

*Non-Time-Critical Removal Action No. 2  
Demonstration of Compliance Plan*

Solvents Recovery Service of New England Site  
Southington, Connecticut

Prepared For:  
SRSNE PRP Group

November 1999

**BBL**  
BLASLAND, BOUCK & LEE, INC.  
engineers & scientists

---

6723 Towpath Road, P.O. Box 66  
Syracuse, New York, 13214-0066  
(315) 446-9120

# ***Table of Contents***

---

<b>Section 1.</b>	<b>Introduction</b> . . . . .	<b>1-1</b>
	1.1 General . . . . .	1-1
	1.2 Ground-Water Containment System Design . . . . .	1-1
	1.3 Containment System Performance Standards . . . . .	1-1
	1.4 Plan Organization . . . . .	1-2
<b>Section 2.</b>	<b>Field Data Acquisition</b> . . . . .	<b>2-1</b>
	2.1 General . . . . .	2-1
	2.2 Containment Test - Requirement #1 . . . . .	2-1
	2.3 Containment Test - Requirement #2 . . . . .	2-1
	2.4 Flow Rate Data . . . . .	2-2
<b>Section 3.</b>	<b>Demonstration of Compliance Reports</b> . . . . .	<b>3-1</b>
	3.1 General . . . . .	3-1
	3.2 Ground-Water Containment System . . . . .	3-1
	3.3 Ground-Water Treatment System . . . . .	3-1
<b>Section 4.</b>	<b>System Adjustments</b> . . . . .	<b>4-1</b>
<b>Section 5.</b>	<b>References</b> . . . . .	<b>5-1</b>
<b>Figures</b>	1 - Site Plan	
	2 - Containment System and Head Monitoring Locations	

# **1. Introduction**

---

## **1.1 General**

This Demonstration of Compliance Plan (DCP) was prepared by Blasland, Bouck & Lee, Inc. (BBL) on behalf of the Solvents Recovery Service of New England Site (SRSNE Site) Potentially Responsible Party (PRP) Group to verify the effectiveness of the Non-Time-Critical Removal Action No. 2 (NTCRA 2) ground-water containment system. In accordance with the NTCRA 2 Statement of Work (SOW), the DCP provides specific performance standards for the ground-water containment system and criteria that will be used to evaluate its effectiveness.

The ground-water containment system was installed in the Town of Southington Wellfield Property (Figure 1). The NTCRA 2 Containment Area encompasses the majority of the northern portion of the Town of Southington Wellfield Property (Figure 2). In vertical section, the NTCRA 2 Containment Area includes the shallow and deep bedrock, extending to a depth of over 150 feet below the top of bedrock in the northern portion of the Town of Southington Wellfield Property. Further upgradient (north), the Containment Area extends over 180 feet below the top of bedrock and over 250 feet below ground surface (BBL, November 1998a; November 1998b; November 1999).

The ground water extracted by the containment system will be pumped to the existing NTCRA 1 ground-water treatment system located in the treatment system building (Figure 1). The NTCRA 1 treatment system and associated overburden ground-water extraction system started operation in July 1995. Effluent from the treatment system will continue to be discharged into the Quinnipiac River.

## **1.2 Ground-Water Containment System Design**

The ground-water containment system includes two ground-water extraction wells that, in combination with the NTCRA 1 containment system, will hydraulically contain bedrock ground water migrating from the SRSNE Operations Area (Figure 2). The design of overburden and bedrock ground-water extraction wells RW-13 and RW-1R is described in the NTCRA 2 100% Ground-Water System Design Report (BBL, November 1999).

