater in both the unconfined and confined aquifers flows southerly across the site towards the Connecticut River (Figure 3-3). The Connecticut River is the discharge boundary for both surface water and groundwater for the entire watershed, acting as the definitive endpoint for groundwater flow paths in the hydrogeologic CSM for the HNP.

The distribution of groundwater contamination at the HNP site has been monitored over the last several years by means of a quarterly sampling program. This monitoring program has shown that detectable concentrations of tritium and Sr-90 are present in site groundwater, but significant levels of Co-60 and Cs-137 have not been observed, especially in more recent years. This observation is consistent with the site-specific partition coefficients (K_ds) determined for radionuclides at HNP. The partition coefficients control the distribution of the radionuclides in groundwater, as compounds with low K_d values are strongly partitioned to groundwater relative to soil and geologic material, while compounds with higher K_d values are more readily partitioned to the solid phase. Tritium has a K_d value of zero and Sr-90 has the lowest K_d (i.e., 8 mL/g) of the remaining radionuclides at the site. Thus, the presence of tritium and Sr-90 in site groundwater is consistent with the site-specific K_ds determined for Sr-90, Co-60, and Cs-137.

The lower K_d for tritium relative to Sr-90 has resulted in tritium migrating into the deeper, confined aquifer at the HNP site. Detection of Sr-90 in groundwater is generally limited to the shallow, unconfined aquifer.

Source areas at HNP are described by two types: 1) Primary Release Areas, where contaminants, consisting largely of dissolved radionuclides in aqueous coolant and other process solutions, were released to the ground under various circumstances; and 2) Secondary Source Areas, consisting of surface and subsurface soil that was subsequently contaminated by the primary releases, either immediately on release, or due to downgradient migration of contaminants in groundwater. Secondary sources contained contaminants at concentrations above soil screening concentrations and could cause groundwater to exceed closure criteria in the future. The primary release and secondary source areas were remediated during demolition activities. The primary release areas for significant releases of radioactive materials and secondary source areas are shown in Figure 3-4.

Groundwater at HNP flows from the inland areas toward the Connecticut River in a generally north to south direction (Figure 3-3). The Connecticut River forms the discharge boundary for surface water as well as shallow and deep groundwater at HNP. Groundwater flow paths have been identified through observations of water elevation in multiple wells, and the flow paths have been simulated using the groundwater flow model for HNP (STRATEX LLC, 2005). Details of the hydrogeologic conceptual site model have been described previously (CH2M HILL, 2005). The general groundwater features are described below.

Within the near-surface portion of the unconfined aquifer, the groundwater flow is diverted by plant structures that intercept the bedrock/unconsolidated interface and extend to elevations above, or near to, the water table. These structures built onto/into bedrock include the following that will remain after demolition:

- The reactor containment building (RCB);
- The spent fuel pool;
- The foundation walls beneath the plant-north portion of the former service building;
- The discharge tunnels; and
- The B-switchgear building.

Historically, other structures would have diverted shallow groundwater, creating preferential flow pathways; these include the primary auxiliary building (PAB), the waste disposal building, the ion exchange building, and the spent resin facility. These structures were removed in their entirety during plant demolition. The diversion of shallow groundwater around remaining impediments to flow is illustrated in Figure 3-5.

Bedrock structural features (e.g., fracture sets and contacts between differing rock types) create preferential flow paths within the deeper bedrock. Of particular interest is a linear feature, believed to consist primarily of a near-vertical fracture set, in combination with intersecting near-horizontal fracture sets, that demonstrates connectivity (through hydraulic response during packer testing deep bedrock wells) extending from well MW-121A near the Connecticut River, to wells MW-103, within the former wastewater tank farm area. The general direction of groundwater flow in the deep bedrock (i.e., below structural interference) is illustrated in Figure 3-6. Figure 3-6 also illustrates the variability in flow patterns inherent to fractured rock systems. Areas of elevated hydraulic conductivity have been observed and inferred along structural features aligned with the rock foliation. These consist primarily of near-vertical fracture sets, rock foliation and contact zones. Secondary features exhibiting lower hydraulic conductivity include near-horizontal fracture sets at various elevations in the rock, as well as secondary mineral contacts (e.g., pegmatite dikes) that intersect the other features. Figure 3-7 is an aerial photograph of HNP that illustrates the exposed bedrock features in the former PAB footprint. Note the strong linear features aligned with the general north-south trending foliation. Also apparent are discontinuous pegmatite dikes that cross and sometimes align with the foliation.

The characteristic groundwater flow beneath the plant with ultimate discharge into the Connecticut River is illustrated in Figure 3-8 which presents simulated particle track flow paths from releases in the inland portion of the industrial area under post-closure hydraulic conditions (i.e., no dewatering, no mat sump operation, demolition in final configuration). Figure 3-9 illustrates a slightly different approach to flow path simulations. This figure shows reverse particle tracks (i.e., particles flowing backward from the river toward the inland portion of the industrial area) under historical operating conditions. In this scenario, the high conductivity preferential flow paths in bedrock appear to play a major role in groundwater flow direction.

3.1.1 Contaminant Distribution in Groundwater

Based on the results of the quarterly groundwater monitoring conducted since 1999 and site-specific behavior of tritium and Sr-90, the dimensions of the groundwater contaminant plumes resulting from historical releases at HNP are best defined by tritium and Sr-90. The distribution of tritium at HNP has been monitored since 1999 and has changed over time. Tritium in the unconfined aquifer has decreased over the last year due to source area remediation in the PAB area. Prior to remedial efforts, tritium was present across the site as summarized in Figures 3-10 and 3-11, which show the tritium distribution in the unconfined aquifer in December 2003. Prior to 2004, the unconfined aquifer was segregated into two separate geologic units: unconsolidated deposits and the shallow bedrock. Based on the refinement of the site conceptual model, these two hydrostratigraphic units have been combined into a single unconfined aquifer. In 2003, elevated tritium concentrations were observed across the site with distinct plumes mapped on both the east and west sides of the discharge tunnel (Figures 3-10 and 3-11) (CY, 2003a). In June 2005, the tritium distribution is significantly diminished with elevated tritium only present in the vicinity of the RCB (Figure 3-12) (CY, 2005). The decrease in tritium concentration in the unconfined aquifer is consistent with the source remediation completed in the PAB area.

The tritium plume defined in the confined aquifer system indicates that the bulk of the plume has already moved downgradient and away from the initial release points. The tritium plume in December 2003 is focused in the source areas, while the tritium plume mapped in June 2005 has significant concentrations well downgradient of the source areas (Figures 3-13 and 3-14). The highest tritium concentration (16,500 pCi/L) is currently observed in bedrock well MW-118A at a depth of 75 feet below ground surface and distinctly downgradient from the source areas (Figure 3-13), while the highest tritium concentration in December 2003 was associated with MW-103D (9,060 pCi/L) adjacent to the RCB and tank farm area (Figure 3-14) (CY, 2003a, 2005).

Based on observations and measurements in deep bedrock boreholes at HNP, the maximum depth of tritium contaminant migration is approximately 175 feet below ground surface (bgs), with the highest concentrations observed around 75 feet bgs in MW-118A (CY, 2005). At depths below 175 feet below ground surface, the formation exhibits a persistent upward pressure differential, consistent with the Connecticut River's function as a regional discharge boundary for groundwater.

In contrast to the widespread distribution of tritium at HNP, Sr-90 interacts with the aquifer matrix and is predominantly contained in the shallow, unconsolidated formation where it is retained. The observed Sr-90 concentrations generally diminish with distance from the source areas. Figures 3-15 and 3-16 illustrate the inferred distribution of Sr-90 in the unconfined and confined aquifers, respectively (CY, 2005).

3.2 Groundwater Monitoring Well Network

The groundwater monitoring well network that will be used for the license termination monitoring period includes wells in the perched, unconfined and confined aquifers located in the following general locations relative to historical contaminant releases and established plumes:

- Upgradient wells in areas apparently unimpacted by plant-related groundwater contamination;
- Wells located within contaminant release areas;
- Wells located downgradient of contaminant release areas; and
- Wells located along the downgradient site boundary.

A summary of the monitoring wells and associated parameters for each monitoring well is included in Table 3-1.

3.2.1 Monitoring Well Locations and Rationale

The rationale for the monitoring well network and its relationship to the source and plume areas is summarized in Table 3-2 and monitoring well locations are shown in plan view on Figure 3-17 (encompassing the central industrial area of HNP). Well construction diagrams for the monitoring wells are presented in Attachment 1 to this plan. Figure 3-17 illustrates the relative position of monitoring wells in the central industrial area, and Figure 3-18 illustrates the proposed monitoring wells in the peninsula area. Individual wells in the monitoring well network are identified by the primary purpose as upgradient wells, source area wells, or downgradient plume wells depending on their location (Table 3-2).

The proposed monitoring well network includes wells that characterize groundwater upgradient of the source areas, wells within and directly downgradient of the source areas, monitoring wells that characterize groundwater on the lateral portions of the defined plume, and wells in the downgradient plume areas. The monitoring well network also provides vertical profiling of the plume as wells are included in both the shallow, unconfined aquifer and deeper wells in the confined aquifer.

The wells established at HNP provide a functional network to monitor contaminants in groundwater and provide bounding observations at the lateral (i.e., between the inland hills; upriver and downriver of the industrial area) and vertical (i.e., between the ground surface and the lower extent of the plume) extent of contamination. In the event that additional wells are found to be necessary, the data from those wells will be included in deliverables, however, the duration of the monitoring period will not be changed.

The proposed monitoring well network includes wells that are located on both the east and west sides of the plume and include MW-123, MW-135, AT-1, and MW-508D on the west side of the plume, and MW-122S/D, MW-107S/D, MW-108S, and MW-121A on the east side of the plume (Figure 3-17). These monitoring wells are screened in the unconsolidated material, shallow bedrock and deep bedrock and monitor both the unconfined and confined aquifers.

The four multi-level bedrock wells provide the bounding observations for vertical distribution of contamination in the confined aquifer system. Consistent with the horizontal plume definition, the vertical distribution of contaminants has also been assessed using tritium as the conservative indicator (i.e., tritium is non-retarded and is the most mobile of the plant-related contaminants). Groundwater sampling and analysis data from conventional monitoring wells and from the four multi-level bedrock wells was reduced and consolidated to prepare two vertical plume maps. The vertical plumes are plotted on two cross sections; one extending from the inland portion of the industrial area (near the containment building) to the Connecticut River, and the other extending parallel to the river from the parking lot area to the upper peninsula area (Figure 3-19). These cross sections integrate the most recent results from the multi-level well analysis and other wells along the section alignment (CY, 2005).

Section A-A′ is the section extending toward the river and is shown in Figure 3-20. The highest tritium concentration at present (i.e., 16,500 pCi/L) is observed at a depth of approximately 75 feet bgs in MW-118A. MW-121A exhibits the deepest of the elevated concentrations (i.e., 8,560 pCi/L) at a depth of 175 feet bgs. This same depth is where vertical hydraulic equipotential conditions (i.e., at elevations above that depth, a downward pressure differential was observed; at elevations below that depth, upward pressure differential was observed) were observed during packer testing of MW-121A (CH2MHill, 2004). This depth is inferred to be the approximate elevation at which groundwater discharges into the Connecticut River.

Section B-B′ is the section parallel to the Connecticut River (Figure 3-19). This cross section, illustrated in Figure 3-21, indicates that the highest subsurface tritium concentrations are observed in MW-118A at 75 feet bgs (16,500 pCi/L), and in MW-119 at a depth of 85 feet below ground surface (14,300 pCi/L). The relationship between these two wells is inferred to be related to the presence of near-horizontal fractures at this elevation. However, the condition could also result from contamination migrating in near-parallel sub-vertical fracture sets that are transmitting the same water. The conservative inference (i.e., that a near-horizontal fracture set exists) is selected for this analysis. In this cross section, the deepest portion of the plume is still found in MW-121A at 175 feet bgs.

Several of the sample zones completed in the multi-level wells are deemed to be non-representative due to extremely low levels of water production (i.e., as low as 0.0007 gallons per hour). These low-yielding zones, which include elevations 300 and 455 feet below ground surface in MW-119, and elevation 465 feet below ground surface in MW-121A did not produce sufficient water volume to purge the multi-level packer assemblies and ensure that representative samples of formation water were collected.

The multi-level wells present sufficient observations in the deep bedrock to provide vertical bounding observations of contamination beneath HNP.

To maintain consistency and comparability in the monitoring activity, the same wells will be sampled during each sampling event. Monitoring wells will be inspected regularly and maintained and repaired as required over the course of the 18-month monitoring activity. In the event a well becomes irreparably damaged, it will be replaced prior to the next scheduled sampling event with a well completed in the same hydrogeologic unit in approximately the same functional location as the damaged well.

3.3 Groundwater Sampling and Analysis Requirements

Groundwater sampling events will be planned and executed in the same manner as previous quarter groundwater monitoring events. A sample event plan will be prepared in accordance with Procedure RPM 5.3-3 (CY, 2004b). The sample event plan specifies the number and type of containers to be filled with sample groundwater from each well, preservation and handling requirements for samples, and analyses to be performed on samples from each well. The substances of concern identified as target analytes for this monitoring activity and the specification for analyses to be performed are described in the following subsections.

3.3.1 Target Analytes

Based on the Site Conceptual Model, the groundwater characterization program has identified the following radioactive constituents as target analytes for monitoring during the 18-month license termination monitoring activity:

- Cesium-137
- Cobalt-60
- Strontium-90
- Tritium

In addition, boron, a non-radioactive constituent, will be monitored as a 'tracer' element. However, for the purposes of site closure, the boron results will be evaluated under the RCRA program.

All samples from all of the monitoring wells identified in Section 3.2, above, will be analyzed for these constituents in each sampling event. In addition to the target analytes identified above, the following analyses will be performed on the first round of samples collected from wells installed within soil removal areas and/or within former source release locations:

- Alpha Spectroscopic Analysis, and
- Analysis for specific Hard-to-Detect Nuclides for the remaining 20 radionuclides identified in the LTP, which are not covered in the above analyses.

If constituents included in the gamma spectroscopic, alpha spectroscopic, or hard-to-detect-nuclides are detected in the first round of samples, they will be added to the target analyte list for those monitoring wells where those detections occurred. A summary of the proposed analytical program including analytical methods, target analytes, and detection limits is summarized in Table 3-3.

3.3.2 Target Analyte Closure Criteria

The LTP requirement for closure is 25 mrem/yr for all media and pathways. That is further refined to contributions from soil, existing groundwater, and potential future groundwater, based on the DCGLs. Table 3-3 provides the target analytes and the associated DCGLs to meet those criteria. The actual calculated dose contribution from all pathways will be used to verify that CYAPCO meets the requirements for license termination for the site.

