DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

RCRA Corrective Action
Environmental Indicator (EI) RCRIS code (CA750)
Migration of Contaminated Groundwater Under Control

Facility Name: **Fisher Scientific**
Facility Address: **One Reagent Lane, Fair Lawn, New Jersey, 07410**
Facility EPA ID#: **NJD004362059**

Definition of Environmental Indicators (for the RCRA Corrective Action)

Environmental Indicators (EI) are measures being used by the RCRA Corrective Action program to go beyond programmatic activity measures (e.g., reports received and approved, etc.) to track changes in the quality of the environment. The two EI developed to-date indicate the quality of the environment in relation to current human exposures to contamination and the migration of contaminated groundwater. An EI for non-human (ecological) receptors is intended to be developed in the future.

Definition of "Migration of Contaminated Groundwater Under Control" EI

A positive "Migration of Contaminated Groundwater Under Control" EI determination ("YE" status code) indicates that the migration of "contaminated" groundwater has stabilized, and that monitoring will be conducted to confirm that contaminated groundwater remains within the original "area of contaminated groundwater" (for all groundwater "contamination" subject to RCRA corrective action at or from the identified facility (i.e., site-wide)).

Relationship of EI to Final Remedies

While final remedies remain the long-term objective of the RCRA Corrective Action program, the EI are near-term objectives which are currently being used as Program measures for the Government Performance and Results Act of 1993 (GPRA). The "Migration of Contaminated Groundwater Under Control" EI pertains ONLY to the physical migration (i.e., further spread) of contaminated groundwater and contaminants within groundwater (e.g., non-aqueous phase liquids or NAPLs). Achieving this EI does not substitute for achieving other stabilization or final remedy requirements and expectations associated with sources of contamination and the need to restore, wherever practicable, contaminated groundwater to be suitable for its designated current and future uses.

Duration / Applicability of EI Determinations

EI Determination status codes should remain in the RCRIS national database ONLY as long as they remain true (i.e., RCRIS status codes must be changed when the regulatory authorities become aware of contrary information).

Facility Information

Fisher Scientific Company's Chemical Division (Fisher) began manufacturing operations at its Fair Lawn, New Jersey, facility in 1955. The facility is situated on nine acres of land in the northeastern corner of the Fair Lawn Industrial Park, and is bounded by Nevins Road to the north, Reagent Lane and Industrial facilities to the west, Henderson Brook and industrial facilities to the south, and Conrail railroad tracks to the east. To the north and west of the railroad track, approximately 200 feet from the site, there are residential properties. Surrounding industrial facilities include Road-Con Systems, Sandvik, Syntron Systems, Kodak, Nabisco, and Lea & Perrins.

The Fisher facility includes ten major buildings that are used for various purposes, including offices, production activities, and storage/warehousing. Production activities are performed in Buildings 2 and 3, and include repackaging, formulating, purifying, chemical distillation, drying processes, and warehousing industrial chemicals. Fisher's products include prepackaged, preassayed inorganic reagents and organic solvents. Solid and liquid materials are purchased in bulk quantities, and are then analyzed, processed, and packaged at the Fair Lawn facility before shipment and distribution. Fisher does not synthesize organic solvents. Hazardous wastes are generated, treated, and stored at the site.

In 1978, the Borough of Fair Lawn detected volatile organic compounds (VOCs) in four municipal supply wells located within and adjacent to the Fair Lawn Industrial Park. Studies showed that the contaminants were derived from the Industrial Park and some of the VOCs detected were known to be handled by Fisher between approximately 1955 and 1974. The New Jersey Department of Environmental Protection (NJDEP) issued a directive to Fisher on May 12, 1983, to conduct a hydrogeologic evaluation at the site. The hydrogeologic evaluation, conducted in 1983, concluded that groundwater contamination consisting of VOCs was present beneath the Fisher site. Based upon these results, NJDEP issued an Administrative Consent Order (ACO) on March 21, 1984. The ACO required that a Remedial Investigation and Feasibility Study (RI/FS) be performed at the site to determine the source of contamination and to evaluate remedial alternatives to minimize further impacts to public health and the environment.

Groundwater and soil investigations have been conducted over the past 17 years to define site conditions. Fisher has performed soil remediation and has been operating an overburden groundwater recovery and treatment system and a bedrock groundwater recovery and treatment system in accordance with the Industrial Site Recovery Act (ISRA). In addition, Fisher has also been cooperating with both NJDEP and the USEPA regarding the Fair Lawn Well Fields Superfund National Priorities List (NPL) Site.

1. Has **all** available relevant/significant information on known and reasonably suspected releases to soil, groundwater, surface water/sediments, and air, subject to RCRA Corrective Action (e.g., from Solid Waste Management Units (SWMU), Regulated Units (RU), and Areas of Concern (AOC)), been **considered** in this EI determination?

  _X_ If yes - check here and continue with #2 below.

  ____ If no - re-evaluate existing data, or

  ____ If data are not available skip to #6 and enter IN (more information needed) status code

Summary of Areas of Environmental Concern (AEC): Based upon the knowledge of site activities relating to handling of volatile organics and conversations with Fisher personnel, six AECs at the Fisher site were selected for initial investigation as identified in the 1984 RI (Ref. 1). A brief description of each AEC is outlined below. Groundwater has been generally investigated on a site-wide basis, and has thus been identified as its own AEC (AEC 7). A site plan is provided in Attachment 1.

AEC 1, Dry Well Area South of Building 6: This AEC was the site of a former acid neutralization pit. According to the RI, the dry well was constructed over 35 years ago as an excavation area that was partially backfilled with limestone. A floor drain in Building 3 was connected by buried sewer line to the dry well for the purpose of neutralizing and disposing of waste acid. Building 3 was utilized for distillation activities when the dry well was in operation and, thus, VOCs may have entered the floor drain and discharged to the dry well. The system was abandoned by plugging the pipeline to the dry well in the 1970s. As part of the RI, soil samples were collected in this area and analyzed for VOCs. No VOCs were detected above the detection limit of 1.0 mg/kg. Therefore, no further action was required by NJDEP to address soil contamination at this AEC (Ref. 2).

AEC 2, Drum Storage and Adjacent Areas South of Building 2: The drum storage area south of Building 2, including the area between Buildings 2 and 3, has been used for temporary holding of spent or expired organic materials returned from consumers or other Fisher plants. The RI indicated that a variety of VOCs could have been released onto the ground in this AEC. In addition, the area immediately south of and adjacent to Building 2 is the location of a distillation system which processes acetonitrile. Based upon initial RI results, two excavations were conducted in this AEC, one between Buildings 1 and 2, and one between Buildings 2 and 3, which extended into AEC 3 (See Attachment 2) between August 1986 and February 1987. Soil was excavated to an NJDEP approved site-specific cleanup level of 10 mg/kg for total VOCs. In December 1992, NJDEP required that Fisher re-examine all residual soil concentrations and compare them to the newly promulgated NJ Soil Cleanup Criteria. Based upon initial soil sampling conducted during the RI, and post-excavation sample results collected during 1986, VOCs (chloroform, 1,2-dichloroethane [DCA], and trichloroethane [TCA]) remain in soil at three locations above the New Jersey Impact to Groundwater Soil Cleanup Criteria (NJ IGWSCC). Remaining soil concentrations did not exceed any other New Jersey soil cleanup criteria. Despite these elevated detections, Fisher recommended that no further action be required because the average concentrations of these compounds are well below the NJ IGWSCC of 1.0 mg/kg, the maximum concentrations of these compounds are less than 10 times the NJ IGWSCC, and fewer than 10 percent of the samples contain VOCs at concentrations exceeding the NJ IGWSCC

(Ref. 2). NJDEP approved the no further action determination for soil at this area on August 24, 1993 (Ref. 9).

<u>AEC 3, Bulk Transfer Area, East and South of Building 3</u>: This AEC was formerly used for unloading solvents and other organic chemicals from rail tank cars to a packaging facility in the southeast corner of Building 3. Overhead piping, which has since been abandoned, connected the railroad siding with the building. In some cases, the solvents were filtered during the transfer operation from the tank cars to on-site storage tanks. The RI indicates that small volumes of VOCs may have been routinely discharged from pumps, hoses, and filter changing activities to surrounding soil. This area, including some newer solvent tanks south of Building 3, continues to be used for handling and packaging solvents, although the railroad siding is no longer used. Based upon initial RI sampling results, a large area of soil was excavated in this area between August 1986 and February 1987. These excavations removed soil that exceeded an NJDEP approved site-specific cleanup level of 10 mg/kg for total VOCs. In December 1992, NJDEP required that Fisher re-examine all residual soil concentrations and compare them to the newly promulgated NJ Soil Cleanup Criteria. The RI and post-excavation sampling results indicated that residual VOCs (tetrachloroethylene [PCE], trichloroethene [TCE], and chloroform) remain in several locations above the NJ IGWSCC. Despite these elevated detections, Fisher recommended that no further action be required because the average concentrations of the contaminants are well below the NJ IGWSCC of 1.0 mg/kg, the maximum concentrations of these compounds are less than 10 times the NJ IGWSCC, and fewer than 10 percent of the samples exceed a specific VOC guideline for TCE and PCE. Approximately 15 percent of the samples exceeded the NJ IGWSCC for chloroform. However, because the levels detected are well below the New Jersey Residential Direct Contact Soil Cleanup Criteria (NJ RDCSCC) and given that groundwater beneath this area is within the capture zone of the active groundwater extraction system, residual chloroform contamination in this area was not expected to be of concern (Ref. 2). NJDEP approved the no further action determination for soil at this site on August 24, 1993 (Ref. 9).