The results of numerical ground-water flow (MODFLOW) simulations, presented in Appendix B of the Draft Feasibility Study Report (BBL, November 1998a) and NTCRA 2 Technical Memorandum (November 1998b) predict that a hydraulic divide will be established downgradient (south) of the extraction wells during the implementation of the ground-water containment system. During a pumping test of well RW-13 in August 1998 (BBL, November 1998a and November 1998b) and an Interim Ground-Water Containment Evaluation using wells RW-13 and RW-1R (BBL, November 1999), the hydraulic divide and Containment Area were verified based on empirical hydraulic head measurements. The hydraulic divides (stagnation points) in the shallow and deep bedrock were situated approximately 400 feet and 270 feet downgradient (south) of the extraction wells during pumping from wells RW-13 and RW-1R. During operation of the NTCRA 2 ground-water containment system, the hydraulic gradient will be inward toward the containment system, creating a continuum of hydraulic control in the bedrock. South of the hydraulic divide, the hydraulic gradient will be southward toward the bend in the river. North of the hydraulic divide, bedrock ground water will converge toward the extraction wells.

## **1.3 Containment System Performance Standards**

The effectiveness of the NTCRA 2 ground-water containment system will ultimately be evaluated based on the performance standards summarized below, which are specified by the NTCRA 2 SOW.

- *The bedrock ground-water containment system shall minimize, to the extent reasonably practicable, the flow of bedrock ground water from the Operations Area of the site.* This provision acknowledges the inherent complexity of containing ground-water flow in fractured bedrock. A substantial degree of bedrock ground-water containment

---

required under this provision will be met through the continued operation of the existing NTCRA 1 overburden ground-water containment system, which achieves demonstrable bedrock ground-water containment (BBL, November 1998a). Additional ground-water extraction downgradient of the NTCRA 1 system as part of NTCRA 2 will provide a backup containment system for bedrock ground water, which will hydraulically contain the dissolved-phase plume of volatile organic compounds (VOCs) above Federal Maximum Contaminant Levels (MCLs) in bedrock downgradient of the NTCRA 1 bedrock ground-water containment area (Figure 2).

- *The containment system shall establish a three-dimensional Area of Containment downgradient of the Operations Area, which will be defined in the NTCRA 2 Demonstration of Compliance Plan.* While ground-water flow in fractured media is complex, the bedrock hydraulic responses observed during the pumping tests of overburden well RW-13 +/- bedrock well RW-1R were reasonably systematic. As summarized in the NTCRA 2 Technical Memorandum (BBL, November 1998b) and the NTCRA 2 100% Ground-Water System Design Report (BBL, November 1999), the bedrock ground-water containment area can be delineated using empirical hydraulic head measurements. The containment area shown on Figure 2 will be monitored using select wells and piezometers in the shallow and deep bedrock.

It should be noted that a short duration shutdown will not have a significant impact on long-term groundwater containment. As long as pumping (containment) is restored within several days, there would be minimal effect on long-term VOC migration, as explained in more detail below. The intent of this discussion is to propose that short-term interruptions in pumping be subject to reporting as such in the routine monthly and/or quarterly reports, and not as "losses of containment" subject to force major reporting. Significant issues, or projected downtime exceeding one week would continue to be reported promptly to the agencies, with written follow-up reports within 7 days. This approach would reduce administrative reporting.

- *Within 60 days of NTCRA 2 system startup and during the entire operation of the system thereafter, it shall be demonstrated, based on a Containment Test, that bedrock ground water within the Area of Containment is flowing in the direction of the NTCRA 2 bedrock ground-water containment system.* While containment is expected to be demonstrated within 60 days following the startup of the NTCRA 2 system, bedrock ground-water containment downgradient of the SRSNE Site is not considered to be time-critical given that: 1) no ground-water receptors are situated within the bedrock VOC plume associated with the SRSNE Site, as delineated in the final RI Report (BBL, June 1998) and verified by Interim Monitoring and Sampling (BBL, February 1999; July 1999); 2) no active ground-water receptors are situated downgradient of the SRSNE-related bedrock VOC plume, which would attenuate or discharge into the Quinnipiac River near Curtiss Street (Figure 2) if allowed to migrate unabated; 3) no VOCs were detected above Federal MCLs downgradient of the estimated NTCRA 2 containment area during the most recent sampling event (BBL, July 1999); 4) the plumes of VOCs in the shallow and deep bedrock are already attenuating (BBL, June 1998; February 1999; and July 1999) and 5) using detailed, site-specific solute-transport parameters quantified during the completion of the RI, the average linear velocity of the SRSNE-related VOC plume in bedrock was estimated as 0.037 ft/day (14 ft/year; BBL, June 1998). Thus, a one-month downtime would result in negligible (approximately one foot of) plume migration.
- *System adjustments shall be made, as appropriate, to satisfy the objectives listed above.* NTCRA 2 compliance will be evaluated on a relatively continuous basis, similar to NTCRA 1 compliance, and system adjustments (e.g., pump and well maintenance, level control cleaning, or potentially addition of new pumping wells) will be made, as necessary, to maintain containment.