While the closure criteria for the monitoring program is defined by the DCGL values, additional evaluations will be conducted. Time series plots will be generated for all constituents of concern. Trend analyses for each of the constituents will meet LTP termination requirements if they are steady state or decreasing at the end of the 18 monitoring period, and below the respective DCGL values. Trends will be evaluated using recognized industry standard statistical analyses, numerical modeling, or a combination of both, to define plume migration in the terms of pulse movement to demonstrate closure criteria will have been met. If closure criteria have not been met, then additional monitoring may be required.

While DCGLs will be used for closure criteria, laboratory detection limits for the target analytes have been set at values consistent with USEPA maximum contaminant levels (MCLs) (Table 3-3). The MCLs are lower than the groundwater DCGLs and require lower detection levels than the DCGLs.

3.4 Quality Assurance Requirements

The quality assurance requirements for the 18-month license termination monitoring activity will require processing as LTP-Q for the upcoming quarterly groundwater monitoring events at HNP. The quality assurance requirements for sampling events are identified in the procedures for groundwater sample event planning, implementation and reporting (Procedures RPM 5.3-0 (CY, 2004a), 5.3-1 (CY, 2003a), 5.3-3 (CY, 2004b), and 5.2-10, (CY, 2005)); the programmatic quality assurance requirements, along with the requirements for data quality assessment, are described in the Groundwater Management Program Quality Assurance Project Plan (CY, 2004c). The requirements for sample custody, packaging, and handling will be those requirements established for Final Status Survey at HNP (CY, 2003b). All groundwater sample analyses will be performed by an off-site laboratory operating under a contractual scope of work consistent with the LTP-Q requirements necessary for the 18 month groundwater monitoring plan sample events (CY, 2004c).

3.5 Groundwater Monitoring Deliverables

The following deliverables will be produced during the 18-month license termination groundwater monitoring period:

- Six quarterly groundwater monitoring summary letter reports. These brief letter reports will be submitted approximately 60 days after completion of each sampling event and will summarize the following information:
    - o wells sampled in the previous quarterly monitoring event;
    - o concentrations of substances of concern detected in monitoring well samples and any changes in concentration trends; and
    - o quarterly precipitation totals and groundwater elevations at the time of sampling.
- Three semi-annual groundwater monitoring reports. The semi-annual reports will follow the same format currently used for that reporting format and will be submitted approximately 90 days after completion of the second sampling event preceding each report. These reports will include a detailed discussion of contaminant trend analysis, results of water level measurement and water level contouring, on-site precipitation totals, and recommendations for subsequent monitoring rounds.
- Supplemental monitoring reports as appropriate. In the event that an unplanned sample event is conducted for some reason or relevant data are generated from other sampling programs (e.g., RCRA), the results will be summarized in a letter report following the same format identified for the quarterly summary letter reports.
- One final groundwater condition summary letter report. This report will summarize all previous monitoring results and support the confirmation that closure criteria for license termination have been met. The letter report will reference previously submitted semi-annual ground water monitoring reports and quarterly summary reports.

4.0 Monitoring Plan Implementation Schedule

The 18-month license termination groundwater monitoring activity schedule is shown in Table 4-1. This schedule is intended to meet the requirements of the HNP license termination plan (i.e., 18 months of monitoring following completion of remediation below the water table, completion of installation of required groundwater monitoring wells, and including two spring high water level periods).

Each round of sampling will involve one day collecting synoptic water levels for the wells included in this monitoring plan, and approximately three additional weeks to complete both the multiport and standard monitoring well sampling, documentation and shipping.

The schedule identifies six quarterly groundwater monitoring summary letter reports that will be submitted approximately 60 days after completion of the quarterly sampling event. Three semi-annual groundwater monitoring reports will be submitted approximately 90 days following the completion of the second quarterly sampling event included in each report. The final deliverable identified in the schedule is the final groundwater condition summary letter report summarizing the previous results and documenting that the closure criteria for license termination have been met.

References

CH2MHill, 2005 — Hydrogeologic Conceptual Site Model for Haddam Neck Plant, Haddam Neck, Connecticut, Prepared for Connecticut Yankee Atomic Power Company, June 2005

CH2MHill, 2004 — Task 2 Supplemental Characterization Report, Prepared for Connecticut Yankee Atomic Power Company, November 2004

CY, 2003a — Semi-Annual Groundwater Monitoring Report, September and December 2003, May 2004

CY, 2003b — CY Procedure for Groundwater Level Measurement and Sample Collection, GGGR-R5300, June 2003.

CY, 2003c — CY Procedure for Chain of Custody of Final Status Survey Samples, GGGR-R5104, November 2003

CY, 2004a — CY Procedure for Groundwater Monitoring Program, GGGR-R0053, March 2004

CY, 2004b — CY Procedure for Groundwater Sampling Event Planning and Data Management, GGGR-5303, March 2004

CY, 2004c — Groundwater Monitoring Program Quality Assurance Plan for the Connecticut Yankee Decommissioning Project, ISC-GQP-0002, April, 2004.

CY, 2005 — Semi-Annual Groundwater Monitoring Report, First and Second Quarter Groundwater Sampling Events, October 2005

STRATEX LLC, 2005 — Task 3 Groundwater Modeling Report, Prepared for Connecticut Yankee Atomic Power Company, December 2005.

TABLES

Table 3-1
Monitoring Well Parameters
2005 18-Month Groundwater Monitoring Plan

Well/Location ID	Northing	Easting	TOC Elevation (ft MSL)	Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	Hydrostratigraphic Unit	Aquifer
AT-1	236492.1	668340.58	20.41	16	41	Unconsolidated	unconfined
MW-100D	236964.21	668415.29	16.45	21	31	Deep Bedrock	confined
MW-100S	236959.88	668418.62	16.45	3.5	9	Unconsolidated	unconfined
MW-101D	236845.02	668655.36	20.82	39.8	49.8	Deep Bedrock	confined
MW-101S	236842.33	668653.7	20.62	8	18	Bedrock	unconfined
MW-102D	236651.79	668905.29	20.66	43	53	Deep Bedrock	confined
MW-102S	236655.03	668907.67	20.53	12.8	22.5	Bedrock	unconfined
MW-103A	TBD	TBD	TBD	30	40	Shallow Bedrock	confined
MW-103B	TBD	TBD	TBD	60	70	Deep Bedrock	confined
MWR-103D	TBD	TBD	TBD	48.5	58.5	Deep Bedrock	confined
MWR-103S	TBD	TBD	TBD	15.5	25.5	Shallow Bedrock	confined
MWR-105D	236555.11	668632.69	23.51	47	57	Deep Bedrock	confined
MWR-105S	236551.44	668633.91	23.31	19	24	unconsolidated	unconfined
MWR-106D	236464.64	668730.32	20.7	45	55	Deep Bedrock	confined
MW-106S	236473.85	668738.1	20.56	14.5	24.5	Shallow Bedrock	unconfined
MW-107D	236374.52	668874.54	20.52	90	100	Shallow Bedrock	confined
MW-107S	236371.27	668871.82	20.39	15	25	Unconsolidated	unconfined
MW-108	236243.62	669142.69	12.15	15	25	Unconsolidated	unconfined
MW-109D	236327.48	668450.18	20.54	45	55	Bedrock	confined
MW-109S	236329.11	668448.13	20.64	15	25	Unconsolidated	unconfined
MW-110D	236083.96	668812.01	22.83	70	80	Bedrock	confined
MW-110S	236081.77	668815.38	22.47	15	25	Unconsolidated	unconfined
MW-112S	235797.44	669204.17	14.51	15	25	Unconsolidated	unconfined
MW-113S	235773.51	669398.06	13.56	15	25	Unconsolidated	unconfined
MW-117S	235070.57	671286.68	15.95	15	25	Unconsolidated	unconfined
MWR-122D	236465.04	668959.63	20.16	185	195	Deep Bedrock	confined
MW-122S	236486.5	668988.86	19.84	9	19	Unconsolidated	unconfined
MW-123	236629.95	668473.66	20.19	23.5	33.47	Shallow Bedrock	confined
MW-124	236478.85	668448.53	20.81	11	21	Unconsolidated	unconfined
MW-125	236324.23	668797.83	20.31	11	22	Unconsolidated	unconfined
MW-130	236586.16	668565.32	23.43	20	30	Unconsolidated/shallow bedrock interface	
MW-131D	236672.57	668625.19	21.05	34	44	unconsolidated	unconfined
MW-131S	236668.73	668630.55	21.15	12.5	22.5	unconsolidated	unconfined
MW-132D	236555.73	668890.7	20.71	26	29	unconsolidated	unconfined
MW-132S	236559.71	668886.57	21.27	13	23	unconsolidated	unconfined
MW-133	236461.75	668504.2	23.75	32	42	Deep Bedrock	confined
MW-134	236461.55	668612.9	23.65	18.72	28.72	unconsolidated	unconfined
MW-135	236644.08	668432.44	19.56	27.72	28.72	unconsolidated	unconfined
MW-136D	TBD	TBD	TBD	20	30	unconsolidated	unconfined
MW-136S	TBD	TBD	TBD	10	20	unconsolidated	unconfined
MW-137	TBD	TBD	TBD	23.5	33.5	Shallow Bedrock	unconfined
MW-138	TBD	TBD	TBD	10	20	unconsolidated	unconfined
MW-508D	236663.18	668190.54	17.78	81.5	91.5	Shallow Bedrock	confined
MW-508S	236666.79	668193.26	17.63	14	24	Unconsolidated	Perched
MW-118A; Zone 5	236281.49	668710.58	22.09	24	34	Deep Bedrock	confined
MW-118A; Zone 4	236281.49	668710.58	22.09	49	79	Deep Bedrock	confined
MW-118A; Zone 3	236281.49	668710.58	22.09	100	130	Deep Bedrock	confined
MW-118A; Zone 2	236281.49	668710.58	22.09	150	165	Deep Bedrock	confined
MW-118A; Zone 1	236281.49	668710.58	22.09	225	240	Deep Bedrock	confined
MW-119; Zone 6	236193.53	668576.03	20.92	45	55	Deep Bedrock	confined
MW-119; Zone 5	236193.53	668576.03	20.92	70	90	Deep Bedrock	confined

Table 3-1
Monitoring Well Parameters
2005 18-Month Groundwater Monitoring Plan

Well/Location ID	Northing	Easting	TOC Elevation (ft MSL)	Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	Hydrostratigraphic Unit	Aquifer
MW-119; Zone 4	236193.53	668576.03	20.92	155	165	Deep Bedrock	confined
MW-119; Zone 3	236193.53	668576.03	20.92	250	265	Deep Bedrock	confined
MW-119; Zone 2	236193.53	668576.03	20.92	295	305	Deep Bedrock	confined
MW-119; Zone 1	236193.53	668576.03	20.92	450	460	Deep Bedrock	confined
MW-120; Zone 5	236303.45	668458.67	21.04	75	95	Deep Bedrock	confined
MW-120; Zone 4	236303.45	668458.67	21.04	100	110	Deep Bedrock	confined
MW-120; Zone 3	236303.45	668458.67	21.04	140	160	Deep Bedrock	confined
MW-120; Zone 2	236303.45	668458.67	21.04	205	215	Deep Bedrock	confined
MW-120; Zone 1	236303.45	668458.67	21.04	230	245	Deep Bedrock	confined
MW-121A; Zone 5	236045.99	668879.76	18.82	100	110	Deep Bedrock	confined
MW-121A; Zone 4	236045.99	668879.76	18.82	160	180	Deep Bedrock	confined
MW-121A; Zone 3	236045.99	668879.76	18.82	275	290	Deep Bedrock	confined
MW-121A; Zone 2	236045.99	668879.76	18.82	305	320	Deep Bedrock	confined
MW-121A; Zone 1	236045.99	668879.76	18.82	460	470	Deep Bedrock	confined

Table 3-2

Monitoring Well Network and Well Characteristics

Well ID	Monitoring Purpose	Screen Top (ft bgs)	Screen Bottom (ft bgs)	Hydrostratigraphc Unit Monitored	Aquifer Monitored
Upgradient Wells (4 total)					
MW-100D	Upgradient	21	31	Deep Bedrock	confined
MW-100S	Upgradient	3.5	9	Unconsolidated	unconfined
MW-101D	Upgraident	39.8	49.8	Deep Bedrock	confined
MW-101S	Upgradient	8	18	Shallow Bedrock	unconfined
Source Area Wells (21 total)					
MW-102D	Makeup water tanks source area	43	53	Deep Bedrock	confined
MW-102S	Makeup water tanks source area	12.8	22.5	Bedrock	unconfined
MW-103A	Wastewater Tank farm source area	30	40	Shallow Bedrock	confined
MW-103B	Wastewater Tank farm source area	60	70	Deep Bedrock	confined
MWR-103D	Wastewater Tank farm source area	48.5	58.5	Deep Bedrock	confined
MWR-103S	Wastewater Tank farm source area	15.5	25.5	Shallow Bedrock	confined
MW-136D	Wastewater Tank farm source area	20	30	unconsolidated	unconfined
MW-136S	Wastewater Tank farm source area	10	20	unconsolidated	unconfined
MW-131D	Wastewater Tank farm source area/PAB soil remediation area	34	44	unconsolidated	unconfined
MW-131S	Wastewater Tank farm source area/PAB soil remediation area	12.5	22.5	unconsolidated	unconfined
MWR-105D	PAB drumming room source area/soil remediation area	47	57	Deep Bedrock	confined
MWR-105S	PAB drumming room source area/soil remediation area	19	24	unconsolidated	unconfined
MW-130	PAB drumming room source area/PAB soil removal area	20	30	Unconsolidated/shallow bedrock interface	unconfined
MW-112S	Septic leach field source area	15	25	Unconsolidated	unconfined
MW-113S	Septic leach field source area	15	25	Unconsolidated	unconfined
MW-132D	Fuel building source area	26	29	unconsolidated	unconfined
MW-132S	Fuel building source area	13	23	unconsolidated	unconfined
MW-137	Fuel building source area	23.5	33.5	Shallow Bedrock	unconfined
MW-138	Zone 12 contaminated drain source area	10	20	unconsolidated	unconfined