<u>AEC 4, Manholes Along West and North Perimeter of Property</u>: The sewer lines along Nevins Road and Reagent Lane, on the north and west sides of the site, are connected to a series of five manholes that were initially believed by NJDEP to have soil exposed at the bottom, rather than concrete. Subsequent inspection by Fisher documented that there were concrete bottoms at all manholes, but concluded that some improvements were required. The inspection showed the concrete bottoms to be corroded and cracked at Manholes 4 and 5. Also, the joints were not watertight where sewer lines connected to the manholes. Corrective measures were taken by Fisher in January 1984, and included refinishing all manhole bottoms and sealing sewer line joints. Based upon initial RI sample results, two small soil excavations were conducted in this AEC in March 1988, in the southwestern corner of the site and at the northern border of the site along Nevins Road. Soil was excavated to an NJDEP approved site-specific cleanup level of 10 mg/kg for total VOCs. In December 1992, NJDEP required that Fisher re-examine all residual soil concentrations and compare them to the newly promulgated NJ Soil Cleanup Criteria. Based upon initial RI sampling results and post-excavation sample results, residual VOCs (TCE and chloroform) remain in several areas above the NJ IGWSCC. Despite these elevated detections, Fisher recommended that no further action be required because the average concentrations of the contaminants are well below NJ IGWSCC of 1.0 mg/kg, the maximum concentrations of these compounds are less than 10 times the NJ IGWSCC, and fewer than 10 percent of the samples exceed a specific VOC guideline for chloroform. Approximately 10.5 percent of the samples exceeded the NJ IGWSCC for TCE, which only marginally exceeds the 10 percent guideline. In addition, the detected levels of TCE were well below the NJ RDCSCC, thus direct exposure is not expected to be of concern (Ref. 2). NJDEP approved the no further action determination for soil at this site on August 24, 1993 (Ref. 9).

AEC 5, Shed Area South of Building 1: Two potential sources of contamination were identified at the Fisher site south of Building 1. Several laboratories located in the southwestern portion of Building 1 are served by a lateral that discharges to the sewer at Manhole 2 near the entrance gate. This lateral was included in the investigation of potential sewer-related sources because VOCs were detected in this vicinity in earlier preliminary soil analyses performed by NJDEP. A waste compactor located at the shed area south of Building 1 was used in the past for crushing of empty containers. Small amounts of organic chemicals could have been introduced into the compactor and then discharged onto the ground at the compactor area. Based upon initial RI sample results, a small excavation was conducted in AEC 5 in March 1988, to an NJDEP approved site-specific cleanup level of 10 mg/kg for total VOCs. In December 1992, NJDEP required that Fisher re-examine all residual soil concentrations and compare them to the newly promulgated NJ Soil Cleanup Criteria. Based upon initial RI sample results and post-excavation results, no residual VOC contamination remains in this AEC above the most stringent NJ soil cleanup criteria. Thus, Fisher recommended no further action for soil in this AEC (Ref. 2). NJDEP approved the no further action determination for soil at this site on August 24, 1993 (Ref. 9).

AEC 6, Background and All Other Plant Areas: An area in the extreme southeastern corner of the site was designated as a background area during the RI. This area was within property boundaries and had not been documented as an area of historical industrial activity. One sample was collected in this area during the RI and analyzed for VOCs to represent background conditions. PCE was detected at a concentration between one and 10 mg/kg, which is above the NJ IGWSCC of 1.0 mg/kg. According to Fisher, data from other AECs indicate that PCE concentrations across the site are low, if detected, and that no other VOCs were detected in this sample. Thus, Fisher recommended no further action for soil in this AEC (Ref. 2). NJDEP approved the no further action determination for soil at this site on August 24, 1993 (Ref. 9).

AEC 7, Groundwater: Groundwater has been investigated on a site-wide basis and has been shown to be impacted by VOCs. Historically, groundwater contamination associated with Fisher operations was detected in on- and off-site locations; however, under current conditions, groundwater contamination is maintained within site boundaries. Groundwater has been impacted in the overburden (glacial deposits) zone, the shallow (bedrock) zone, and the intermediate (bedrock) zone. In general, groundwater in the glacial deposits contains a larger number of contaminants at significantly higher concentrations than groundwater from the bedrock aquifer zones. Analytical sample results from all three zones show the presence of VOCs, with acetonitrile and aromatic hydrocarbons (benzene, toluene, ethylbenzene, and xylene [BTEX]) predominating in the glacial deposits and higher concentrations of chlorinated solvents in the shallow bedrock zone. VOCs in the overburden are concentrated in the area between AECs 1 and 3 (in the area of wells FS-23 and FS-27R) just north of the recovery trench for overburden groundwater. VOCs in the shallow bedrock are primarily concentrated in the area east of Building 1 (near well FS-14); however, the location of the highest concentrations varies by contaminant. Concentrations of VOCs in the intermediate bedrock are generally highest along the southern boundary of Building 1 (in the vicinity of well FS-18) (Refs. 5, 6, 7, and 8). Groundwater is currently undergoing remediation by operation of two treatment systems. Overburden groundwater is being extracted via two recovery trenches located northeast and southwest of Building 6 and by a series of seven extraction wells (TPW-1 through TPW-7) located in the central, north-central and northeastern parts of the site. Extracted groundwater from the overburden zone is treated via air stripping/carbon adsorption and is then discharged to the Passaic Valley Sewer Commission (PVSC) under a New Jersey Pollutant Discharge Elimination System (NJPDES) permit. Deep groundwater (from the shallow and intermediate bedrock zones) is extracted via three production wells (PW-2, PW-4, and PW-5), is used as non-contact cooling water at the facility, is subsequently treated by carbon adsorption, and is then discharged to Henderson Brook under a NJPDES-Discharge to Surface Water (DSW) permit (Refs. 3 and 4). Fisher is required to submit quarterly Remedial Action Reports which detail the results of water level data collected each quarter, and groundwater quality monitoring results which Fisher must collect semi-annually during the second and fourth quarters. Fisher is in the process of installing additional monitoring wells to further define the capture zones of the extraction wells and trenches in order to achieve no further action status from NJDEP (Ref. 5). NJDEP has also directed Fisher to prepare a proposal for a Classification Exception Area (CEA), which delineates areas of groundwater contamination that exceed New Jersey Groundwater Quality Criteria (NJ GWQC). NJDEP requested that Fisher provide information on the extent of contamination above applicable standards in each of the three groundwater zones beneath the site (Ref. 5). Based upon available file materials, the CEA has not yet been established.

In summary, NJDEP has approved no further action for soil in AECs 1 through 6. Residual levels of contamination do exist in several of these AECs above NJ Soil Cleanup Criteria and will be discussed further in subsequent responses. Investigations and remedial actions associated with contaminated groundwater (AEC 7) at the site are currently ongoing.

References:

1. Remedial Investigation, Fisher Scientific Company, Fair Lawn, New Jersey Facility. Prepared by Weston Consultants. Dated September 28, 1984.
2. Letter from Thomas Fusillo, ENVIRON Corporation, to Jacqueline Bobko, NJDEP, re: Area of Environmental Concern Review, Comparison to Soil Cleanup Guidelines. Dated July 16, 1993.
3. Evaluation of the Overburden Remediation System. Prepared by ENVIRON Corporation. Dated August, 1994.
4. Packer Test Report. Prepared by ENVIRON Corporation. Dated February, 1996.
5. Letter from Sharon Burkett, ENVIRON Corporation, to Jacqueline Bobko, NJDEP, re: Remedial Action Report, First Quarter 2000. Dated April 21, 2000.
6. Remedial Action Report, Second Quarter 2000. Prepared by ENVIRON Corporation. Dated August, 2000.
7. Modified Remedial Action Report, Third Quarter 2000. Prepared by ENVIRON Corporation. Dated November, 2000.
8. Remedial Action Report, Fourth Quarter 2000. Prepared by ENVIRON Corporation. Dated February, 2001.
9. Teleconference between Elizabeth Butler, USEPA, and Phillip Barnes, ENVIRON, re: Fisher Scientific. June 10, 2001.

2. Is **groundwater** known or reasonably suspected to be "**contaminated**"[1] above appropriately protective "levels" (i.e., applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action, anywhere at, or from, the facility?

_X_ If yes - continue after identifying key contaminants, citing appropriate "levels," and referencing supporting documentation.

___ If no - skip to #8 and enter "YE" status code, after citing appropriate "levels," and referencing supporting documentation to demonstrate that groundwater is not "contaminated."

___ If unknown - skip to #8 and enter "IN" status code.

Rationale:

Hydrogeology

The Fisher site is underlain by glacial deposits that range from 10 to 30 feet thick across the area (Ref. 1). The glacial deposits are unconsolidated sediments with grain size ranging from sandy gravel to silty clay, with sandy silt as the most common sediment type. The deposits are lenticular, and the individual layers are not continuous across the site. The clay content of the glacial sediments is generally higher at the southeastern corner of the site. The glacial deposits are known as the overburden zone at the Fisher site and constitute the uppermost aquifer, where present.

The glacial materials are underlain by sedimentary rocks of the Triassic Brunswick Formation (Ref. 1). Bedrock is mostly sandstone with some conglomerate and shale interbeds. The primary porosity of the bedrock has been filled by compaction and cementation processes; the effective porosity of the bedrock aquifer is, therefore, due to the presence of fractures. Two vertical fracture sets have been identified at the site, oriented northeast-southwest and northwest-southeast in the Brunswick Formation. Core samples, caliper logs, and packer tests indicate that there are two intervals that have significant fracture permeability in the bedrock beneath the site. The upper zone, known as the shallow bedrock zone, is present beneath the bedrock-overburden contact, and extends from approximately 20 feet to 50 feet below ground surface (bgs) across the site (Ref. 5). Beneath this interval, bedrock is less fractured and does not reliably yield groundwater in the interval from approximately 50 to 70 feet bgs. Beneath this lower permeability interval, another fractured zone is present, generally ranging from 70 to 100 feet bgs. The lower fractured zone has been designated the intermediate bedrock zone at the site. Deeper zones within the bedrock aquifer have been subjected to packer and pumping tests in bedrock wells at several locations across the site. Available data do not indicate that significant contamination is present in fractured zones in the deeper portion of the Brunswick Formation.