#### **1.4 Plan Organization**

The remaining sections of this DCP describe:

- 
- The acquisition of field data that will be used to evaluate the effectiveness of the ground-water containment system (Section 2);
  - Data interpretation and reporting (Section 3); and
  - Adjustments to the ground-water containment system (Section 4).

## **2. Field Data Acquisition**

### **2.1 General**

The data required to demonstrate compliance with the ground-water containment and treatment system performance standards will be obtained in the form of head measurements from wells and piezometers installed in the area around the containment system, flow measurements from the containment-system extraction wells, and treatment system effluent pumping rates and analytical data.

As specified in the SOW, the effectiveness of the ground-water containment system at achieving the performance standards will be evaluated based on the results of a Containment Test. The successful Containment Test will show that the following two conditions are achieved during operation of the ground-water containment system:

1. Within the NTCRA 2 Containment Area, bedrock ground water with dissolved contaminants east and downgradient of the Operations Area is flowing in the direction of the ground-water containment system; and
2. All bedrock ground-water flow downgradient of the NTCRA 2 extraction system within the Containment Area is reversed and maintained in the direction of the ground-water containment system.

The Containment Test is to be satisfactorily demonstrated within a 60-day Compliance Period, which begins at the initiation of full-scale operation of the bedrock ground-water containment system, and during the entire operation of the system thereafter. The Containment Test results will be evaluated based on field measurements of hydraulic heads at a specified array of monitoring locations installed within the shallow and deep bedrock. To verify that each of the two requirements of the Containment Test are satisfied during operation of the NTCRA 2 Ground-Water Containment System, two different groups of wells and piezometers will be monitored, as described below.

### **2.2 Containment Test - Requirement #1**

To confirm that VOC-impacted bedrock ground water east and downgradient of the Operations Area within the Containment Area is flowing in the direction of the ground-water extraction wells (Containment Test Requirement #1), hydraulic head measurements will be obtained at the following pairs of wells/piezometers in the general vicinity upgradient (north) of the ground-water containment system (Figure 2):

- Shallow bedrock - MW-704R and MW-121A; and
- Deep bedrock - MW-704DR and MW-705DR.

Ground-water elevations will be measured monthly at these locations.

### **2.3 Containment Test - Requirement #2**

To verify that bedrock ground-water flow downgradient of the extraction system within the Containment Area is reversed and maintained in the direction of the ground-water containment system, (Containment Test Requirement #2), hydraulic head measurements will be obtained at the following locations shown on Figure 2:

- Shallow bedrock - MW-704R, MW-204A, PZR-2R, and PZR-4R; and
- Deep bedrock - MW-704DR, PZR-2DR, and PZR-4DR.

---

Hydraulic head data will be measured monthly at these bedrock monitoring wells and piezometers.