Table 3-2

Monitoring Well Network and Well Characteristics

Well ID	Monitoring Purpose	Screen Top (ft bgs)	Screen Bottom (ft bgs)	Hydrostratigraphc Unit Monitored	Aquifer Monitored
Downgradient Plume Wells (26 total)					
MW-106D	Downgradient plume	45	55	Deep Bedrock	confined
MW-106S	Downgradient plume	14.5	24.5	Shallow Bedrock	unconfined
MW-107D	Downgradient plume	90	100	Shallow Bedrock	confined
MW-107S	Downgradient plume	15	25	Unconsolidated	unconfined
MW-108	Downgradient plume prior to discharge at discharge canal	15	25	Unconsolidated	unconfined
MW-109D	Downgradient plume prior to discharge at Connecticut River	45	55	Bedrock	confined
MW-109S	Downgradient plume prior to discharge at Connecticut River	15	25	Unconsolidated	unconfined
MW-110D	Downgradient plume prior to discharge at Connecticut River	70	80	Bedrock	confined
MW-110S	Downgradient plume prior to discharge at Connecticut River	15	25	Unconsolidated	unconfined
MW-117S	Isolated historic detection on peninsula	15	25	Unconsolidated	unconfined
MW-118A	Downgradient plume near discharge to Connecticut River – lower bound of plume in bedrock	Multi-level well sample zones at: 30, 75, 125, 160 & 235		Bedrock	Confined
MW-119	Downgradient plume near discharge to Connecticut River – lower bound of plume in bedrock	Multi-level well sample zones at: 50, 85, 160, 260, 300 & 455		Bedrock	Confined
MW-120	Downgradient plume near discharge to Connecticut River – lower bound of plume in bedrock	Multi-level well sample zones at: 90, 105, 155, 210 & 240		Bedrock	Confined
MW-121A	Downgradient plume near discharge to Connecticut River – lower bound of plume in bedrock	Multi-level well sample zones at: 105, 175, 285, 315 & 465		Bedrock	Confined
MWR-122D	Downgradient plume	185	195	Deep Bedrock	confined
MW-122S	Downgradient plume	9	19	Unconsolidated	unconfined
MW-123	Downgradient plume	23.5	33.47	Shallow Bedrock	confined
MW-124	Downgradient plume	11	21	Unconsolidated	unconfined
MW-125	Downgradient plume along preferential flow pathway/Discharge tunnel soil remediation area	11	22	Unconsolidated	unconfined

Table 3-2

Monitoring Well Network and Well Characteristics

Well ID	Monitoring Purpose	Screen Top (ft bgs)	Screen Bottom (ft bgs)	Hydrostratigraphc Unit Monitored	Aquifer Monitored
MW-130	PAB drumming room source area/PAB soil removal area	20	30	Unconsolidated/shallow bedrock interface	
MW-133	Downgradient plume along preferential flow pathway	32	42	Deep Bedrock	confined
MW-134	Downgradient plume along preferential flow pathway/Discharge tunnel soil remediation area	18.72	28.72	unconsolidated	unconfined
MW-135	Downgradient plume	27.72	28.72	unconsolidated	unconfined
MW-508D	Downgradient plume, defines plant north extent of plume	81.5	91.5	Shallow Bedrock	confined
MW-508S	Isolated perched plume under parking lot	14	24	Unconsolidated	Perched
MW-AT1	Downgradient plume	16	41	Unconsolidated	Unconfined

Table 3-3. Target Radionuclides and DCGLs for HNP Groundwater Closure Criteria.

Nuclide	DCGL (pCi/L)	MCL (μg/L)	MDC (pCi/L)	Laboratory Method
Cesium-137	431	200	15	USEPA 900.1
Cobalt-60	1140	100	25	USEPA 900.1
Strontium-90	251	8	2	USEPA 905.0
Tritium	652,000	20,000	400	USEPA 906.0

Note:
DCGL = Derived Concentration Guideline Level corresponding to a TEDE of 25 mrem/yr
MCL = Maximum Contaminant Level
MDC = Minimum Detectable Concentration

FIGURES

Table 4-1. 18-Month License Termination Groundwater Monitoring Schedule

Month Sequence	Season	Month	Sample Event	Deliverables
0	Winter	Dec-05	Winter 05	
1		Jan-06		
2		Feb-06		Quarterly Summary (Winter 05)
3	Spring	Mar-06	Spring 06	
4		Apr-06		Semi-Annual GW Monitoring Report
5		May-06		Quarterly Summary (Spring 06)
6	Summer	Jun-06	Summer 06	
7		Jul-06		
8		Aug-06		Quarterly Summary (Summer 06)
9	Fall	Sep-06	Fall 06	
10		Oct-06		Semi-Annual GW Monitoring Report
11		Nov-06		Quarterly Summary (Fall 06)
12	Winter	Dec-06	Winter 06	
13		Jan-07		
14		Feb-07		Quarterly Summary (Winter 06)
15	Spring	Mar-07	Spring 07	
16		Apr-07		Semi-Annual GW Monitoring Report
17		May-07		Quarterly Summary (Spring 07)
18	Summer	Jun-07	Summer 07	
19		Jul-07		Final Groundwater Compliance Summary
20		Aug-07		

FIGURES

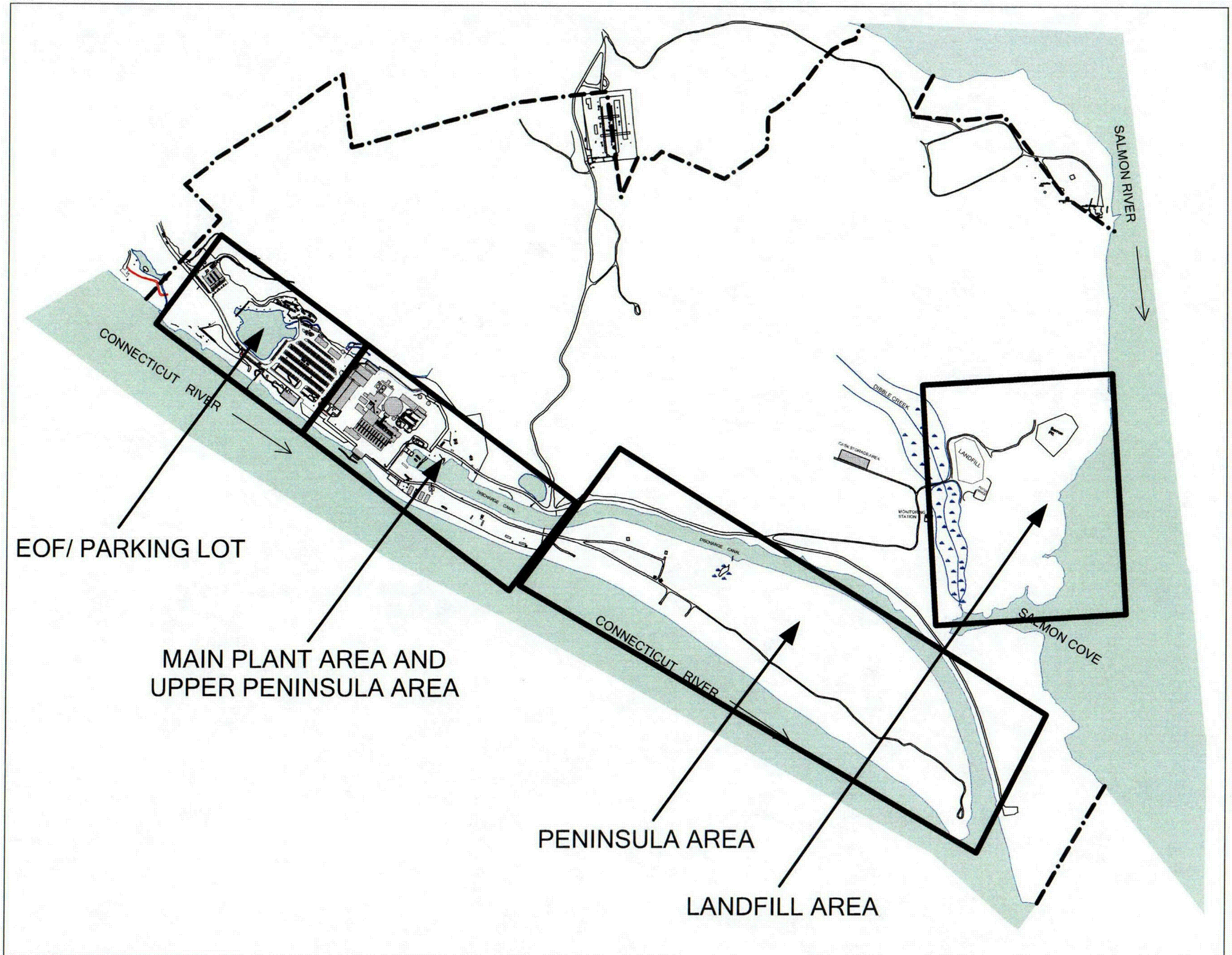

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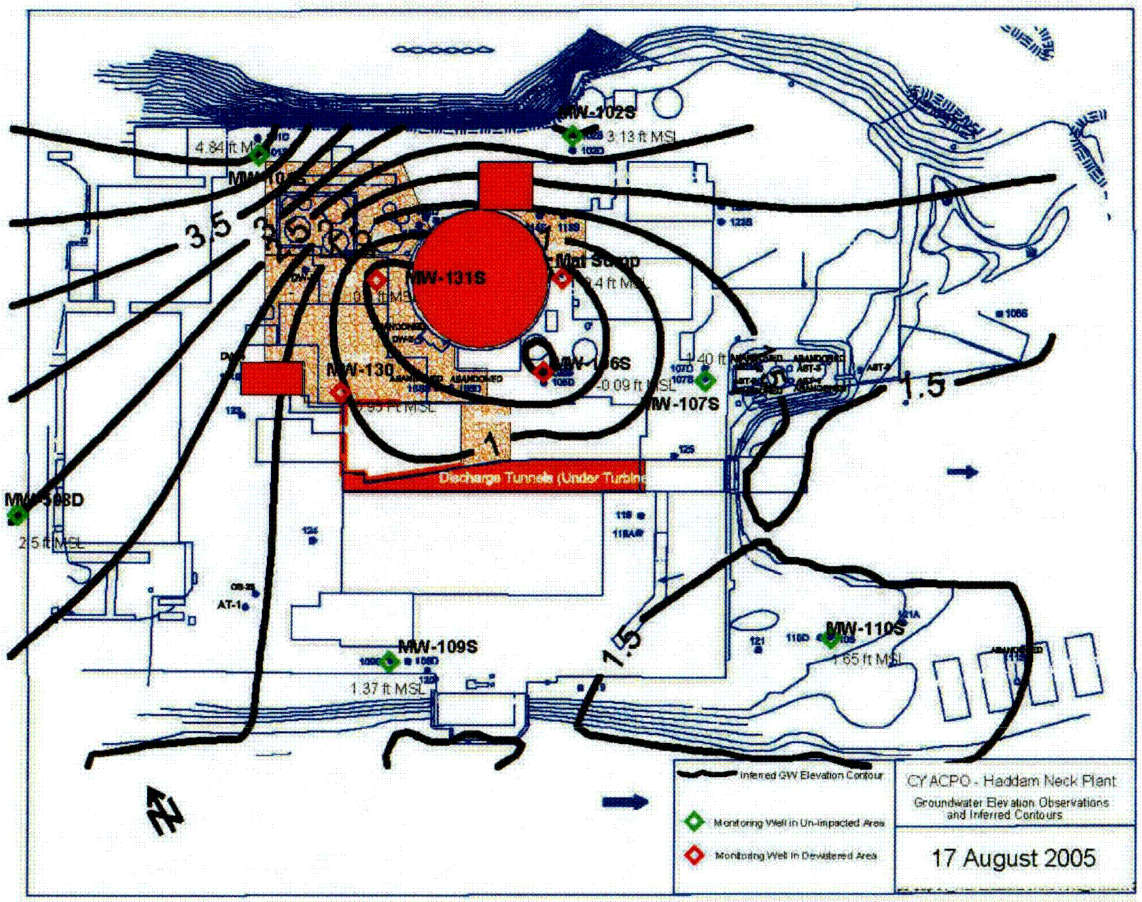
FIGURE 2-1
HADDAM NECK PLANT PROPERTY MAP
HADDAM NECK, CT

27feb04_CY Site Map of HNP

C-01

Figure 3-1. Inferred water elevation contours in shallow unconfined aquifer, Haddam Neck Plant, 17 August 2005.



C-02

Figure 3-2. Inferred water elevation contours in shallow unconfined aquifer, Haddam Neck Plant, 11 September 2005.