Groundwater monitoring and remediation is being conducted in the three aquifers (overburden, shallow, and intermediate zone) described above. The water table varies from 6 to 14 feet bgs, and up to 4 feet of seasonal variation in water levels has been observed at the site. The water table is beneath the top of bedrock at the western portion of the site. The shallow bedrock zone is the uppermost aquifer at this part

---

[1] "Contamination" and "contaminated" describes media containing contaminants (in any form, NAPL and/or dissolved, vapors, or solids, that are subject to RCRA) in concentrations in excess of appropriate "levels" (appropriate for the protection of the groundwater resource and its beneficial uses).

of the Fisher property. Where the saturated zone pinches out at the western side of the site, groundwater flows downward into the upper zone of the bedrock aquifer, as indicated by water levels in the monitoring wells in the overburden zone and shallow bedrock zone. Prior to installation of the extraction trenches and wells, hydraulic gradients ranged from 0.04 at the eastern part of the site to 0.02 beneath the central part of the site in the overburden zone (Ref. 1).

At the eastern part of the site, where there is a saturated interval in the overburden zone, groundwater historically flowed to the west and southwest from an apparent recharge area east of Building 3, along the eastern boundary of the facility. From the recharge area, groundwater flowed south and southwest towards Henderson Brook, a small stream that flows along the southern edge of the site. At the northeastern part of the site, groundwater in the overburden flowed to the west and west-northwest. The water table elevation decreases from east to west across the site as the glacial deposits thin beneath the western half of the site. Slug tests performed in monitoring wells completed in the overburden zone indicate that hydraulic conductivity of the glacial sediments ranges from about 0.15 to 0.6 feet per day.

Groundwater monitoring prior to initiation of groundwater remediation indicated that there was a downward vertical gradient from the overburden zone into the shallow bedrock zone. Vertical gradients ranged up to 0.04, and horizontal flow in both bedrock zones was to the west prior to startup of the groundwater remediation systems. Pumping and packer tests indicated that the hydraulic conductivity of the shallow bedrock zone ranges up to 2.8 feet per day (Ref. 5) and that yields up to 20 gallons per minute (gpm) could be sustained in the shallow bedrock zone. Packer tests also indicated significant fracture permeability is present in the intermediate bedrock zone. The more permeable portions of this zone are located along the western edge of the site and at off-site areas to the west and southwest. Packer tests results also indicated that some hydraulic connection exists between the shallow and intermediate bedrock zones, and the interconnections between different zones in the bedrock aquifer are greater at off-site areas southwest of the site. The packer tests and previously conducted pumping tests in the bedrock wells also show that the withdrawal of groundwater from wells PW-4 and PW-5 results in hydraulic containment of groundwater beneath the western half of the site, with the zone of influence of these wells extending off site to the west, southwest, and northwest of the Fisher property.

Historical Contamination

Groundwater contamination was initially characterized at the site during the RI conducted at the Fisher facility beginning in 1983 (Ref. 1). Initially, 12 monitoring wells were installed in the overburden and shallow bedrock zones. VOC contamination was detected in all of the monitoring wells that were installed during the RI. Contaminants detected included chlorinated ethenes and ethanes, chloroform, carbon tetrachloride, methylene chloride, acetonitrile, and BTEX. The highest contaminant concentrations detected in groundwater are located at well FS-23, which is completed in the overburden zone south of the Building 3 in the east-central part of the site. This is near the truck unloading station, which is part of AEC 3 at the site. Groundwater contamination in the overburden zone has also been detected south of Building 2, near the drum storage area at AEC 2, and in the south-cental portion of the site, near the dry well south of Building 6 at AEC 1. Groundwater contaminated with VOCs has also been detected at the north-central part of the site at monitoring well FS-01B. This location is near Manhole 5 of the sewer system. Soil sampling results from the RI indicated that source areas for VOC contamination were present at areas south and southwest of Building 3, near the locations of the truck unloading station and the hazardous waste drum storage area. Groundwater monitoring conducted during the RI indicated considerable variability in contaminant concentrations at the monitoring locations. Estimated maximum contaminant concentrations from the RI are listed in Table 1.

Table 1. Maximum Contaminant Concentrations Detected in Groundwater during the 1984 RI at the Fisher Scientific Site, Fair Lawn, New Jersey (μg/L)

Contaminant	Concentration	NJ GWQC
Benzene	74,000	1
Carbon Tetrachloride	34,000	2
Chlorobenzene	1,100	4
Chloroform	30,000	6
1,1-DCA	10	70
1,2-DCA	710	2
Ethylbenzene	73,000	700
Methylene Chloride	3,100	2
Tetrachlorethene	3,500	1
Toluene	210,000	1,000
Trans-1,2-dichloroethene (DCE)	220	100
1,1,1-TCA	220	30
1,1,2,2-tetrachloroethane	3,200	2
TCE	130,000	1
Acetonitrile	220,000	40
Xylenes	310,000	40

Overburden Zone

Additional groundwater characterization activities have been undertaken at the site, including investigations conducted for development of the Remedial Action Plan addenda in 1985 and 1987. Additional wells were installed to further characterize VOC contamination in the overburden, shallow bedrock, and intermediate bedrock zones (Ref. 6). Subsequent evaluations of groundwater contamination and flow patterns were performed in 1991 and 1992 to support development of the active groundwater remediation system at the site (Ref. 3). These investigations delineated areas of groundwater contamination in the overburden zone south of the truck unloading station, south of Building 6, and east of Building 1. Contamination from these sources was found to extend across the central and south-central portion of the site. Contaminants that exceeded NJ GWQC by two to four orders of magnitude in the overburden zone during these investigations include BTEX, chlorinated ethenes, methylene chloride, carbon tetrachloride and 1,2-DCA. Acetonitrile has been detected in the overburden zone at estimated concentrations of up to 100,000 μg/L (Ref. 6). An interim NJ GWQC of 40 μg/L has been established for this contaminant.

Shallow Bedrock Zone

Groundwater contamination in the shallow bedrock zone includes the contaminants detected in the overburden zone; however, acetonitrile, chloroform, methylene chloride and 1,2-DCA were detected at higher concentrations in the shallow bedrock zone than in the overburden zone. BTEX compounds, vinyl chloride and other chlorinated VOCs were also detected in shallow bedrock zone, but at lower concentrations than observed in the overburden zone. Contaminant concentrations in the shallow bedrock zone are highest at the south-central part of the site near the AEC 1 dry well, and in the vicinity of AEC 2, the drum storage area south of Building 2 in the central part of the site. Cis-1,2-dichloroethene has a maximum concentration in the shallow bedrock zone south of Building 1, at monitoring well FS-17.

Intermediate Bedrock Zone

Contaminant concentrations in the intermediate bedrock zone show a different lateral distribution than in the overlying shallow bedrock zone. The highest contaminant concentrations are present at FS-18, south of Building 1 in the west-central part of the site; at FS-10, near the AEC 1 dry well; and at FS-42, near AEC 5 and the compactor shed at the southwestern part of the site. Chloroform, TCE, cis-1,2-DCE, and carbon tetrachloride have been detected at over 100 µg/L in the intermediate bedrock zone. Chlorinated VOCs, acetonitrile and benzene detected in the intermediate bedrock zone are also present at lower concentrations than observed in the overlying shallow bedrock zone.

The presence of contaminants in the intermediate bedrock zone south and west of the contamination detected in overlying aquifers may indicate the influence of the production wells at the site, which are used to capture contaminated groundwater in both bedrock zones. The production wells also extract groundwater from deeper bedrock zones, as indicated by total well depth that exceeds 400 feet bgs at PW-4. Because production wells PW-4 and PW-5 have higher yields, contamination in the bedrock zones migrates towards these pumping centers. In addition, interconnections between the fracture zones are complex, and preferential pathways in the bedrock aquifer may also impact the distribution of contaminants in the intermediate bedrock zone (Ref. 5).

Remedial Actions

A number of remedial actions have been undertaken at the site to address subsurface contamination. Contaminated soils present at AECs 2 and 3 were excavated and removed from the site in 1986 and 1987 (Ref. 2). Approximately 6,000 cubic yards of soil contaminated with more than 10 mg/kg total VOCs were excavated from the site and transported to a commercial hazardous waste disposal facility. Smaller volumes of soil were also excavated at AECs 4 and 5 in the southwestern part of the site. Contaminated soil was a secondary source of VOC contamination that was impacting groundwater.

In addition to soil excavation, other remedial actions have been implemented at the site to address groundwater contamination. These include installation of the trench recovery system in the overburden zone in 1992. The overburden remediation system included two recovery trenches located northeast and southeast of Building 6. The recovery system piping and pumps were designed to operate at a capacity of 60 gpm, but have been operated at 12 to 20 gpm because of the low hydraulic conductivity of the glacial materials that comprise the overburden zone. Based on a performance evaluation of the system in 1993, NJDEP required modification of the system to address groundwater contamination in the overburden zone north and west of the capture zone of the trench system. Seven shallow extraction well points were installed in the overburden zone (Ref. 3). These wells extract contaminated groundwater from areas east and south of Building 1 that were not captured by the trench system. Because of the low yield of the overburden, each of the wells is operated at less than 1 gpm. Groundwater extracted from the trenches and shallow extraction wells is pumped to the treatment system at the south central part of the site, near Building 6. The groundwater from the overburden zone is treated by a granular activated carbon adsorption process and is discharged to the sanitary sewer under a permit issued by the PVSC. The system has been operated in its current configuration since 1997.

To address contamination in the bedrock zones, Fisher operates three production wells (PW-2, PW-4 and PW-5) completed across the shallow and intermediate zones, where contamination has been delineated. These wells are also screened in the deeper zones of the fractured bedrock zone (Ref. 8). The wells are pumped to extract contaminated groundwater, and to provide hydraulic control, preventing downgradient migration of contamination in the bedrock zones (Refs. 4 and 5). The water produced by these wells is used for non-contact cooling water at the Fisher site, and is then treated by granular activated carbon and air-stripping prior to discharge to Henderson Brook. The discharge to Henderson Brook is regulated under a NJPDES permit issued to Fisher. Well PW-1 was located at the southwestern corner of Building 1, but was abandoned in 1988. There was no information in the file material that indicated a well identified as PW-3 was ever present at the site.