The hydraulic gradient will be considered reversed, and inward toward the Containment Area when the hydraulic head data measured at the shallow and deep bedrock monitoring wells MW-704R and MW-704DR located adjacent to extraction wells RW-13 and RW-1R, are lower than the heads measured at the corresponding shallow bedrock and deep bedrock monitoring wells and piezometers listed above. *→ actually list for future reports*

As specified in the SOW, to verify the continuity of the reversal of the hydraulic gradient, daily hydraulic head measurements will be recorded either manually or via transducer/data logger at the following locations:

- Shallow bedrock - MW-704R and PZR-2R; and
- Deep bedrock - MW-704DR and PZR-2DR.

These data will be obtained daily during the first year of containment-system operation.

#### 2.4 Flow Rate Data *to be what?*

In addition to the hydraulic head measurements described above, the flow rate from the containment system will be recorded continuously using an in-line totalizing flow meter (located in the treatment system building) throughout the first 12 months of containment system operation. The cumulative volume of ground water pumped by the containment-system extraction wells will be documented daily during the first week of the Compliance Period, and on a weekly basis for the remainder of the first 12 months of system operation. The effluent from the treatment system will also be monitored as part of the routine NTCRA 1 monitoring program to determine flow rate and water-quality characteristics, as required by the terms of the effluent limits established for the NTCRA 1 treatment system by the Connecticut Department of Environmental Protection (CT DEP).

## **3. Demonstration of Compliance Reports**

### **3.1 General**

The results of the ground-water containment and treatment system monitoring activities described above will be presented in Demonstration of Compliance Reports, which will be submitted to the United States Environmental Protection Agency (USEPA) on a monthly basis for the first three months of containment system operation and quarterly thereafter. These reports will contain the information necessary to demonstrate compliance with the performance standards for the ground-water containment and treatment system, descriptions of adjustments made to the system, and conclusions regarding compliance, as well as the basis for these conclusions. If compliance is not demonstrated, based on the data acquired under the DCP, a plan and schedule will be presented describing the actions that will be undertaken to establish compliance with the performance standards in the SOW.

### **3.2 Ground-Water Containment System**

To demonstrate the effectiveness of the ground-water containment system, Demonstration of Compliance Reports will include:

- A table of hydraulic head data measured each period; and
- Hydrographs created using hydraulic head data from monitoring wells MW-704R and MW-704DR, and piezometers PZR-2R and PZR-2DR, which will verify the temporal continuity of the gradient reversal.

The hydraulic head measurements will be used to verify that bedrock ground water between the Operations Area and the extraction wells, and between the extraction wells and the Containment Area boundary (hydraulic divide) is flowing in the direction of the extraction wells. The tabulated hydraulic head data measured at wells and piezometers situated at the same depth interval (shallow or deep bedrock) will also be used to verify that the hydraulic gradient is inward toward the extraction wells. The hydrographs created from data measured daily at monitoring wells MW-704R and MW-704DR, and piezometers PZR-2R and PZR-2DR will be used to verify that the gradient reversal is continuous through time.

Area(s) not in compliance with the performance standards and the location of the hydraulic divide will be identified based on the hydraulic heads tabulated in each Demonstration of Compliance Report. If the containment system performance standards are not demonstrated based on the compliance monitoring data, a plan and schedule will be presented in the same Demonstration of Compliance Report describing actions that will be taken to achieve the containment system performance standards.

### **3.3 Ground-Water Treatment System**

The Demonstration of Compliance Reports will also present the following information pertinent to the ground-water treatment system operation:

- Tabulated summary of the total volume of water pumped from the NTCRA 2 Containment System and treated by the NTCRA 1 treatment system; and
- Comparison of the discharge monitoring analytical results to the effluent limits established by the CT DEP.

If the CT DEP effluent limits are not demonstrated by the NTCRA 1 monitoring data for the treatment system, a plan and schedule will be presented in the Demonstration of Compliance Report describing modifications to the operation or design of the treatment system necessary to achieve the ground-water treatment system performance



---

standards. Each Demonstration of Compliance Report will present a concluding statement addressing the status of compliance with the performance standards.