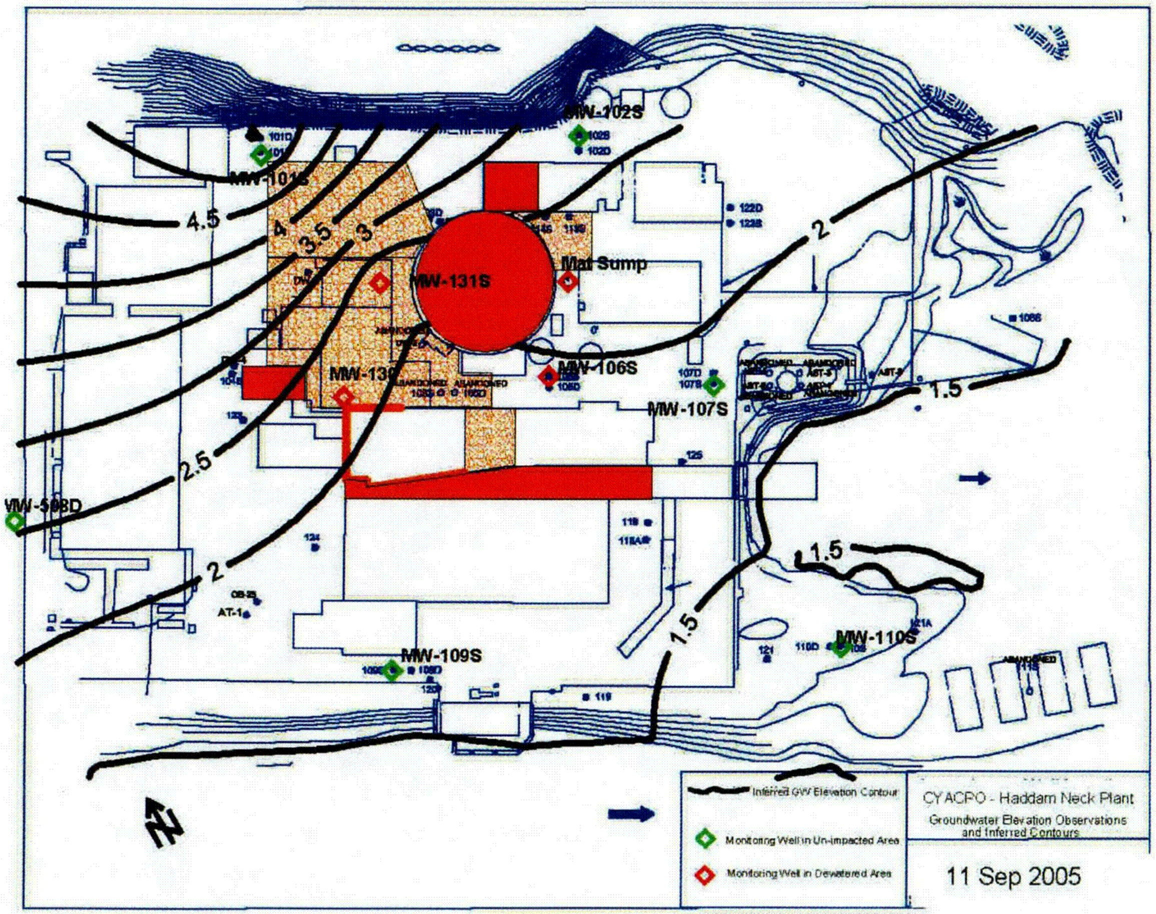
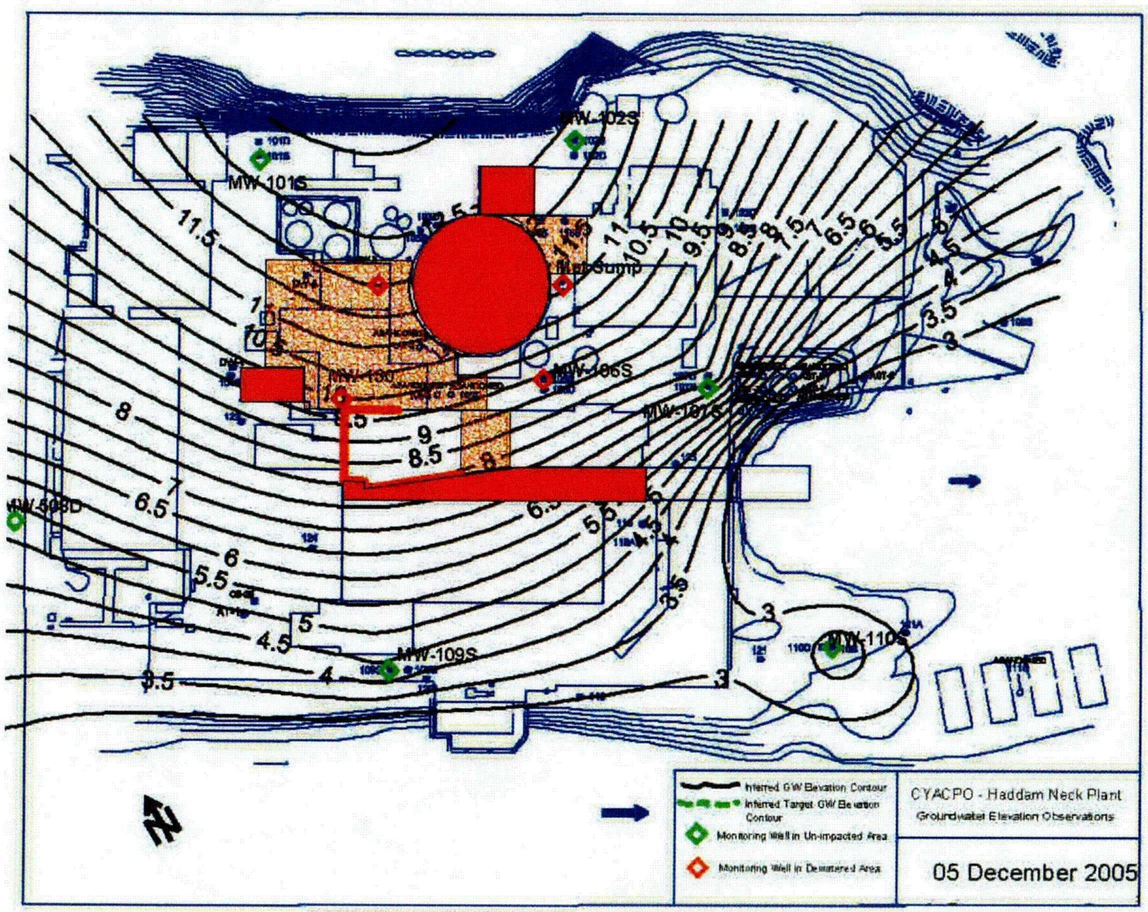


Figure 3-3. Inferred water elevation contours in shallow unconfined aquifer, Haddam Neck Plant, 5 December 2005



C-04

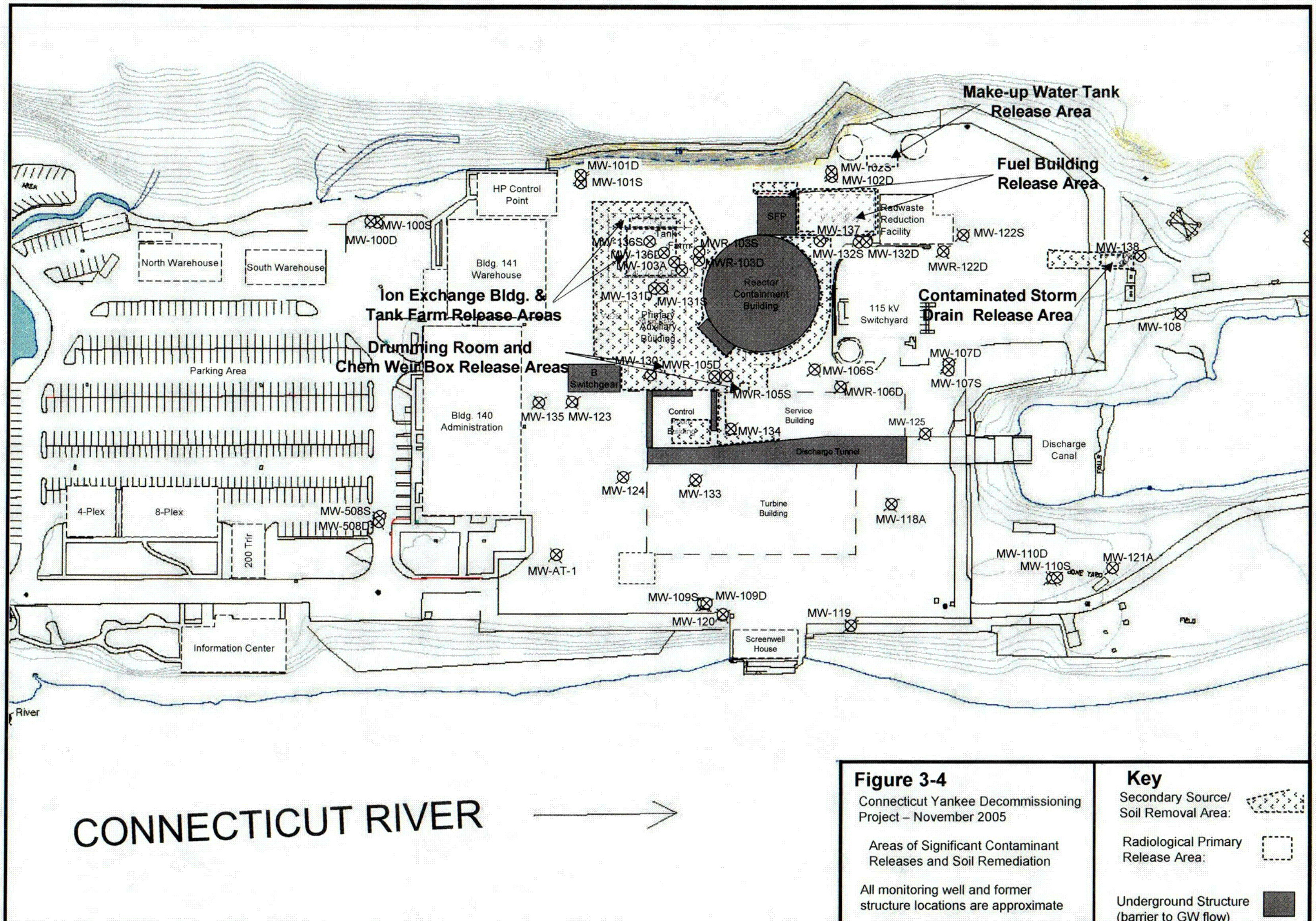


Figure 3-4

Connecticut Yankee Decommissioning Project – November 2005

Areas of Significant Contaminant Releases and Soil Remediation

All monitoring well and former structure locations are approximate

Key

Secondary Source/ Soil Removal Area:

Radiological Primary Release Area:

Underground Structure (barrier to GW flow)

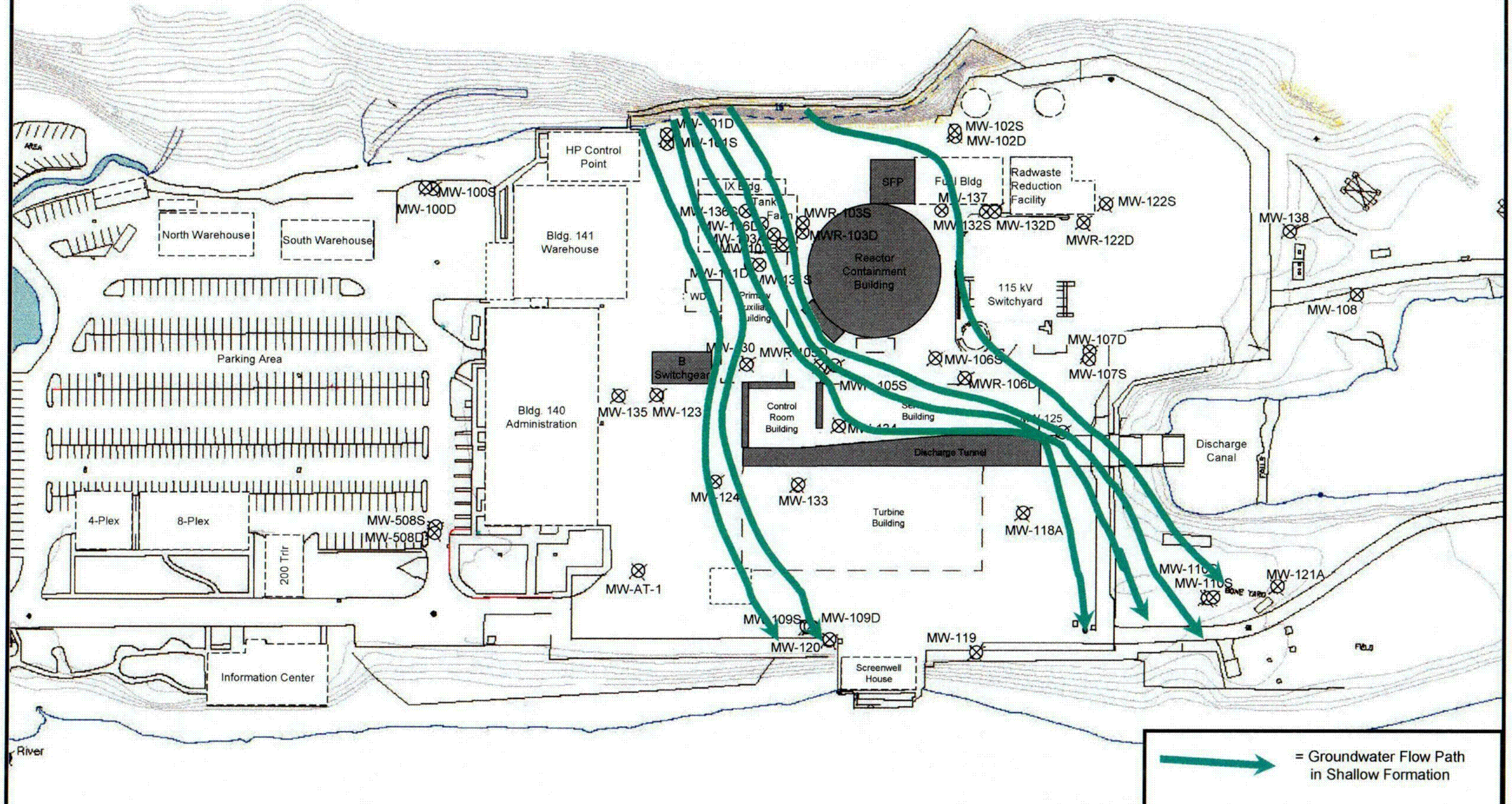


Figure 3-5

Connecticut Yankee Decommissioning Project – November 2005

Shallow Groundwater Flow Paths as Affected by Underground Structures

All monitoring well and former structure locations are approximate

Key

Monitoring Well: MW-133

Existing Structure:

Removed Structure:

Underground Structure (barrier to GW flow)