In order to evaluate the radius of influence of the production wells, and to assess hydraulic connections between different fracture zones in the bedrock, Fisher performed packer and pumping tests at the bedrock wells at the site, and at wells located at the Polevoy site southwest of Fisher (Ref. 5). In addition, groundwater levels were obtained from bedrock monitoring wells at the Sandvik site adjacent to the Fisher site to the west. Data collected from packer and pumping tests and from caliper logs of the bedrock wells were used to delineate the radius of influence of the pumping wells. The data collected from these tests demonstrated that pumping at wells PW-4 and PW-5 captured groundwater in the shallow and intermediate bedrock zones across the Fisher site, and that the zones of influence for these wells extend westward beneath the eastern portion of the Sandvik site. Water level measurements collected during the packer tests indicate that PW-4 and PW-5 have a larger radius of influence in the intermediate zone than in the shallow bedrock zone, reflecting greater hydraulic interconnection of the fractures in the intermediate zone. The data collected from the packer tests and subsequent performance monitoring at Fisher and Sandvik through 1997 indicated that the wells capture groundwater across the western portion of the site and the eastern portion of the Sandvik site (Ref. 7). Pumping at well PW-2 has a more limited radius of influence, and the yield of this well is lower than that at PW-4 and PW-5. However, because groundwater flows westward across the site, groundwater that is not within the zone of influence of PW-2 flows westward and is captured by PW-4 and PW-5.

NJDEP has also directed Fisher to prepare a proposal for a Classification Exception Area (CEA), which delineates areas of groundwater contamination that exceed New Jersey Groundwater Quality Criteria (NJ GWQC). NJDEP requested that Fisher provide information on the extent of contamination above applicable standards in each of the three groundwater zones beneath the site. Based upon available file materials, the CEA has not yet been established.

Current Contamination

VOC contamination at the Fisher site is monitored on a semi-annual basis in order to assess the contamination, and to evaluate the performance of the remedial systems. While the monitoring results show that contaminant concentrations have decreased at the site, a number of contaminants continue to exceed NJ GWQC in the overburden, shallow bedrock, and intermediate bedrock zones (Ref. 10). The maximum contaminant concentrations detected that exceed the NJ GWQC in the fourth quarter 2000 monitoring event are summarized in Table 2. The remedial systems are monitored quarterly for water levels. Recent water level data and well locations for each zone are shown in Attachments 3 through 5. Water level monitoring at the site also shows that the remedial systems provide hydraulic containment for the contamination present in the overburden, shallow bedrock, and intermediate bedrock zones at the Fisher site. Water level monitoring has not been conducted at off-site locations since 1997; however, the remediation systems are being operated with similar water withdrawal rates, and on-site water levels are similar to previous conditions. The extent of the capture zones provided by the production wells is probably similar to previously observed results in the off-site areas, but data are no longer reported from off-site wells as part of the remedial action monitoring at the Fisher site.

Overburden Zone

Contamination in the overburden zone extends across the southeastern and south-central parts of the site. The horizontal extent of contamination in the overburden has not changed significantly during the operation of the remediation systems. The stability of the extent of contamination reflects the very high contaminant concentrations at source areas prior to startup of the extraction trenches and well points. Total VOC concentrations have decreased at highly contaminated wells in the overburden zone, including FS-01B, FS-23, and FS-26 through FS-30. Contaminant concentrations have increased at FS-25 between 1992 and 2000, reflecting the migration of VOCs towards the western extraction trench, which is south and downgradient of FS-25. Contamination is also present in the central part of the site, immediately east of Building 1, and in the north-central part of the site, near Manhole 4. Contaminants that currently exceed NJ GWQC in the overburden zone include chlorinated ethenes and ethanes, acetonitrile, BTEX compounds, chlorobenzene, chloroform, and methylene chloride. NJDEP has directed Fisher to evaluate the possibility of contaminant sources that may be contributing to elevated acetonitrile concentrations, including sewer lines and sumps located at Building 9 (Ref. 9).

Shallow Bedrock Zone

Contaminant concentrations in the shallow bedrock zone have decreased since remedial actions have been initiated at the site. For example, total VOC concentrations at well FS-03R have decreased from a maximum annual average of over 11,000,000 µg/L in 1993 to 10,000 µg/L in the fourth quarter 2000 monitoring event (Refs. 7 and 10). The lateral distribution of contaminants in this zone is also stable. VOCs present in the shallow bedrock zone include benzene, toluene and xylenes, and chlorinated ethenes, ethanes and methanes. The shallow bedrock contamination is present at several locations at the Fisher site, including AEC 2 - east of Building 1 (FS-14), near the AEC 1 dry well (FS-15R), and at AEC 4 - near the drum storage area south of Building 1 (FS-17). The total contaminant concentrations are generally lower in the shallow bedrock zone than in the overburden, except at FS-14, which has very high concentrations of acetonitrile, chloroform, and methylene chloride. Contaminants present at concentrations up to several orders of magnitude greater than their respective NJ GWQC in the shallow bedrock zone include chloroform, carbon tetrachloride, methylene chloride, 1,2-DCA, and acetonitrile.

Methylene chloride is present in the shallow bedrock zone at concentrations that are a significant fraction of the solubility limit of the compound at well FS-14. However, no monitoring at the site has detected any dense, non-aqueous phase liquids (DNAPL) in the bedrock zones. There may be small amounts of residual DNAPL in the shallow bedrock zone, but DNAPL often occurs in fractured rock aquifers as separate microscopic masses in the fracture system. Any small, disconnected volumes of DNAPL that may be present in bedrock fractures are not amenable to recovery through conventional extraction techniques, such as dual-phase pumping systems.

Intermediate Bedrock Zone

VOC concentrations in the intermediate bedrock zone are lower than those found in either of the two overlying zones, with a maximum of 730 µg/L total VOCs at FS-18 in the southwestern part of the site, at AEC 4 south of Building 1. Carbon tetrachloride, and chlorinated ethenes and ethanes all exceed NJ GWQC in the intermediate bedrock zone. The highest VOC concentrations in the intermediate bedrock zone are present at the southwestern and south-central parts of the site. The lateral distribution of contaminants in the intermediate zone reflects downward migration of contaminated groundwater from the shallow bedrock zone, and lateral migration towards the extraction wells PW-4 and PW-5 at the western portion of the site. Water level data collected at the intermediate zone monitoring wells and the production wells indicate that groundwater in the intermediate zone flows towards wells PW-4 and PW-5 from the western half of the Fisher site and from the eastern portion of the Sandvik site. Production well PW-2 located at the eastern side of the Fisher site has a more limited radius of influence, and provides hydraulic control for contamination at the east-central part of the site in both bedrock zones.

Table 2. Groundwater Wells Containing Maximum Contaminant Concentrations, 4th Quarter 2000 (µg/L)

Contaminant	NJ GWQC	Overburden				Shallow Bedrock					Intermediate Bedrock		Production Wells	
		FS-03R	FS-23	FS-27R	FS-29	FS-05	FS-12	FS-14	FS-15R	FS-17	FS-18	FS-42	PW-04	PW-05
1,1,1-TCA	30	ND(50)	**1,500**	**160**	ND	1.2J	ND	ND(2,500)	ND(50)	ND	ND	ND	ND	3J
1,1,2,2-Tetrachloroethane	2	ND(10)	**240**	**26**	ND(5)	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-DCA	70	ND	**110J**	**130**	ND	4.4J	3.5J	ND(2,500)	ND	2.8J	2.9J	ND	ND	1.8J
1,1-DCE	2	ND(20)	**140**	**26**	ND(10)	**4.1**	0.6J	ND(1,000)	ND(20)	ND	ND(4)	ND	**2J**	**2.9**
1,2-DCA	2	ND(20)	ND(100)	ND(20)	**75**	0.7J	1J	**7,700**	ND(20)	**3.7**	**29**	ND	**6.6**	1.1J
Acetonitrile	40	**9,700**	**1,900J**	ND(1,000)	**2,100**	ND(100)	ND(100)	**220,000**	ND(1,000)	ND(100)	ND	ND	ND	ND
Benzene	1	**73**	**7,700**	**2,600**	**19**	ND	**8.2**	ND(500)	**140**	**8.4**	**56**	ND	ND	ND
Carbon Tetrachloride	2	ND(20)	**4,800**	ND(20)	ND(10)	1.1J	**150**	ND(1,000)	**790**	**2.3**	**120**	**5.1**	**220**	**120**
Chlorobenzene	4	**87**	**540**	**120**	**110**	ND(5)	**16**	ND(2,500)	**12J**	**48**	**69**	ND(5)	ND	ND
Chloroform	6	**35J**	**4,100**	**15J**	3.3J	**10**	**23**	**51,000**	**1,100**	**34**	**120**	**160**	**89**	**84**
Chloromethane	30	ND	ND	ND	ND	ND	ND	ND(2,500)	23J	ND	ND	ND	ND	ND
cis-1,2-DCE	10	ND(50)	**13,000**	**5,100**	2.6J	2.6J	**87**	ND(2,500)	**12J**	**120**	**110**	2.5J	**25**	7.6
Ethyl Benzene	700	8J	**7,600**	**2,600**	3.6J	ND	ND	ND(2,000)	25J	ND	ND	ND	ND	ND
Methylene Chloride	2	ND(30)	**4,000**	ND(30)	ND(15)	ND(3)	0.8J	**58,000**	**720**	ND(3)	ND(6)	**2.6J**	ND	ND
PCE	1	ND(10)	**290**	**10**	ND(5)	0.6J	**1J**	ND(500)	**36**	**5.4**	**11**	**2.5**	**7**	**120**
Toluene	1,000	18J	**30,000**	**1,800**	3.2J	ND	0.8J	ND(2,500)	93	ND	ND	ND	ND	ND
trans-1,2-DCE	100	ND	ND(250)	9.6J	ND	ND	0.7J	ND(2,500)	ND	1J	1.5J	ND	ND	ND
TCE	1	ND(10)	**29,000**	**17**	ND(5)	**8.5**	**8.1**	ND(500)	**730**	**42**	**140**	**41**	**75**	**87**
Vinyl Chloride	5	ND(50)	**690**	**2,900**	ND(25)	ND	**54**	ND(2,500)	ND(50)	**40**	**53**	ND	ND	ND
Xylenes(total)	40	29J	**38,000**	**7,300**	9.7J	ND	0.5J	ND(2,500)	**86**	ND	ND	ND	ND	ND
Total VOCs	NA	10,000	140,000	23,000	2,300	33	360	340,000	3,800	310	730	210	420	430

Table notes: Numbers in parentheses are elevated detection limits. Numbers in bold are concentrations detected above NJ GWQC.
J = estimated concentration. ND = not detected. NA = not applicable.