## **4. System Adjustments**

If, based on the review of hydraulic head data measured at the site during the ground-water containment system operation, the system does not appear to satisfy the containment-system performance standards, adjustments will be made to the containment system to establish and maintain hydraulic control. These adjustments may include the modification of ground-water extraction rates at the extraction wells or the installation of additional extraction wells, if necessary. Similarly, if the analytical results of samples from the treatment system effluent do not meet the effluent limits established by the CT DEP, the treatment system will be modified, as necessary, to attain the requirements for discharge. Any brief interruption (i.e., less than one week) will be noted in Demonstration of Compliance Reports, including the cause and duration of the interruption and actions taken to rectify it. Any potentially longer-term interruption will be verbally reported to USEPA, and a written plan will be submitted within one week of the interruption describing the proposed actions to remedy the interruption and re-establish containment.

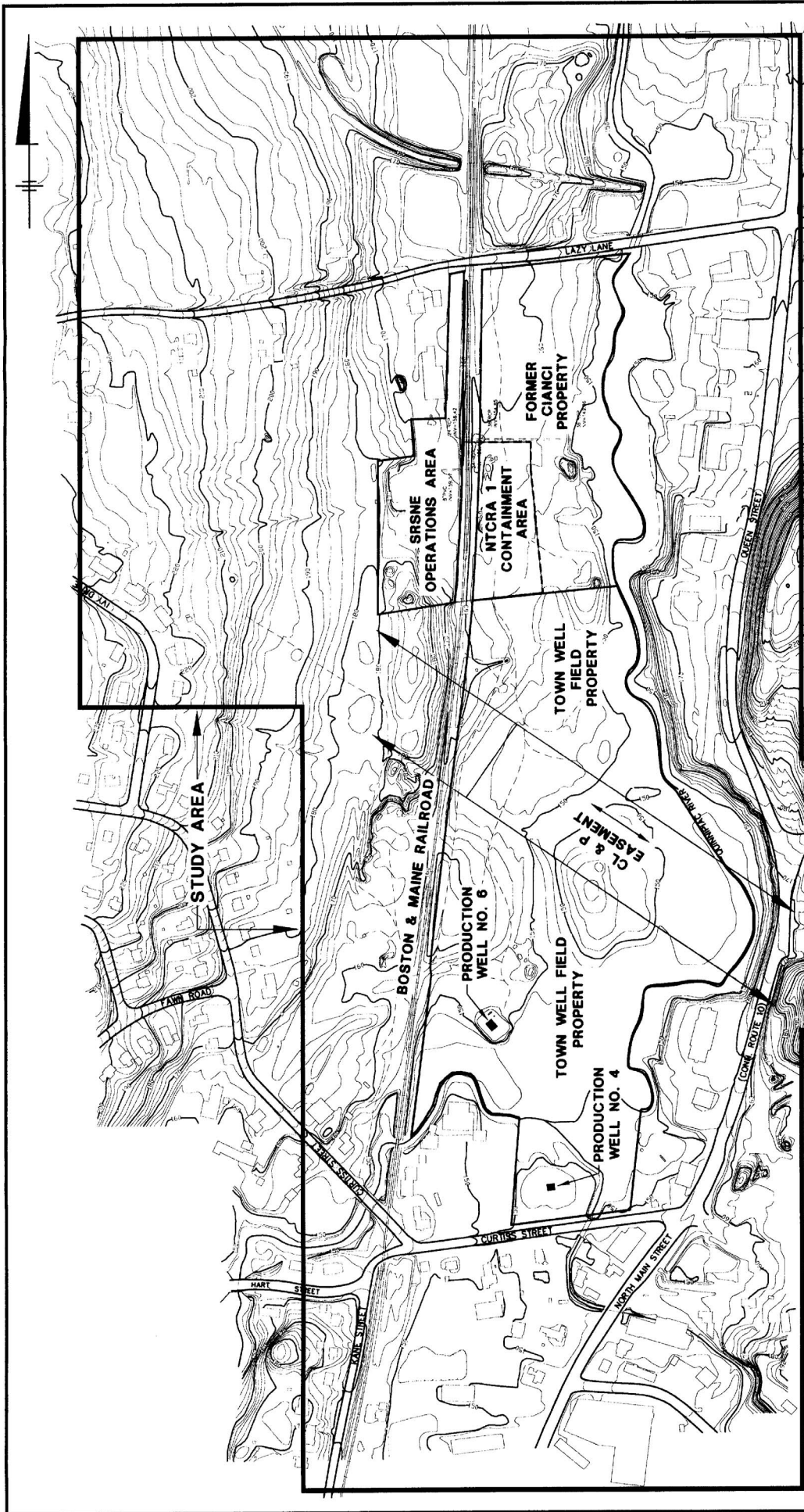
## **5. References**

---

Blasland, Bouck & Lee, Inc. "Draft Feasibility Study." Solvents Recovery Service of New England Site, November 1998a.

Blasland, Bouck & Lee, Inc. "Draft NTCRA 2 Technical Memorandum." Solvents Recovery Service of New England Site, November 1998b.

Blasland, Bouck & Lee, Inc. "Draft NTCRA 2 100% Design Report." Solvents Recovery Service of New England Site, November 1999.



SRSNE PRP GROUP  
SOUTHINGTON, CONNECTICUT  
NTCRA 2

**DEMONSTRATION OF COMPLIANCE PLAN**

**SITE PLAN**

**BBL**  
BLASLAND, BUCK & LEE, INC.  
engineers & scientists

FIGURE 1

Original includes color coding.