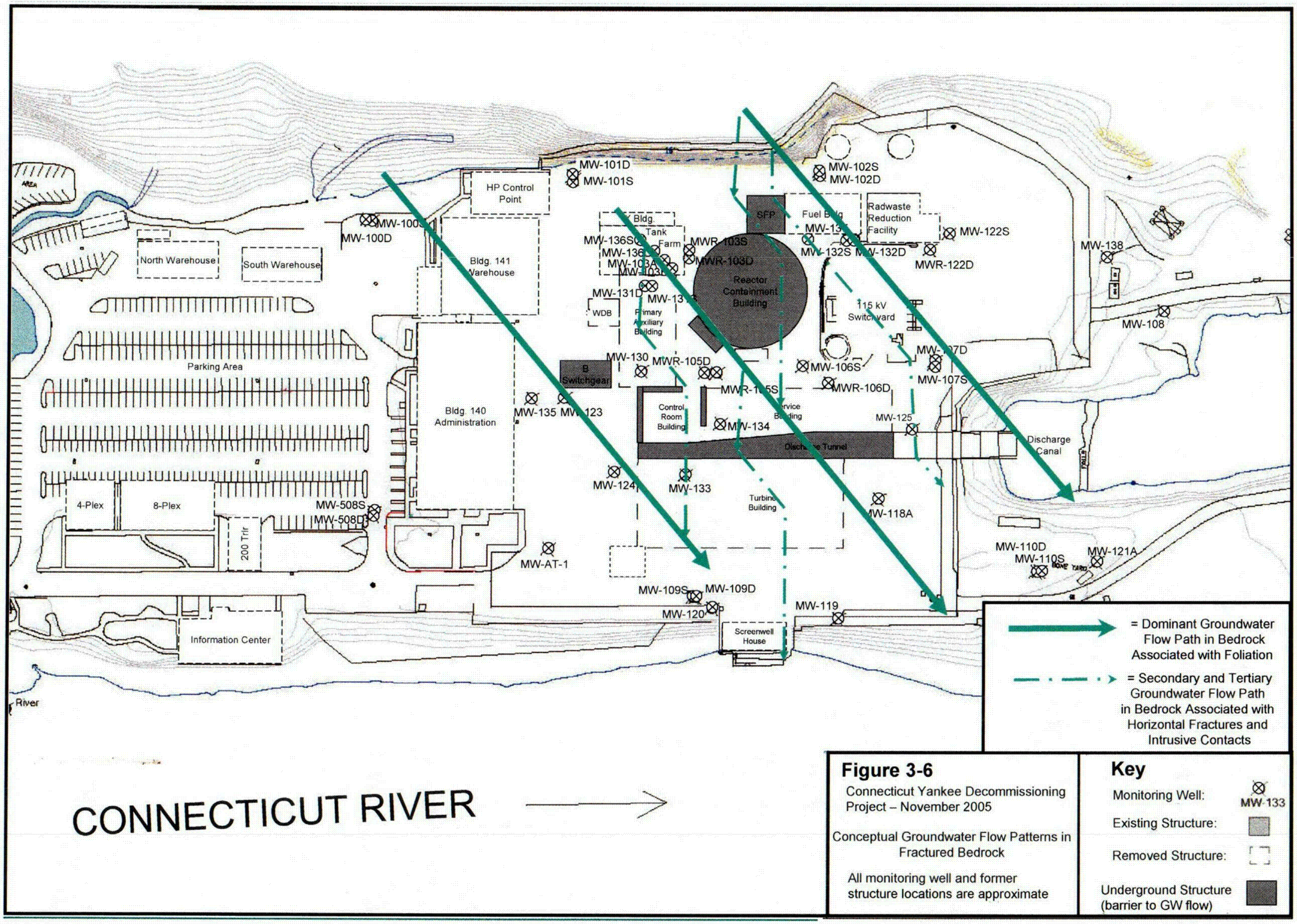


Figure 3-6

Connecticut Yankee Decommissioning Project – November 2005

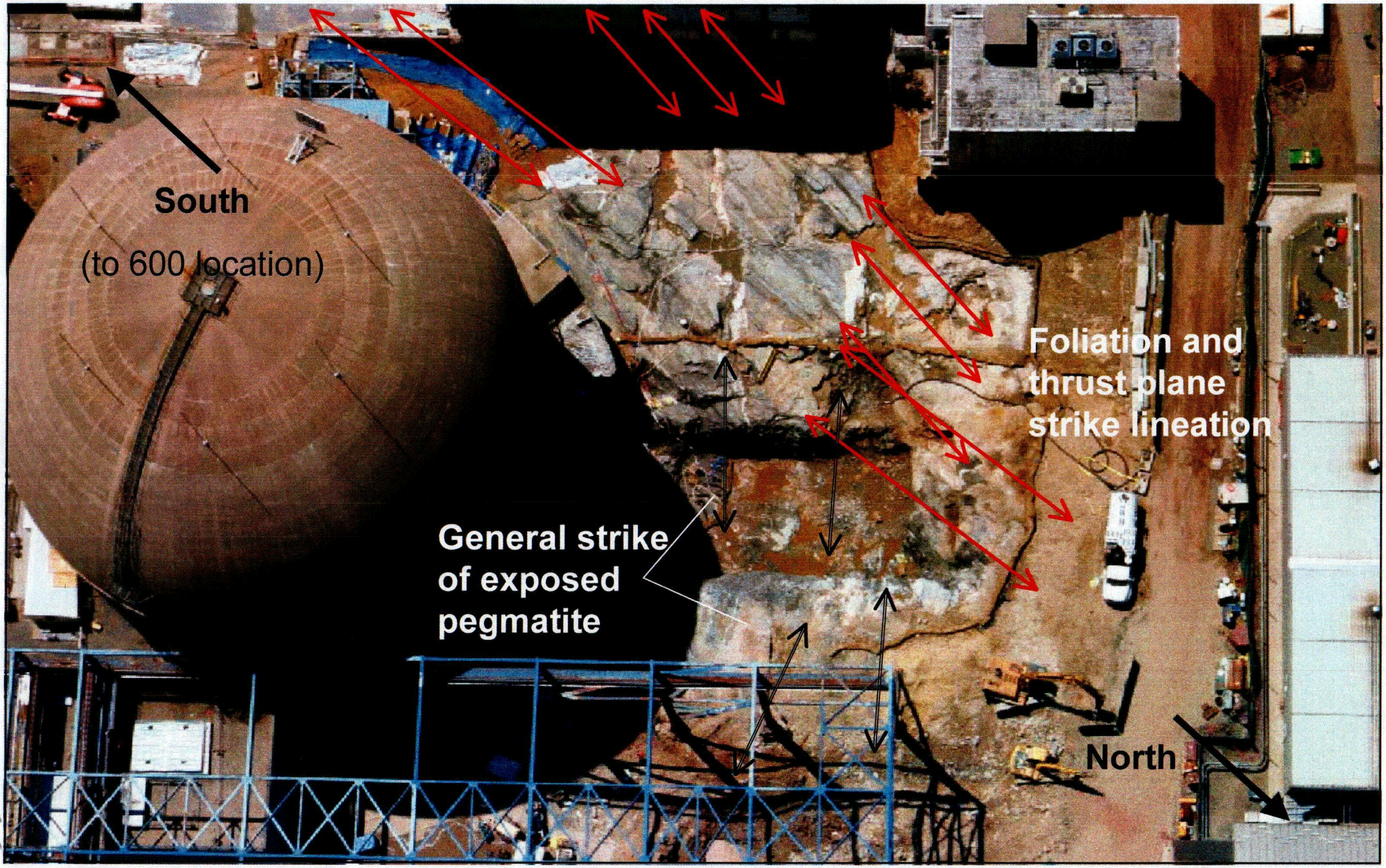
Conceptual Groundwater Flow Patterns in Fractured Bedrock

All monitoring well and former structure locations are approximate

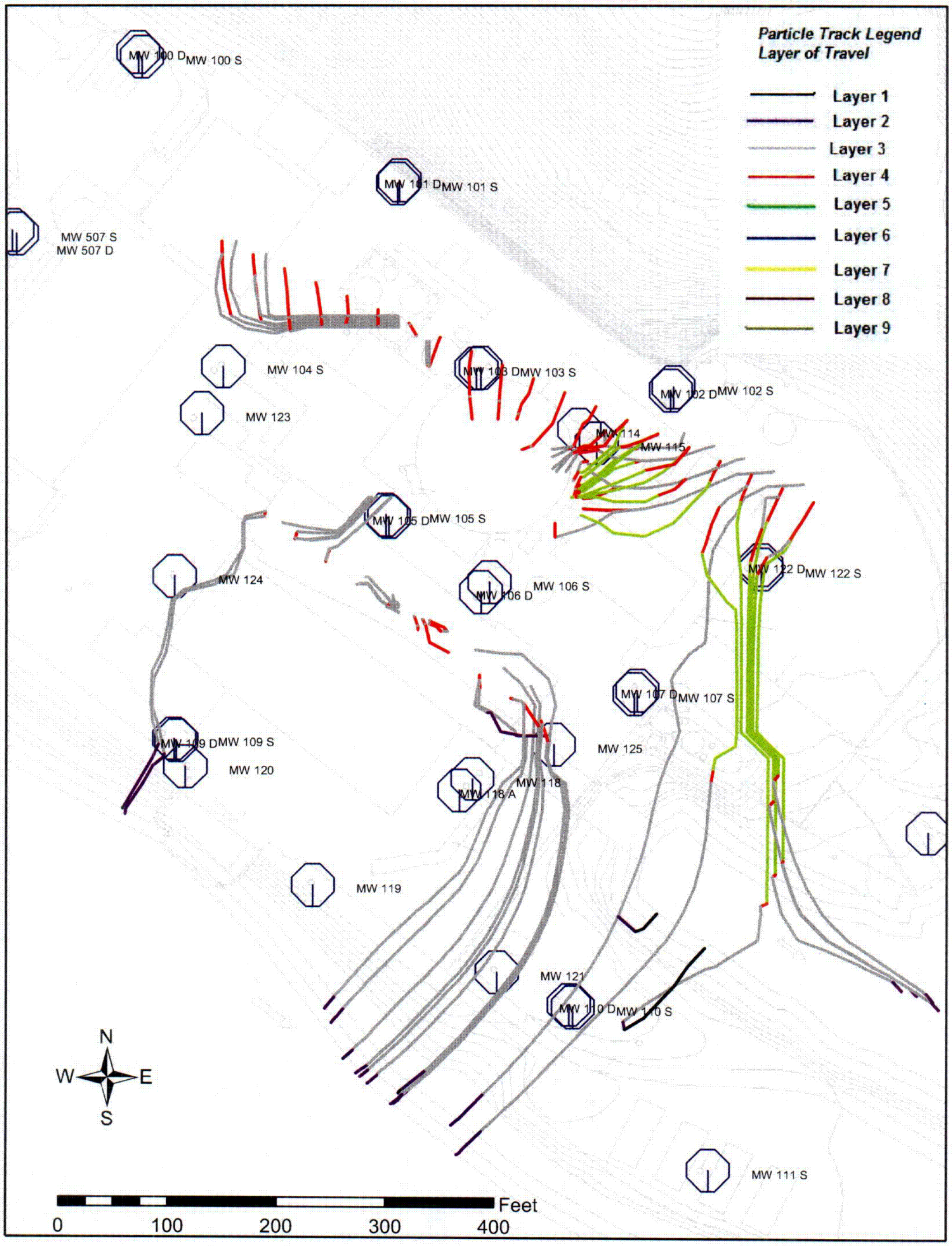
C-67

Figure 3-7

Aerial Photo of the Haddam Neck Plant Showing Exposed Bedrock Under the Former Primary Auxiliary Building, Waste Disposal Building and Tank Farm Areas.



CY Groundwater Model



Legend

Constant Head

General Head Boundary

Drain

Barrier Wall

Forward Particle Tracking from two rows of arbitrary points during maximum dewatering under average annual recharge

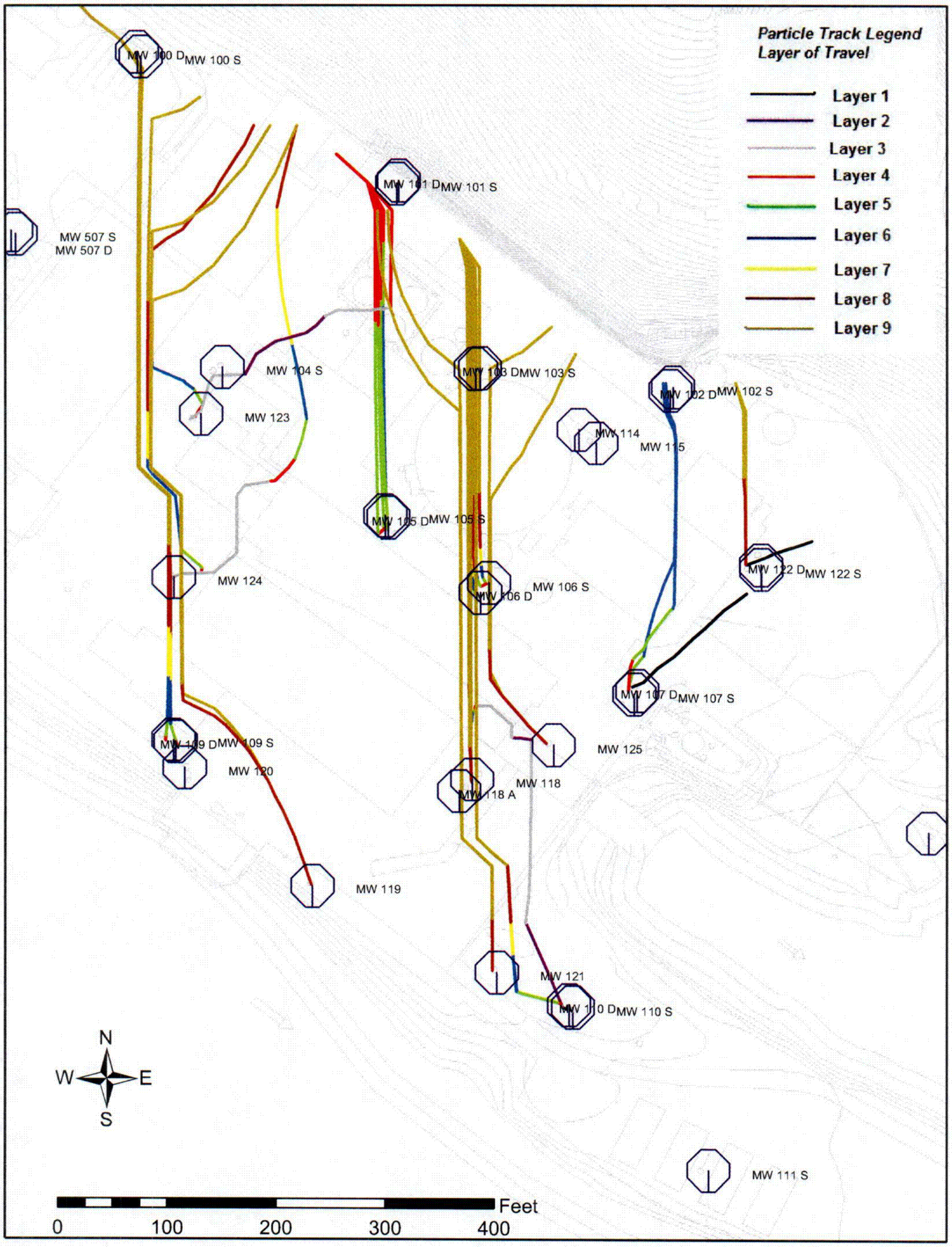
Particles started at 0.1 and 0.9 times depth of layer. Particles were started in model layers 3 and 4

STRATEX
strategic consulting

Figure 3-8

C-09

CY Groundwater Model



Legend

- Constant Head
- Drain
- General Head Boundary
- Barrier Wall

Reverse Particle Tracking from Major Monitoring Wells in Steady-state Operational Mode

Particles started at 0.1 and 0.9 times depth of layer in which each monitoring well is located