References:

1. Remedial Investigation Report, Fisher Scientific Company Fair Lawn New Jersey Facility, Volume 1, Technical Report. Prepared by Roy F. Weston, Incorporated. Dated September, 1984.
2. Remedial Action Plan Soil Excavation Phase Monitoring Report, Fisher Scientific Company. Prepared by Raymond C. Merrell. Dated April, 1987.
3. Evaluation of the Overburden Remediation System, Fisher Scientific Company. Prepared by Environ. Dated August, 1994.
4. Remedial Action Report, Fourth Quarter 1995, Fisher Scientific Company. Prepared by Environ. Dated January, 1996.
5. Packer Test Evaluation Report, Fisher Scientific Company. Prepared by Environ. Dated January, 1996.
6. Memorandum from Bill Lowry, NJDEP, to Greg Neuman, NJDEP, re: Development of Impact to Groundwater SCC for Acetonitrile at Fisher Scientific Company. Dated August 28, 1996.
7. Remedial Action Report, Second Quarter 1997, Fisher Scientific Company. Prepared by Environ. Dated July, 1997.
8. State of New Jersey Department of Environmental Protection Bureau of Water Allocation Permit. Dated July, 1997.
9. Letter from Michael Justiniano, NJDEP, to W.F. Blank, Jr., Allied Signal, Inc., re: Administrative Consent Order, ISRA Case Number E85823. Dated June 19, 2000.
10. Remedial Action Report, Fourth Quarter 2000, Fisher Scientific Company. Prepared by Environ. Dated January, 2001.

3. Has the **migration** of contaminated groundwater **stabilized** (such that contaminated groundwater is expected to remain within "existing area of contaminated groundwater"[2] as defined by the monitoring locations designated at the time of this determination)?

_X_ If yes - continue, after presenting or referencing the physical evidence (e.g., groundwater sampling/measurement/migration barrier data) and rationale why contaminated groundwater is expected to remain within the (horizontal or vertical) dimensions of the "existing area of groundwater contamination"[2].

___ If no (contaminated groundwater is observed or expected to migrate beyond the designated locations defining the "existing area of groundwater contamination"[2]) - skip to #8 and enter "NO" status code, after providing an explanation.

___ If unknown - skip to #8 and enter "IN" status code.

Rationale:

Remedial systems are currently being operated at the Fisher site to control groundwater contamination in each of the affected aquifers beneath the site, including the overburden zone, the shallow bedrock zone, and the intermediate bedrock zone. The performance of the active remedial systems has been evaluated based on the water level and groundwater quality data collected at the site and nearby locations. The water level measurements from wells completed in each of the aquifers beneath the site show that the remedial systems are capturing the on-site groundwater contamination. The remedial systems also cause some groundwater to flow from off-site locations to the extraction wells at the Fisher site. The Fisher site is located near the municipal supply wells of the Fairlawn Well Fields NPL site. Numerous potential industrial sources in the area, including Fisher, are suspected of contributing to the area-wide groundwater contamination in the Fair Lawn Well Fields NPL site. However, identification of the individual sources that contributed to the Fairlawn Well Fields has not yet been accomplished because of the complex migration pathways in the fractured bedrock aquifers, the presence of multiple sources of VOC contamination in the area of the Fairlawn Well Fields NPL site, and the lack of historical groundwater monitoring data from the well fields and surrounding areas. Steps have been taken to address the area-wide contamination and the impact on these municipal wells, including designating the Fair Lawn Well Fields as an NPL site, closing of some municipal well fields, and the installation of monitoring and treatment systems on other municipal well fields (Ref. 3). Thus, given the controls at these municipal wells, exposure to potential contamination in these wells is not expected to be of concern. The following discussions provide an evaluation of current conditions and the effectiveness of the active remedial systems in controlling the groundwater contamination at the Fisher site and adjacent areas that can be attributed to contaminant releases at the Fisher property.

Groundwater contaminant migration in the overburden zone is controlled by groundwater extraction from two trenches and seven well points. Water level monitoring data collected from wells and trenches at the site is collected on a quarterly basis, and the data show that the trenches provide hydraulic control across the southeastern and south-central parts of the site in the overburden zone (Refs. 1 and 2). Water levels measured in the sumps at the trenches are typically between 65 and 66 feet above sea level, while water

---

[2] "existing area of contaminated groundwater" is an area (with horizontal and vertical dimensions) that has been verifiably demonstrated to contain all relevant groundwater contamination for this determination, and is defined by designated (monitoring) locations proximate to the outer perimeter of "contamination" that can and will be sampled/tested in the future to physically verify that all "contaminated" groundwater remains within this area, and that the further migration of "contaminated" groundwater is not occurring. Reasonable allowances in the proximity of the monitoring locations are permissible to incorporate formal remedy decisions (i.e., including public participation) allowing a limited area for natural attenuation.

levels at nearby wells show that water levels are 72 to 74 feet above sea level, reflecting the drawdown in the overburden zone due to operation of the trenches. The radius of influence for the trenches extends from Henderson Brook, at the southern site boundary, to an area north of the trenches near well FS-22. Groundwater is extracted from the overburden zone along the eastern edge of Building 1 from extraction well points TPW-1, TPW-3, and TPW-4. Groundwater is extracted from the northeast part of the site by pumping at TPW-2. Extraction points that control groundwater contaminant migration in the area west of the trenches include well points TPW-5, TPW-6, and TPW-7.

Each of the extraction well points is operated at average flow rates of up to 0.07 gpm, and automatic level controls cause the pumps to shut off when there is insufficient water in the overburden zone for the pumps to operate. The low pumping rates reflect the low hydraulic conductivity of the overburden materials. The extraction points are pumped to decrease water levels by 2 to 5 feet below the water table in the surrounding areas. Combined flow from the extraction trenches is approximately 20 gpm. The pumps and piping can operate at up to 60 gpm; however, increasing the flow from the trenches causes complete dewatering of the overburden at the trenches, which decreases the effectiveness of the extraction system (Ref. 2). The reduced pumping rate optimizes the overall extraction efficiency and stability of the capture zones for the trench system.

Groundwater contaminant migration is controlled in the shallow and intermediate bedrock zones by pumping at wells PW-2, PW-4 and PW-5. PW-2 is pumped at an average flow rate of approximately 9 gpm, while PW-4 and PW-5 are operated at flow rates between 23 and 43 gpm. The higher flow rates and laterally extensive drawdown induced by operation of these wells reflects the higher hydraulic conductivity and lateral communication of the fractured bedrock zones. Water level data from each zone indicates that PW-2 captures groundwater from the bedrock zones at the eastern portion of the site, with a groundwater divide extending from Building 2 southward to Building 6. Wells PW-4 and PW-5 capture groundwater across the western part of the site in both zones, and from the eastern portion of the Sandvik site. Water level measurements were collected quarterly at off-site wells and results showed that the radius of influence of the bedrock wells extended westward beneath the adjacent properties to the west. Based on the information in the progress reports, Fisher no longer monitors water levels at the off-site locations.

In addition to the water level information, groundwater quality monitoring shows that contaminant concentrations have decreased in the impacted zones during the operation of the remedial systems. Maximum contaminant concentrations have decreased by up to several orders of magnitude in each of the zones. The decreases can be attributed to contaminant removal by the extraction systems, degradation of contaminants by chemical and biological processes occurring in the aquifers, and removal of contaminated soil at the site that acted as secondary sources of groundwater contamination. The largest decreases in contaminant concentrations have occurred in the overburden zone, which was directly impacted by releases of VOCs to soil at the site. Because the contaminants adsorb to soil and aquifer solids, desorption of the contaminants into groundwater will require operation of the site remedial systems for a considerable period of time in order to achieve NJ GWQC at the Fisher site.

References:

1. Remedial Action Report, Second Quarter 2000, Fisher Scientific Company. Prepared by Environ. Dated July, 2000.
2. Remedial Action Report, Fourth Quarter 2000, Fisher Scientific Company. Prepared by Environ. Dated January, 2001.
3. Teleconference between Elizabeth Butler, USEPA, and Phillip Barnes, ENVIRON, re: Fisher Scientific. June 10, 2001.

4. Does "contaminated" groundwater **discharge** into **surface water** bodies?

___ If yes - continue after identifying potentially affected surface water bodies.

_X_ If no - skip to #7 (and enter a "YE" status code in #8, if #7 = yes) after providing an explanation and/or referencing documentation supporting that groundwater "contamination"does not enter surface water bodies.

___ If unknown - skip to #8 and enter "IN" status code.

Rationale:

Water level monitoring conducted at the extraction trenches and nearby monitoring wells indicates that the radius of influence of the trenches extends to Henderson Brook. Because water levels are lower in the trenches than in the surrounding aquifer and Henderson Brook, Henderson Brook recharges the aquifer at the property boundary; it behaves as a constant head boundary, providing water to the overburden zone that then flows northward to the trenches, where it is extracted. This is demonstrated by the trench water levels, which are approximately 65 to 66 feet above sea level, while water levels in the surrounding aquifer and Henderson Brook are 72 to 75 feet above sea level (Refs. 2 and 3). This relationship was also demonstrated in the groundwater flow simulations conducted during the evaluation of the overburden extraction system (Ref. 1). The quarterly monitoring data collected at the site has consistently shown this pattern during operation of the trench recovery system.

Because the overburden material is not saturated at the western side of the Fisher site, and at areas further to the west, surface water from Henderson Brook is not in hydraulic communication with groundwater in the underlying zones in this area, and there is no possibility of discharge of contaminated groundwater to surface water.

These hydraulic relationships demonstrate that surface water at the site boundary is acting as a source of recharge to shallow groundwater, and provides a source of water input to the system to support contaminant migration to the recovery systems.