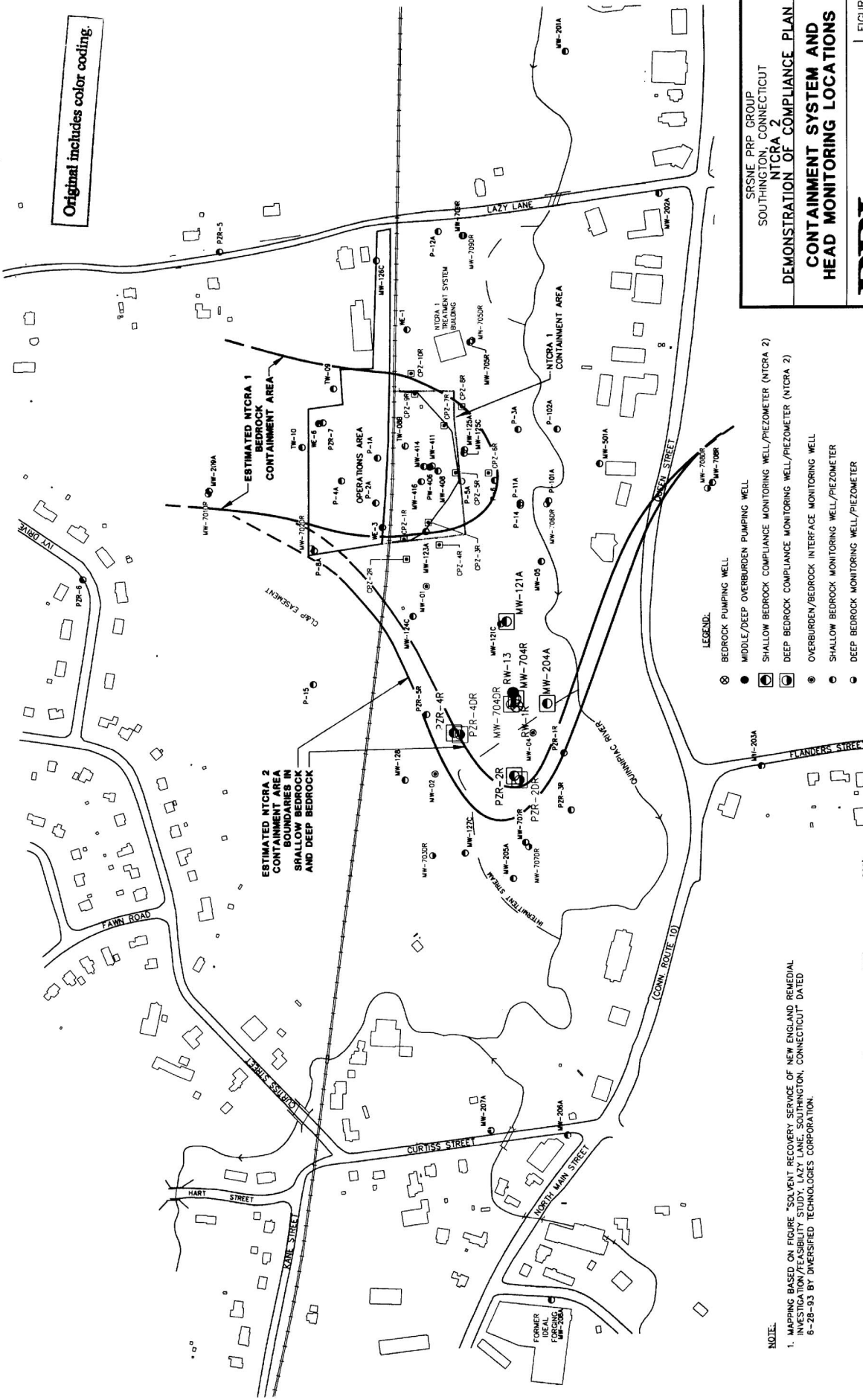
LEGEND

- 10' GROUND SURFACE INTERFERED ELEVATION CONTOUR
- 10' GROUND SURFACE INTERFERED ELEVATION CONTOUR (2 FT. CONTOUR INTERVAL)

NOTE:

1. WARPING BASED ON F.G. RE "SOLVENT RECOVERY SERVICE OF NEW ENGLAND REMEDIAL INVESTIGATION FEASIBILITY STUDY" JUNE 1992, AND SOU' THING ON, CONNAT'CT, DATED 6-28-92 BY SURVEYED TECHNOLOGIES CORPORA. GN.
2. DATE OF SURVEY: 8/17/00, 2/20/01
3. DRAWN BY: PCH
4. CHECKED BY: JBL

Original includes color coding.



SRSNE PRP GROUP  
SOUTHINGTON, CONNECTICUT  
**NTCRA 2**  
**DEMONSTRATION OF COMPLIANCE PLAN**  
**CONTAINMENT SYSTEM AND**  
**HEAD MONITORING LOCATIONS**

**BBL**  
BUSLAND, BOUCK & LEE, INC.  
engineers & scientists

FIGURE  
**2**

- LEGEND:
- BEDROCK PUMPING WELL
  - MIDDLE/DEEP OVERBURDEN PUMPING WELL
  - ◐ SHALLOW BEDROCK COMPLIANCE MONITORING WELL/PIEZOMETER (NTCRA 2)
  - ◑ DEEP BEDROCK COMPLIANCE MONITORING WELL/PIEZOMETER (NTCRA 2)
  - ⊙ OVERBURDEN/BEDROCK INTERFACE MONITORING WELL
  - ⊙ SHALLOW BEDROCK MONITORING WELL/PIEZOMETER
  - ⊙ DEEP BEDROCK MONITORING WELL/PIEZOMETER
  - ⊙ SHALLOW BEDROCK PIEZOMETER (NTCRA 1)



NOTE:  
1. MAPPING BASED ON FIGURE "SOLVENT RECOVERY SERVICE OF NEW ENGLAND REMEDIAL INVESTIGATION/FEASIBILITY STUDY, LAZY LANE, SOUTHINGTON, CONNECTICUT" DATED 8-28-93 BY DIVERSIFIED TECHNOLOGIES CORPORATION.

K. 08/11/02  
L. 08/11/02  
10/18/09  
02/27/2010