STRATEX
strategic consulting

Figure 3-9

C-10

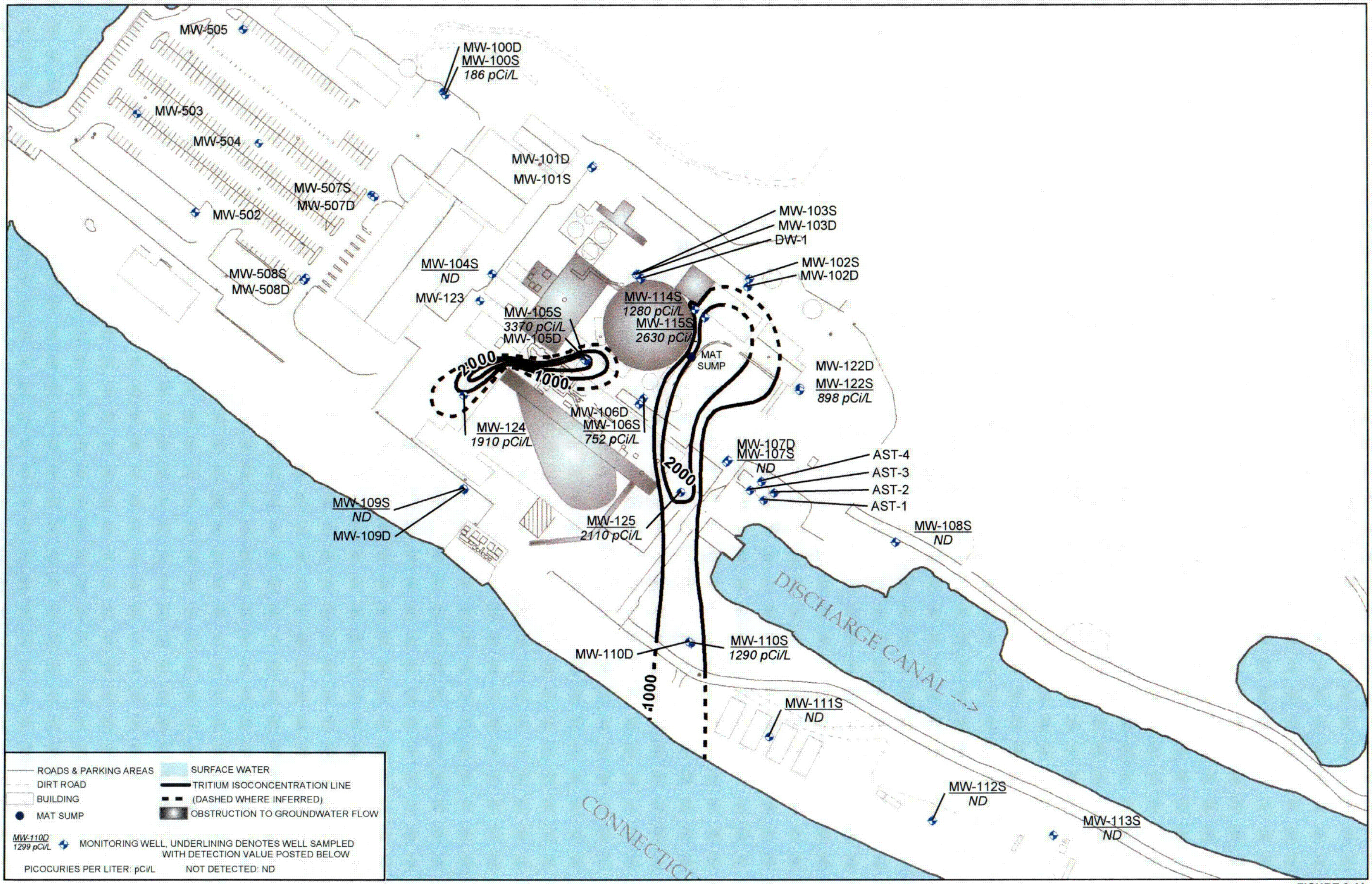


FIGURE 3-10
INFERRED DISTRIBUTION OF THE UNFILTERED TRITIUM (pCi/L) IN THE UNCONSOLIDATED DEPOSITS HYDROSTRATIGRAPHIC UNIT AT THE INDUSTRIAL AREA AND UPPER PENINSULA AREA OF THE HADDAM NECK PLANT DECEMBER 2003
HADDAM NECK, CT

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\\boomer\H\projects3\CT_Yankee\MXD\GW_Monitoring_Report_4_2004\TRITIUM_UNFILTERED__CONSOLIDATED_12_03.mxd JHenderson 5/17/2004

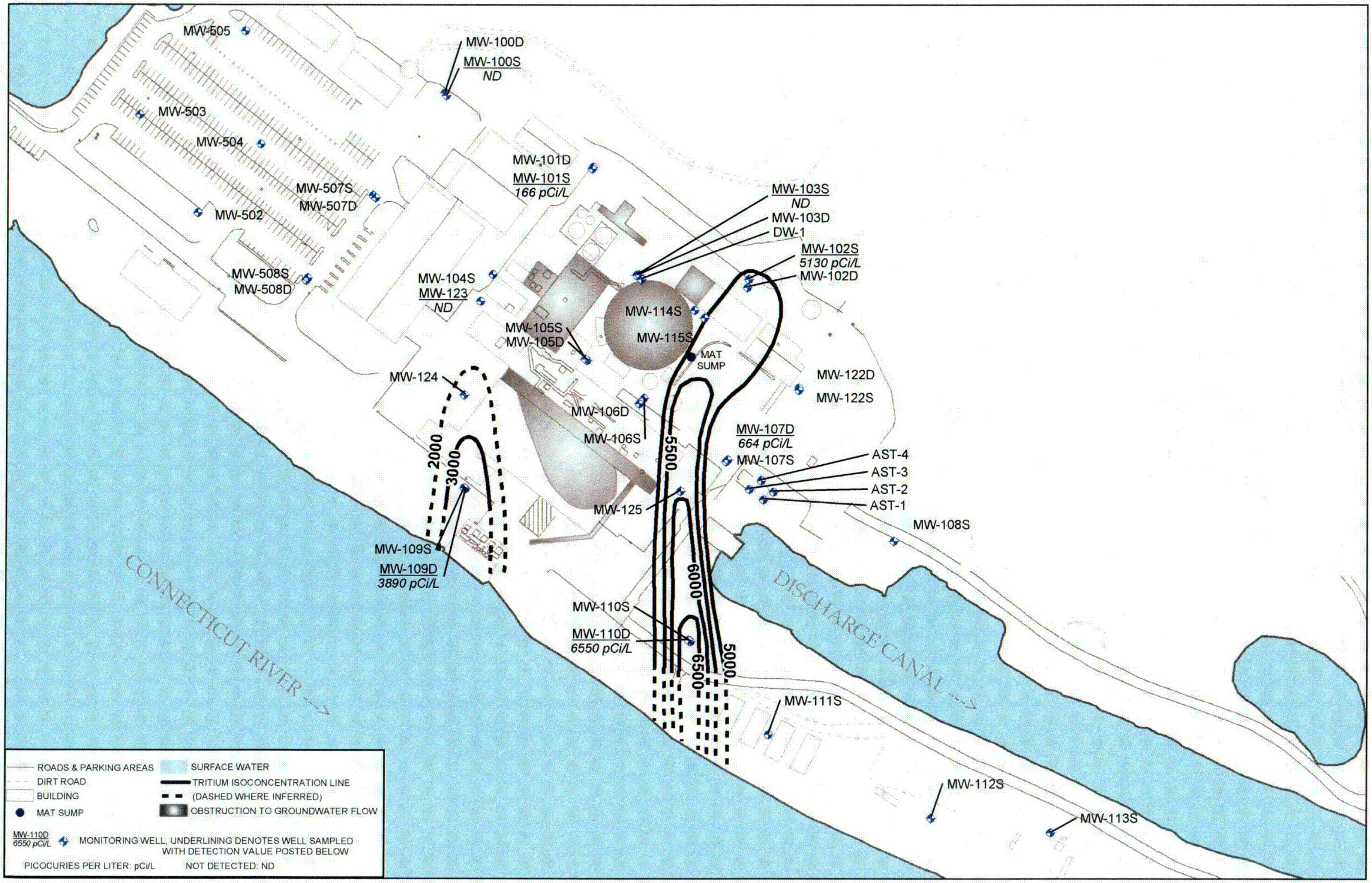
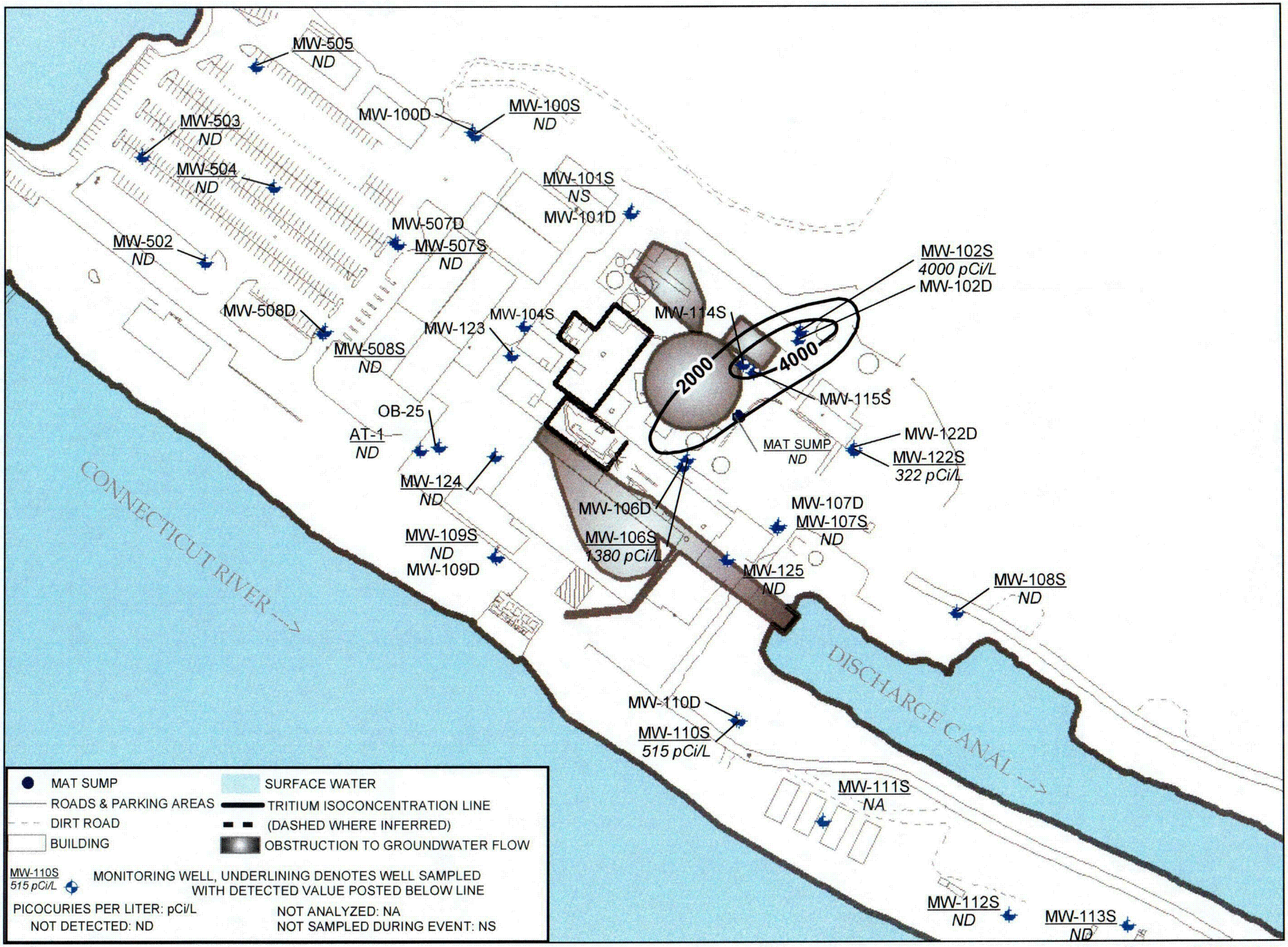


FIGURE 3-11
INFERRED DISTRIBUTION OF THE FILTERED TRITIUM (pCi/L) IN THE SHALLOW BEDROCK HYDROSTRATIGRAPHIC UNIT AT THE INDUSTRIAL AREA AND UPPER PENINSULA AREA OF THE HADDAM NECK PLANT DECEMBER 2003
HADDAM NECK, CT

CH2MHILL

\\boomer\H\projects3\CT_Yankee\MXD\GW_Monitoring_Report_4_2004\TRITIUM_FILTERED_SHALLOW_BR_12_03.mxd JHenderson 5/17/2004

B-12



C-13

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FIGURE 3-12
INFERRED DISTRIBUTION OF TRITIUM (pCi/L) IN THE UNCONFINED AQUIFER
AT THE INDUSTRIAL AREA AND UPPER PENINSULA AREA OF THE HADDAM NECK PLANT JUNE 2005
HADDAM NECK, CT

\\boomer\H\projects3\CT_Yankee\MXD\GW_Q2_05\Tritium_UNCONFINED_06_05.mxd BBodinso 9/8/2005

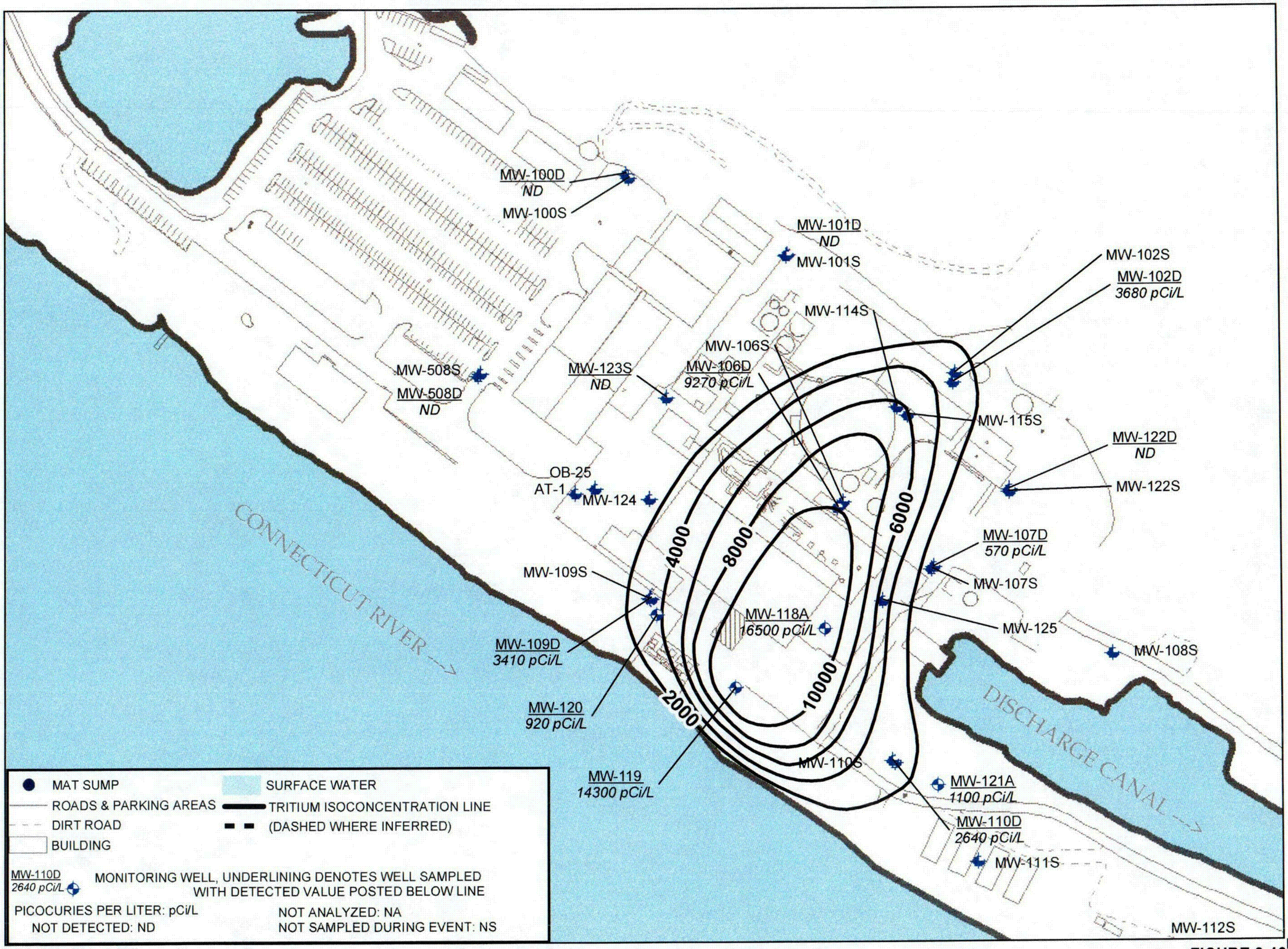

FIGURE 3-13MW

INFERRED DISTRIBUTION OF TRITIUM (pCi/L) IN THE CONFINED AQUIFER
AT THE INDUSTRIAL AREA AND UPPER PENINSULA AREA OF THE HADDAM NECK PLANT JUNE 2005
HADDAM NECK, CT