References:

1. Evaluation of the Overburden Remediation System, Fisher Scientific Company. Prepared by Environ. Dated August, 1994.
2. Remedial Action Report, Second Quarter 2000, Fisher Scientific Company. Prepared by Environ. Dated July, 2000.
3. Remedial Action Report, Fourth Quarter 2000, Fisher Scientific Company. Prepared by Environ. Dated January, 2001.

5. Is the **discharge** of "contaminated" groundwater into surface water likely to be **"insignificant"** (i.e., the maximum concentration[3] of each contaminant discharging into surface water is less than 10 times their appropriate groundwater "level," and there are no other conditions (e.g., the nature, and number, of discharging contaminants, or environmental setting), which significantly increase the potential for unacceptable impacts to surface water, sediments, or ecosystems at these concentrations)?

___ If yes - skip to #7 (and enter "YE" status code in #8 if #7 = yes), after documenting: 1) the maximum known or reasonably suspected concentration[3] of key contaminants discharged above their groundwater "level," the value of the appropriate "level(s)," and if there is evidence that the concentrations are increasing; and 2) provide a statement of professional judgement/explanation (or reference documentation) supporting that the discharge of groundwater contaminants into the surface water is not anticipated to have unacceptable impacts to the receiving surface water, sediments, or ecosystem.

___ If no - (the discharge of "contaminated" groundwater into surface water is potentially significant) - continue after documenting: 1) the maximum known or reasonably suspected concentration[3] of each contaminant discharged above its groundwater "level," the value of the appropriate "level(s)," and if there is evidence that the concentrations are increasing; and 2) for any contaminants discharging into surface water in concentrations[3] greater than 100 times their appropriate groundwater "levels," the estimated total amount (mass in kg/yr) of each of these contaminants that are being discharged (loaded) into the surface water body (at the time of the determination), and identify if there is evidence that the amount of discharging contaminants is increasing.

___ If unknown - enter "IN" status code in #8.

Rationale:

This question is not applicable. See response to question #4.

[3] As measured in groundwater prior to entry to the groundwater-surface water/sediment interaction (e.g., hyporheic) zone.

6. Can the **discharge** of "contaminated" groundwater into surface water be shown to be "**currently acceptable**" (i.e., not cause impacts to surface water, sediments or ecosystems that should not be allowed to continue until a final remedy decision can be made and implemented[4])?

___ If yes - continue after either: 1) identifying the Final Remedy decision incorporating these conditions, or other site-specific criteria (developed for the protection of the site=s surface water, sediments, and ecosystems), and referencing supporting documentation demonstrating that these criteria are not exceeded by the discharging groundwater; OR 2) providing or referencing an interim-assessment[5], appropriate to the potential for impact, that shows the discharge of groundwater contaminants into the surface water is (in the opinion of a trained specialist, including an ecologist) adequately protective of receiving surface water, sediments, and ecosystems, until such time when a full assessment and final remedy decision can be made. Factors which should be considered in the interim-assessment (where appropriate to help identify the impact associated with discharging groundwater) include: surface water body size, flow, use/classification/habitats and contaminant loading limits, other sources of surface water/sediment contamination, surface water and sediment sample results and comparisons to available and appropriate surface water and sediment "levels," as well as any other factors, such as effects on ecological receptors (e.g., via bio-assays/benthic surveys or site-specific ecological Risk Assessments), that the overseeing regulatory agency would deem appropriate for making the EI determination.

___ If no - (the discharge of "contaminated" groundwater can not be shown to be "**currently acceptable**") - skip to #8 and enter "NO" status code, after documenting the currently unacceptable impacts to the surface water body, sediments, and/or ecosystem.

___ If unknown - skip to 8 and enter "IN" status code.

Rationale:

This question is not applicable. See response to question #4.

---

[4] Note, because areas of inflowing groundwater can be critical habitats (e.g., nurseries or thermal refugia) for many species, appropriate specialist (e.g., ecologist) should be included in management decisions that could eliminate these areas by significantly altering or reversing groundwater flow pathways near surface water bodies.

[5] The understanding of the impacts of contaminated groundwater discharges into surface water bodies is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration to be reasonably certain that discharges are not causing currently unacceptable impacts to the surface waters, sediments or eco-systems.

7. Will groundwater **monitoring** / measurement data (and surface water/sediment/ecological data, as necessary) be collected in the future to verify that contaminated groundwater has remained within the horizontal (or vertical, as necessary) dimensions of the “existing area of contaminated groundwater?”

_X_ If yes - continue after providing or citing documentation for planned activities or future sampling/measurement events. Specifically identify the well/measurement locations which will be tested in the future to verify the expectation (identified in #3) that groundwater contamination will not be migrating horizontally (or vertically, as necessary) beyond the “existing area of groundwater contamination.”

___ If no - enter “NO” status code in #8.

___ If unknown - enter “IN” status code in #8.

Rationale:

Quarterly water level monitoring and semi-annual groundwater quality monitoring are performed at the facility under direction of the NJ ISRA program (Ref. 1). The facility is remediating the site under an ACO issued by the NJDEP. The ACO requires the facility to operate the active remedial systems at the site, and to monitor wells at the facility completed in the overburden, shallow bedrock, and intermediate bedrock zones. Reporting requirements include the total volumes of water extracted and treated by the remedial systems.

References:

1. Remedial Action Report, Fourth Quarter 2000, Fisher Scientific Company. Prepared by Environ. Dated January, 2001.

8. Check the appropriate RCRIS status codes for the Migration of Contaminated Groundwater Under Control EI (event code CA750), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (attach appropriate supporting documentation as well as a map of the facility).

_X_ YE - Yes, "Migration of Contaminated Groundwater Under Control" has been verified. Based on a review of the information contained in this EI determination, it has been determined that the "Migration of Contaminated Groundwater" is "Under Control" at the Fisher Scientific Company, EPA ID # NJD004362059, located at 1 Reagent Lane, Fair Lawn, New Jersey. Specifically, this determination indicates that the migration of "contaminated" groundwater is under control, and that monitoring will be conducted to confirm that contaminated groundwater remains within the "existing area of contaminated groundwater" This determination will be re-evaluated when the Agency becomes aware of significant changes at the facility.

___ NO - Unacceptable migration of contaminated groundwater is observed or expected.

___ IN - More information is needed to make a determination.

Completed by: ______________________________ Date:____________________

Stuart Strum
Hydrogeologist
Booz·Allen & Hamilton

Reviewed by: ______________________________ Date:____________________

Pat Shanley
Hydrogeologist
Booz·Allen & Hamilton

______________________________ Date:____________________

Elizabeth Butler, RPM
RCRA Programs Branch
USEPA Region 2

______________________________ Date:____________________

Barry Tornick, Section Chief
RCRA Programs Branch
USEPA Region 2

Approved by: Original signed by: _______________ Date: September 27, 2001

Raymond Basso, Chief
RCRA Programs Branch
USEPA Region 2

Locations where references may be found:

References reviewed to prepare this EI determination are identified after each response. Reference materials are available at the USEPA Region 2, RCRA Records Center, located at 290 Broadway, 15th Floor, New York, New York, and the New Jersey Department of Environmental Protection Office located at 401 East State Street, Records Center, 6th Floor, Trenton, New Jersey.

Contact telephone and e-mail numbers: Elizabeth Butler, USEPA RPM
(212) 637-4163
butler.elizabeth@epa.gov

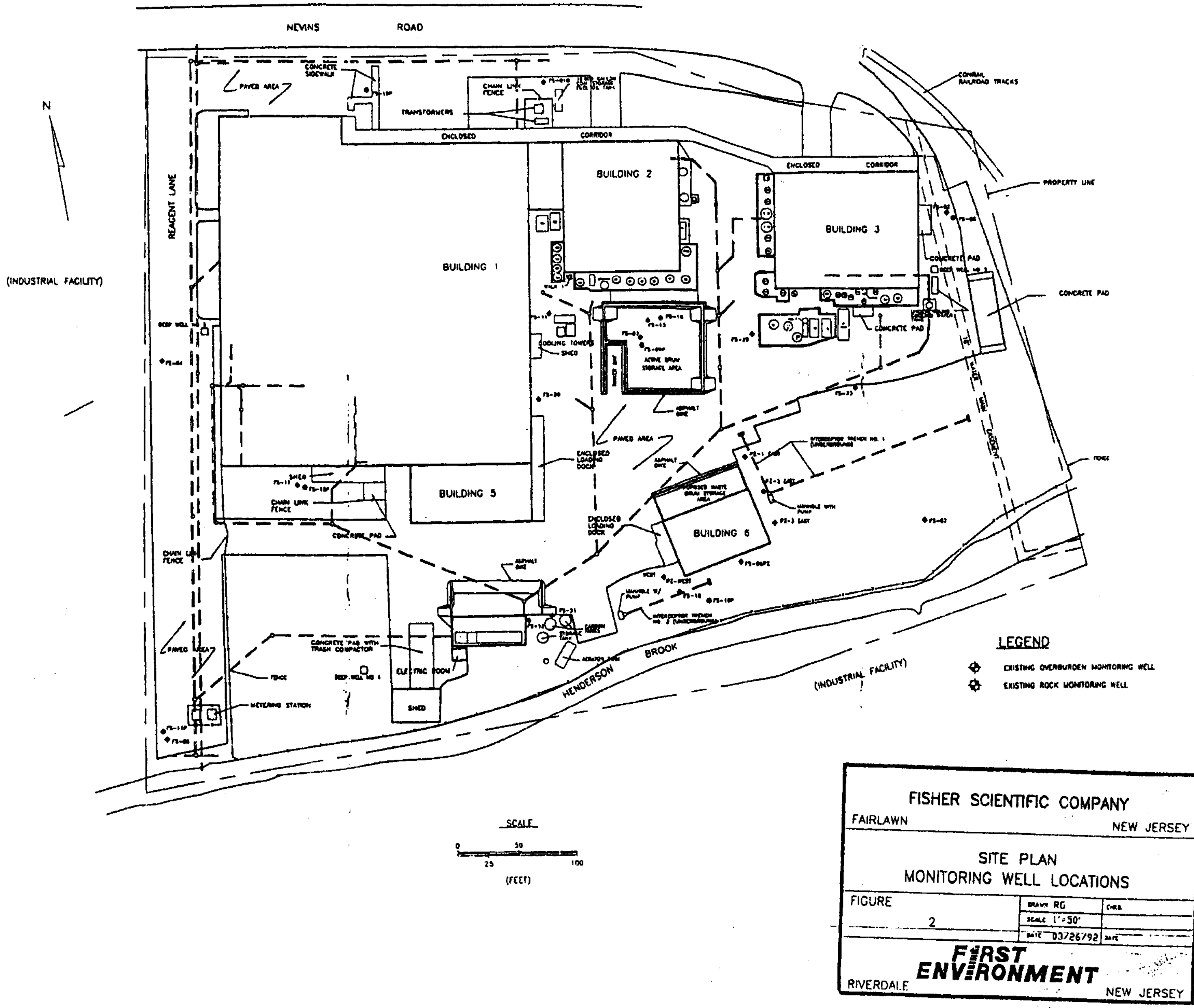
Attachments

The following attachments have been provided to support this EI determination.

- Attachment 1 - Site Plan Map
- Attachment 2 - Locations of AECs, Excavated Areas, and Soil Samples
- Attachment 3 - Monitoring Well Locations and Groundwater Elevation Contours - Overburden (11/27/00)
- Attachment 4 - Monitoring Well Locations and Groundwater Elevation Contours - Shallow Bedrock (11/27/00)
- Attachment 5 - Monitoring Well Locations and Groundwater Elevation Contours - Intermediate Bedrock (11/27/00)
- Attachment 6 - Summary of Media Impacts Table

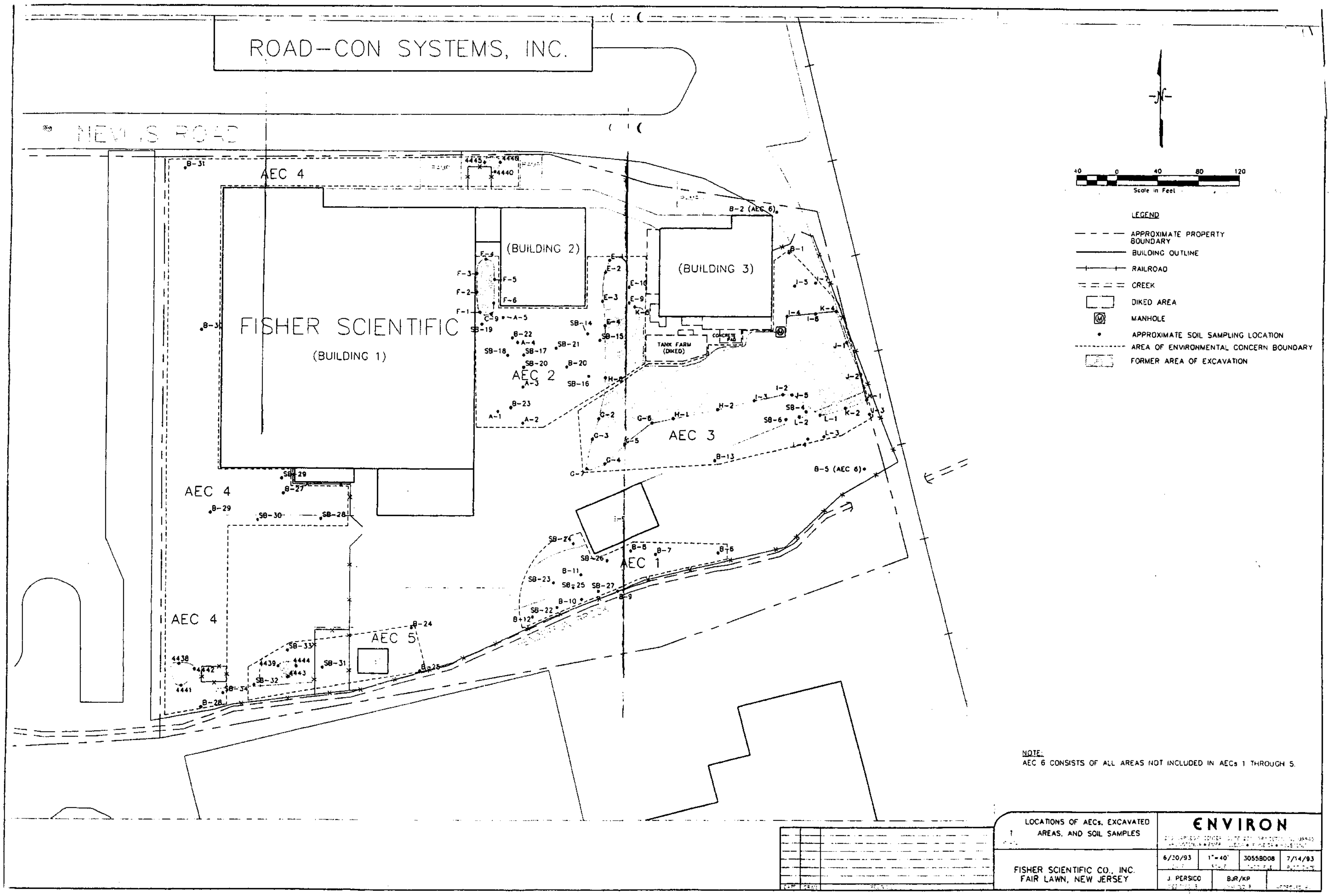
Attachment 1 - Site Plan Map

(Source: Feasibility Study of Discharge Alternatives for the Fisher Scientific Company, Fair Lawn, New Jersey Facility. Prepared by First Environment, Inc. Dated May, 1992.)



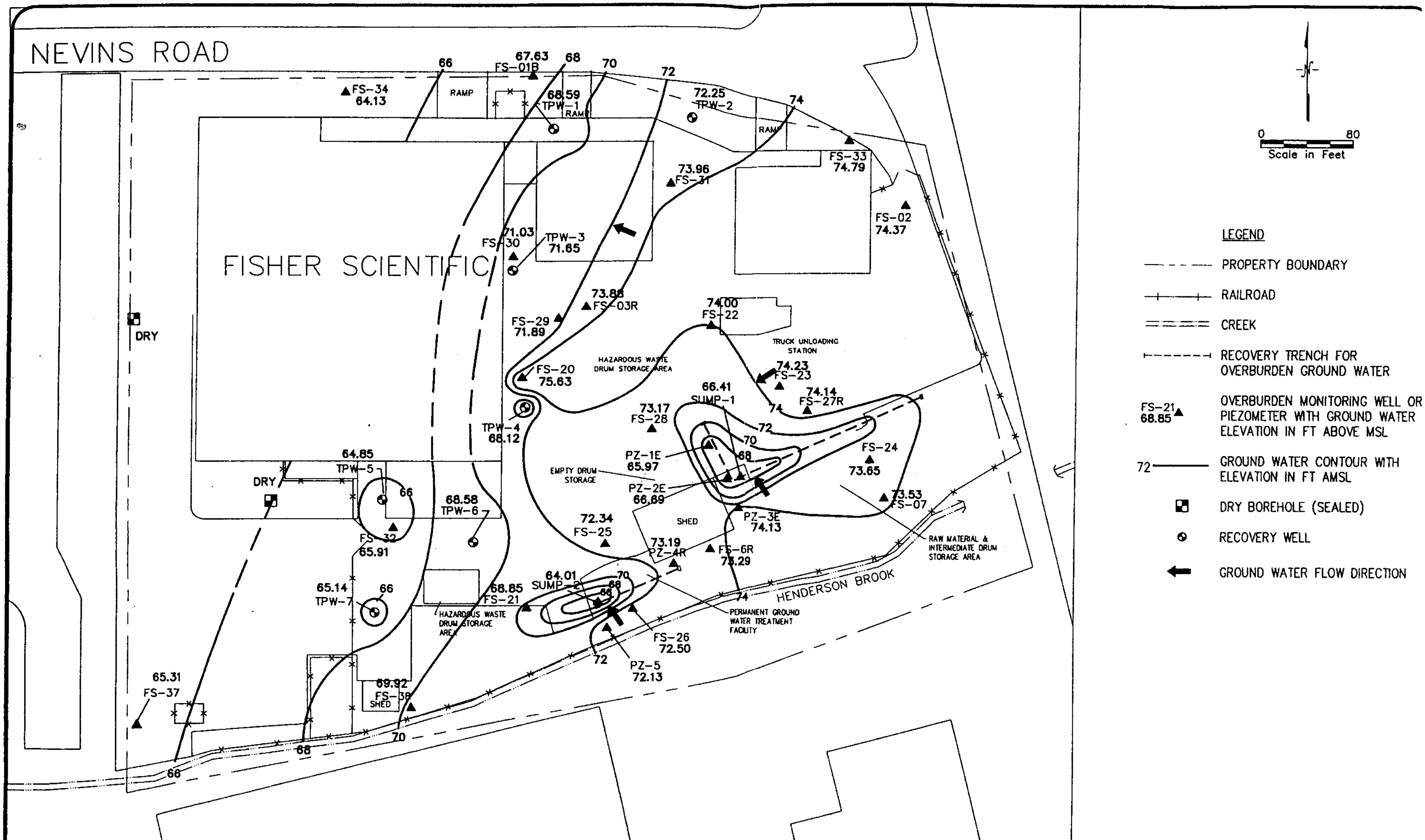
Attachment 2 - Locations of AECs, Excavated Areas, and Soil Samples

(Source: Letter from Thomas Fusillo, ENVIRON Corporation, to Jacqueline Bobko, NJDEP, re: Area of Environmental Concern Review, Comparison to Soil Cleanup Guidelines. Dated July 16, 1993.)