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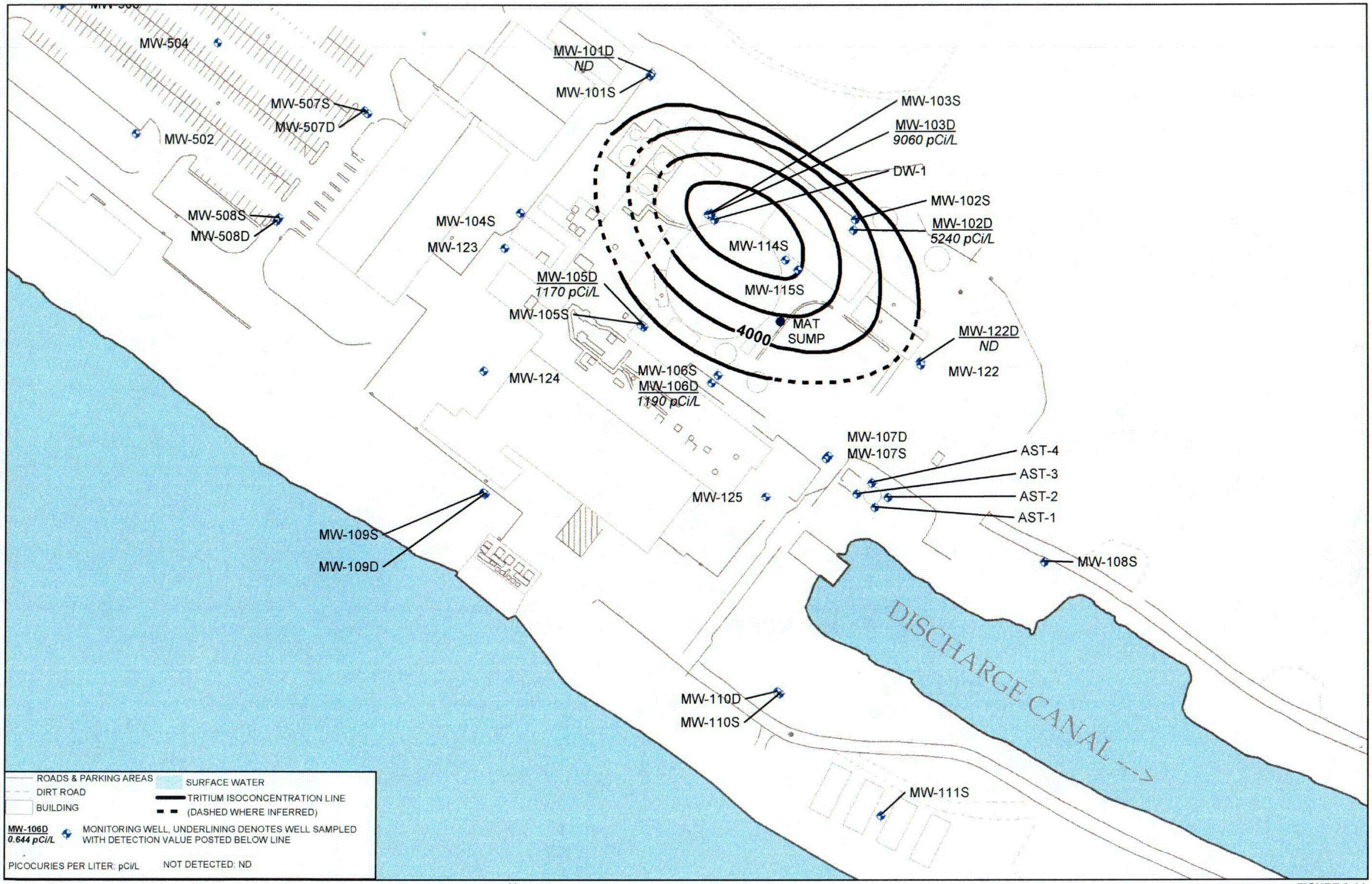

C-15

CH2MHILL

FIGURE 3-14

INFERRED DISTRIBUTION OF FILTERED TRITIUM (pCi/L) IN THE DEEP BEDROCK HYDROSTRATIGRAPHIC UNIT AT THE INDUSTRIAL AREA AND UPPER PENINSULA AREA OF THE HADDAM NECK PLANT DECEMBER 2003

HADDAM NECK, CT

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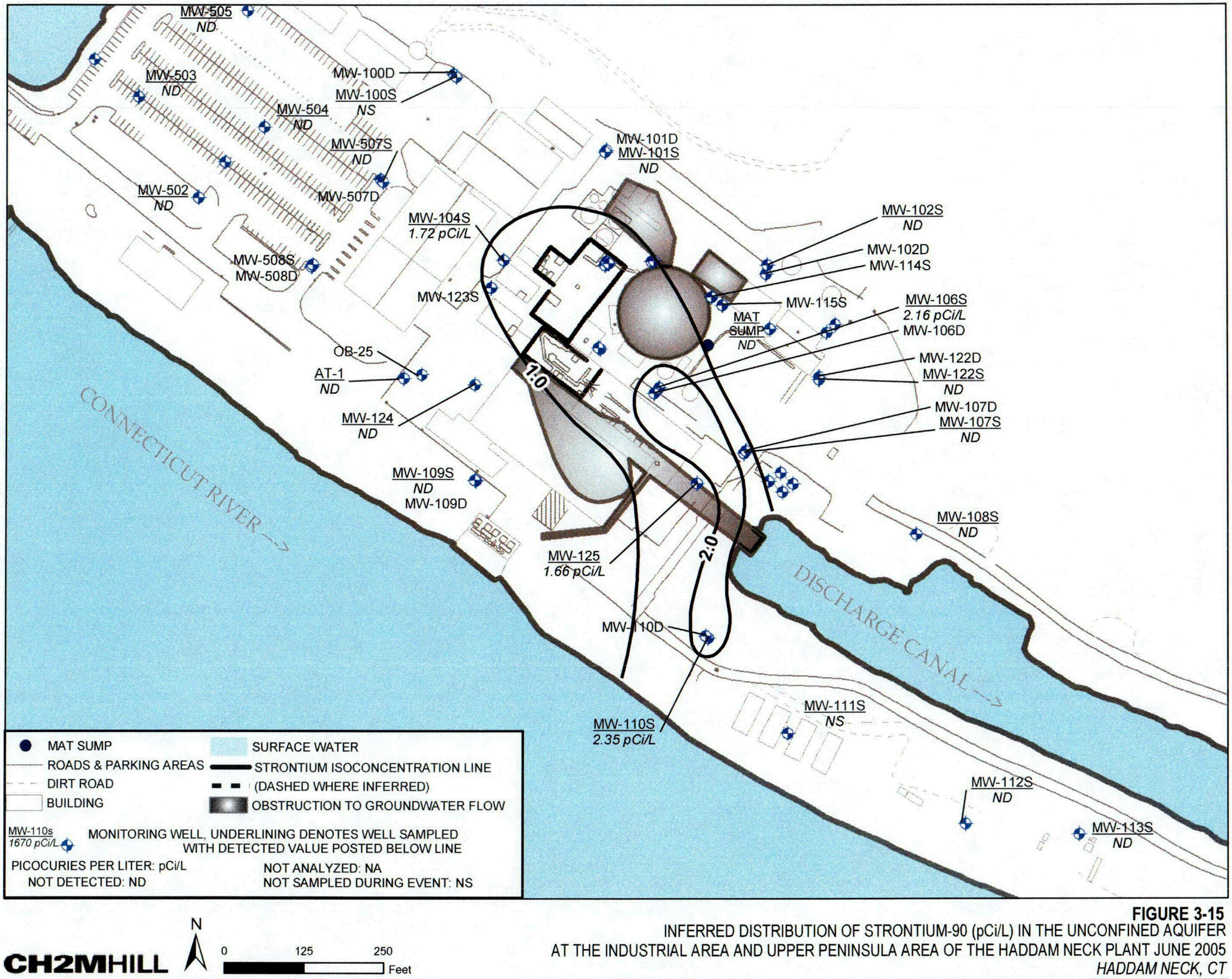
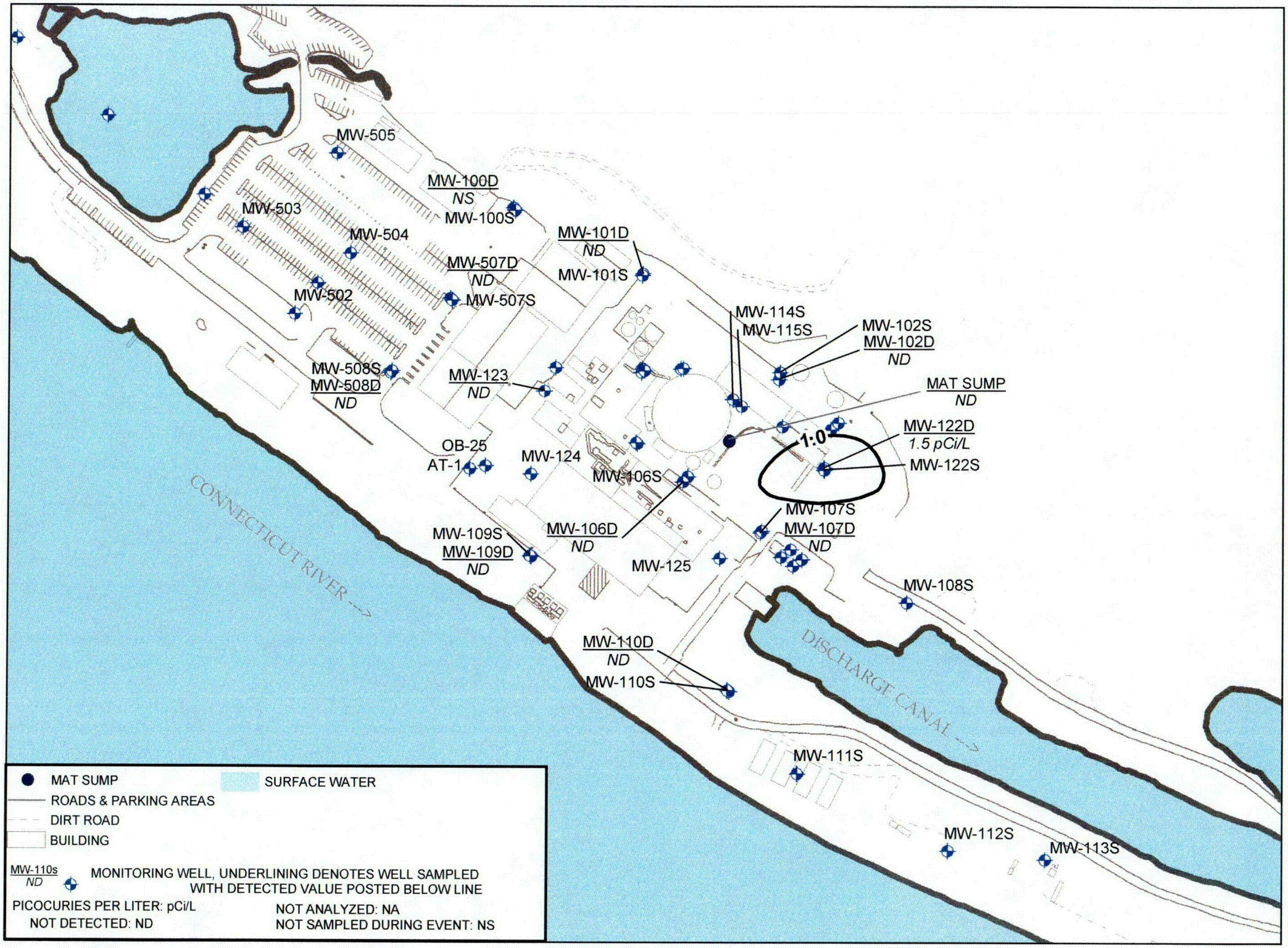


CH2MHILL

FIGURE 3-15
INFERRED DISTRIBUTION OF STRONTIUM-90 (pCi/L) IN THE UNCONFINED AQUIFER
AT THE INDUSTRIAL AREA AND UPPER PENINSULA AREA OF THE HADDAM NECK PLANT JUNE 2005
HADDAM NECK, CT

\\boomer\H\projects3\CT_Yankee\MXD\GW_Q2_05\Sr-90_UNCONFINED_06_05.mxd JKelly 9/1/2005

C-16



C-17

CH2MHILL

FIGURE 3-16
INFERRED DISTRIBUTION OF STRONTIUM-90 (pCi/L) IN THE CONFINED AQUIFER
AT THE INDUSTRIAL AREA AND UPPER PENINSULA AREA OF THE HADDAM NECK PLANT JUNE 2005
HADDAM NECK, CT

\\boomer\H\projects3\CT_Yankee\MXD\GW_Q2_05\Sr-90_CONFINED_06_05.mxd JKelly 9/1/2005

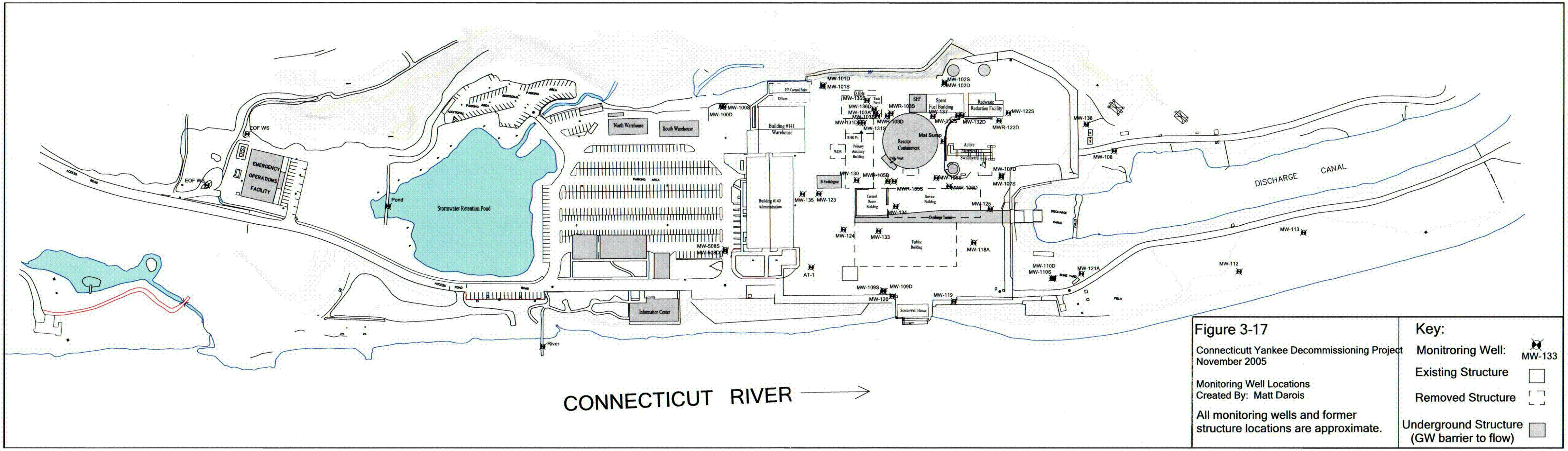


Figure 3-17

Connecticutt Yankee Decommissioning Project
November 2005

Monitoring Well Locations
Created By: Matt Darois

All monitoring wells and former structure locations are approximate.

Key:

Monitroring Well: MW-133

Existing Structure

Removed Structure

Underground Structure (GW barrier to flow)

Figure 3-18

Connecticut Yankee Decommissioning Project
November 2005

Monitoring Well Locations
Created By: Matt Darois

All monitoring wells and former structure locations are approximate.

Key:

Monitroring Well: MW-133

Existing Structure

Removed Structure

Underground Structure (GW barrier to flow)

C-19

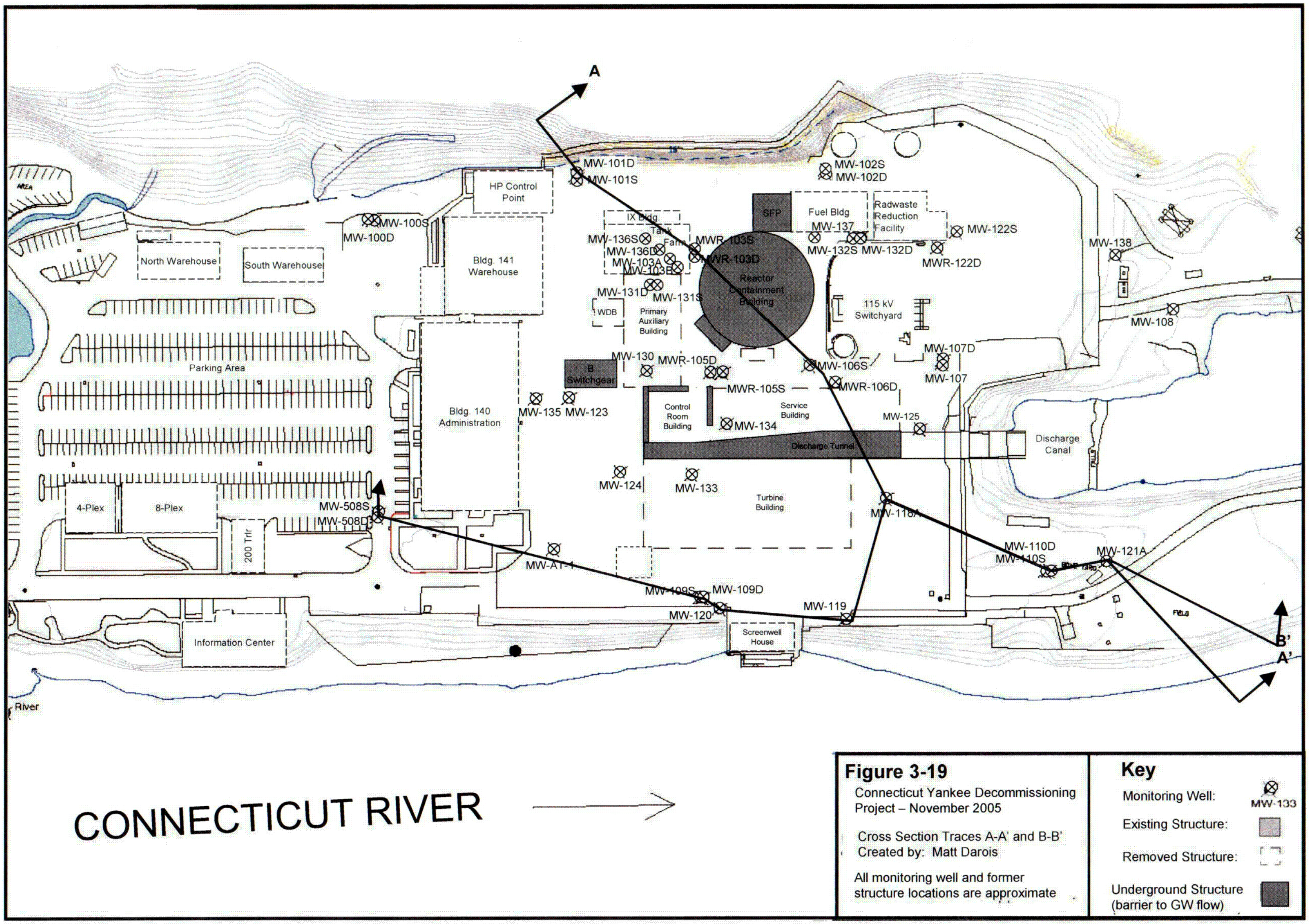


Figure 3-19

Connecticut Yankee Decommissioning Project – November 2005

Cross Section Traces A-A' and B-B'
Created by: Matt Darois

All monitoring well and former structure locations are approximate

C-20

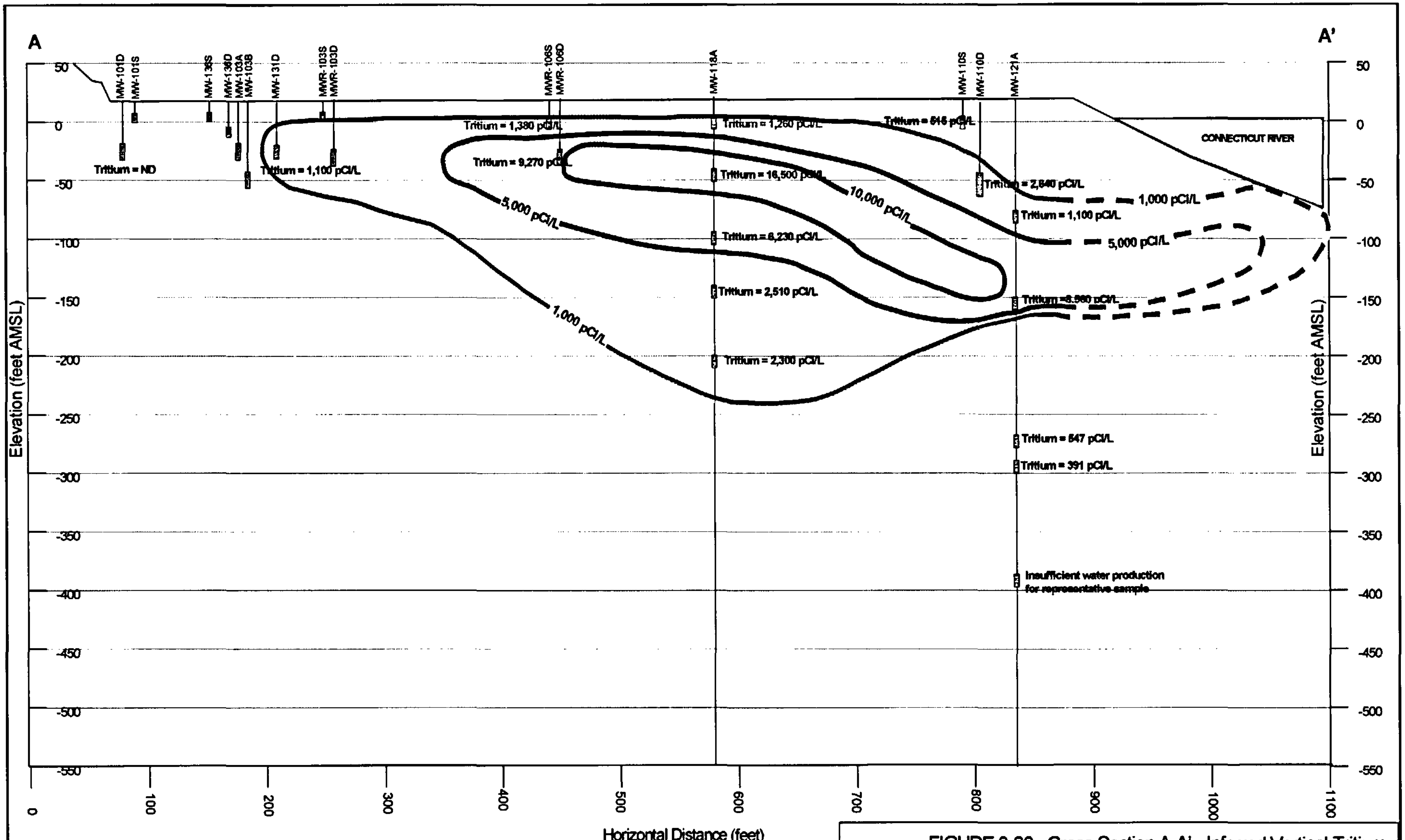


FIGURE 3-20. Cross Section A-A'. Inferred Vertical Tritium Plume Distribution. Haddam Neck Plant. Fall 2005 Data.

Note: Vertical equipotential conditions observed in MW-121A at approximately 175 ft bgs.

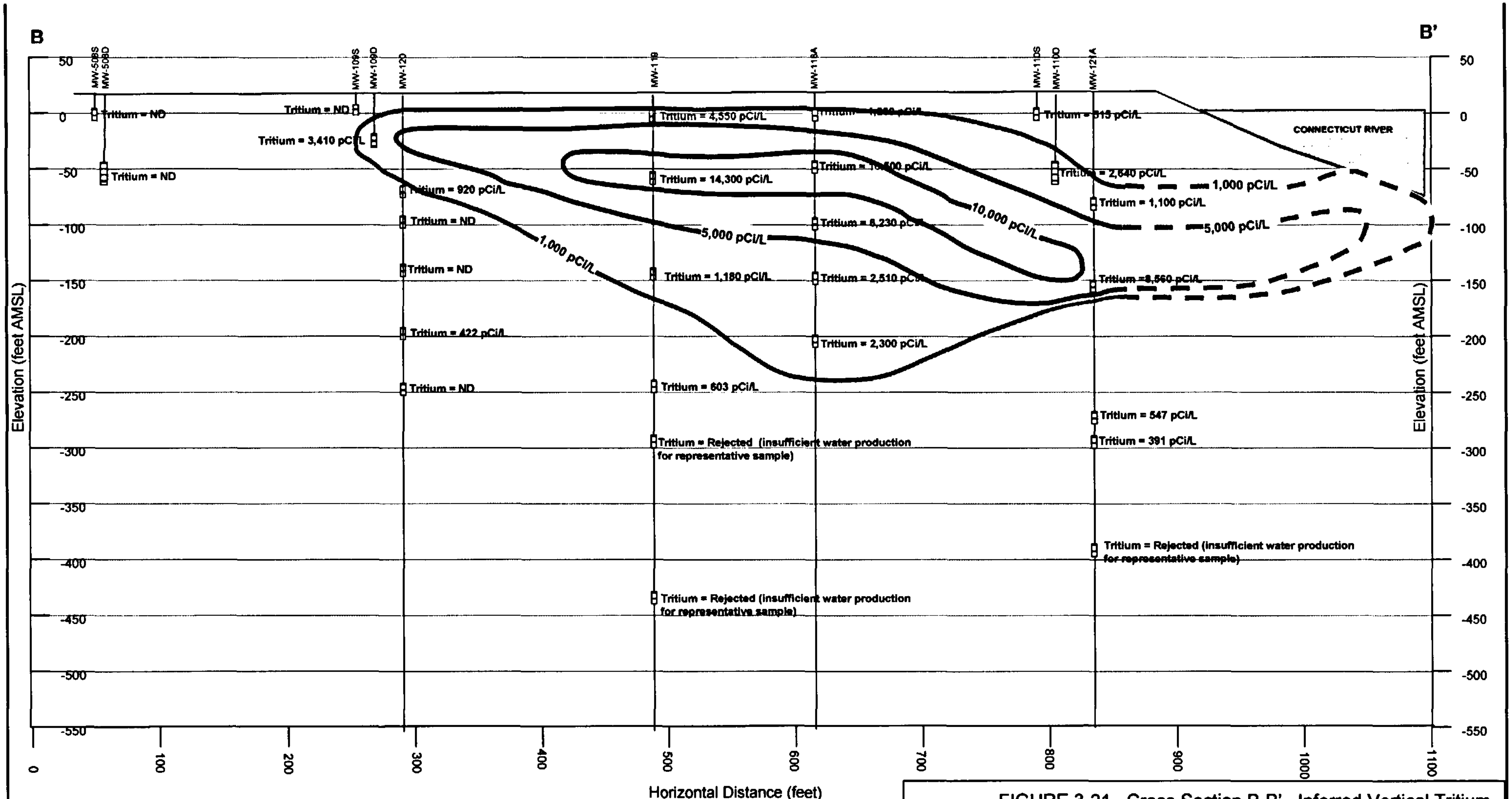


FIGURE 3-21. Cross Section B-B'. Inferred Vertical Tritium Plume Distribution. Haddam Neck Plant. Fall 2005 Data.

Note: Vertical equipotential conditions observed in MW-121A at approximately 175 ft bgs.