Attachment 3 - Monitoring Well Locations and Groundwater Elevation Contours - Overburden (11/27/00)

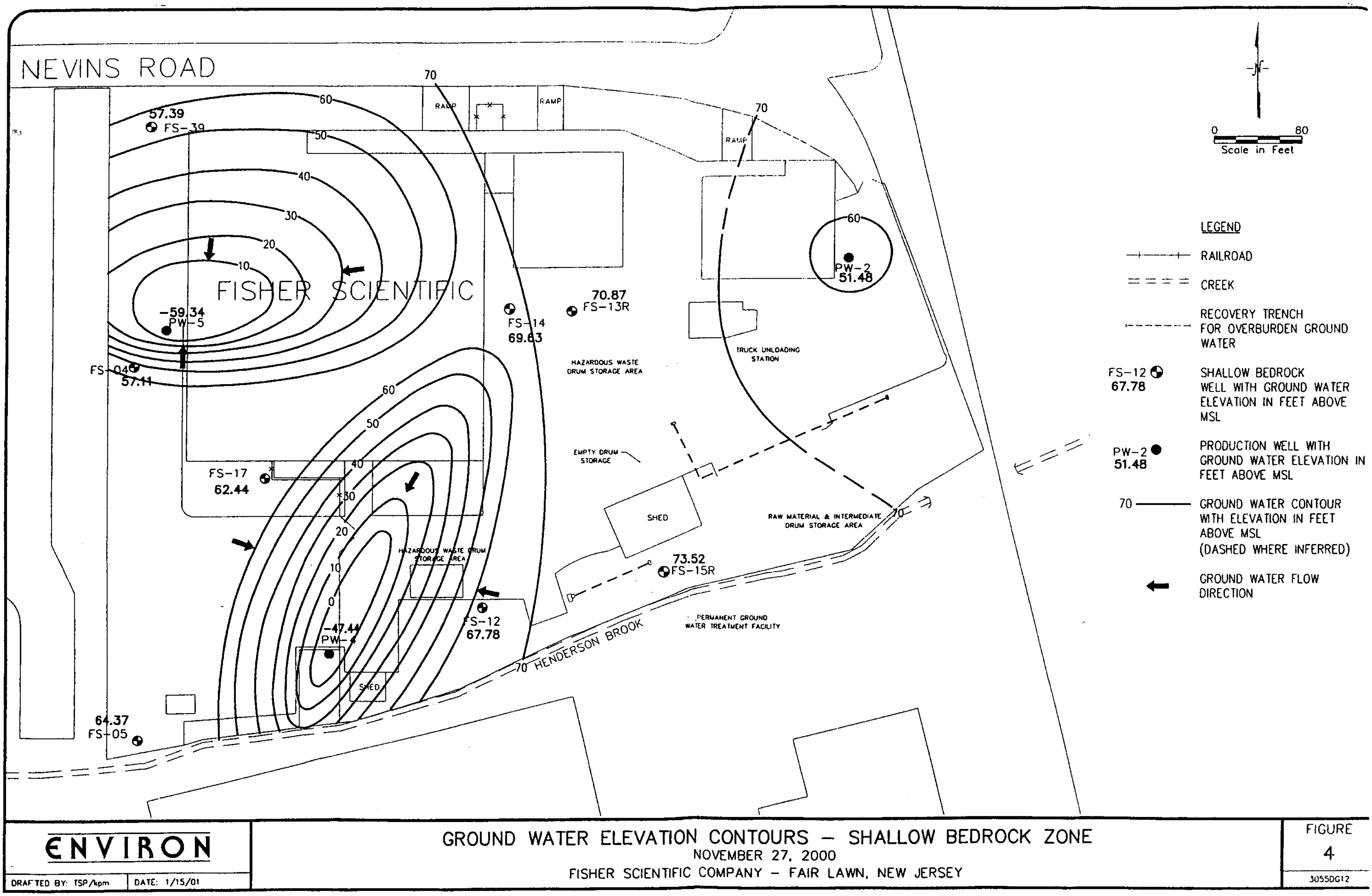
(Source: Remedial Action Report, Fourth Quarter 2000. Prepared by ENVIRON Corporation. Dated February, 2001.)



ENVIRON	GROUND WATER ELEVATION CONTOURS – OVERBURDEN ZONE NOVEMBER 27, 2000 FISHER SCIENTIFIC COMPANY – FAIR LAWN, NEW JERSEY	FIGURE 3
DRAFTED BY: TSP/kpm DATE: 1/15/01		3055DG10

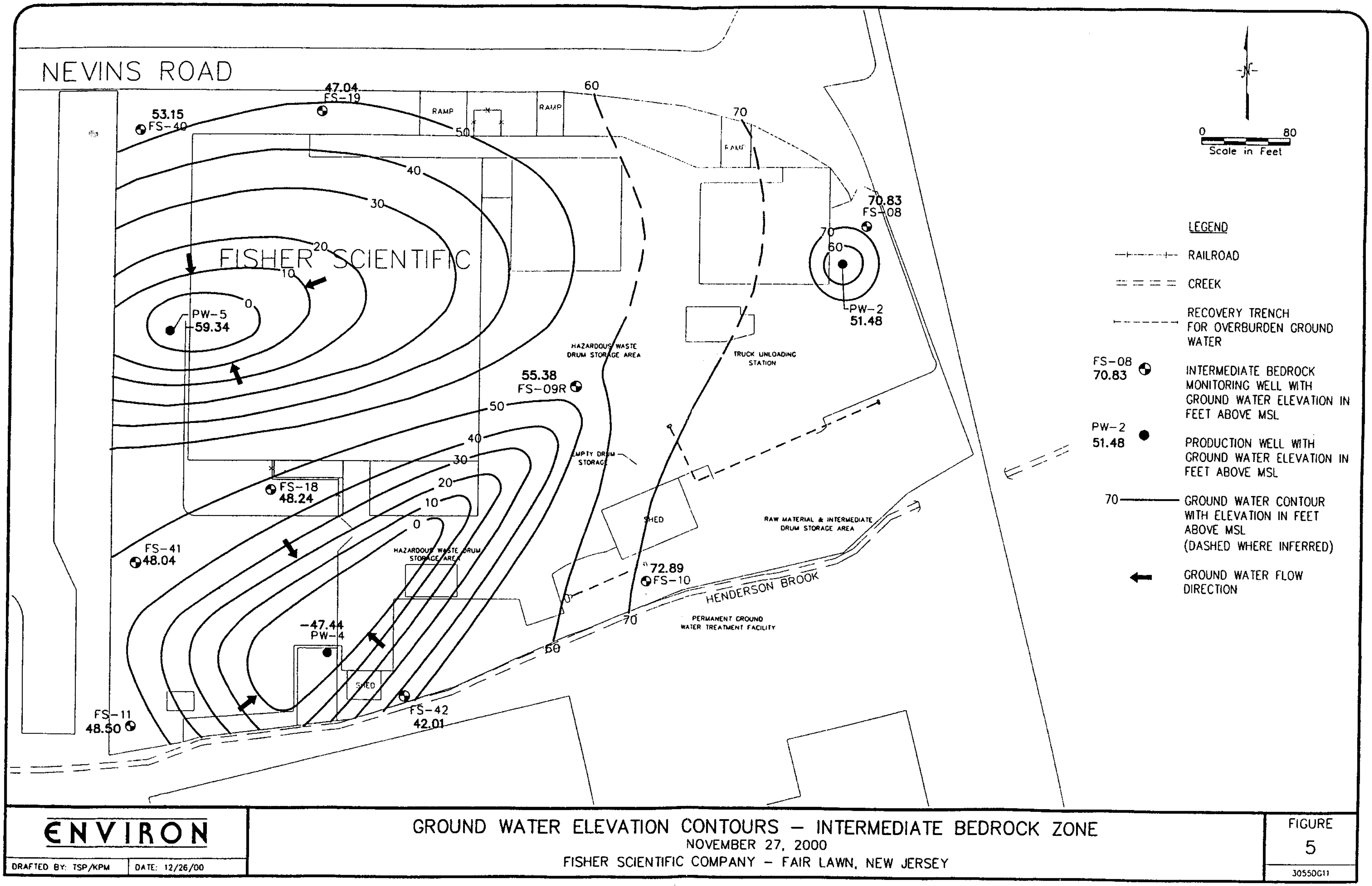
Attachment 4 - Monitoring Well Locations and Groundwater Elevation Contours - Shallow Bedrock (11/27/00)

(Source: Remedial Action Report, Fourth Quarter 2000. Prepared by ENVIRON Corporation. Dated February, 2001.)



Attachment 5 - Monitoring Well Locations and Groundwater Elevation Contours - Intermediate Bedrock (11/27/00)

(Source: Remedial Action Report, Fourth Quarter 2000. Prepared by ENVIRON Corporation. Dated February, 2001.)



Attachment 6 - Summary of Media Impacts Table
Fisher Scientific Company

AEC	GW *	AIR (Indoors)	SURF SOIL	SURF WATER	SED	SUB SURF SOIL	AIR (Outdoors)	CORRECTIVE ACTION MEASURE	KEY CONTAMINANTS
AEC 1. Dry Well Area South of Building 6	Yes	No	No	No	No	No	No	▸ Groundwater extraction, treatment and discharge	VOCs
AEC 2. Drum Storage and Adjacent Areas South of Building 2	Yes	No	Yes	No	No	Yes	No	▸ Groundwater extraction, treatment and discharge ▸ Soil Excavation ▸ Fencing	VOCs
AEC 3. Bulk Transfer Area, East and South of Building 3	Yes	No	Yes	No	No	Yes	No	▸ Groundwater extraction, treatment and discharge ▸ Soil Excavation ▸ Fencing	VOCs
AEC 4. Manholes Along West and North Perimeter of Property	Yes	No	Yes	No	No	Yes	No	▸ Groundwater extraction, treatment and discharge ▸ Soil Excavation	VOCs
AEC 5. Shed Area South of Building 1	Yes	No	Yes	No	No	Yes	No	▸ Groundwater extraction, treatment and discharge ▸ Soil Excavation ▸ Fencing	VOCs
AEC 6. Background and All Other Plant Areas	No	No	No	No	No	Yes	No	▸ Fencing	PCE
AEC 7. Groundwater *	NA								

*Groundwater is generally being evaluated on a site-wide basis by evaluating constituents present in the three impacted zones at the site (overburden, shallow, intermediate). However, this table indicates the areas in which groundwater contamination above relevant standards has been detected.
NA - Not applicable