DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

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

Facility Name: **Sybron Chemicals, Inc.**
Facility Address: **Box 66, Birmingham Road, Birmingham, New Jersey**
Facility EPA ID#: **NJD002339406**

Definition of Environmental Indicators (for the RCRA Corrective Action)

Environmental Indicators (EIs) are measures being used by the Resource Conservation and Recovery Act (RCRA) Corrective Action program to go beyond programmatic activity measures (e.g., reports received and approved) to track changes in the quality of the environment. The two EIs 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 objectives of the RCRA Corrective Action program, the EIs 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 Resource Conservation Recovery Act Information System (RCRAInfo) national database ONLY as long as they remain true (i.e., RCRAInfo status codes must be changed when the regulatory authorities become aware of contrary information).

Facility Information

The Sybron Chemicals, Inc., (Sybron) facility is located in Pemberton Township in Burlington County, New Jersey. The production facility, two former settling basins, and a former disposal area (referred to as Neck Field) are located on the south bank of the north branch of Rancocas Creek (NBRC). Sybron also owns approximately 410 acres on the north side of the NBRC. Part of this area is occupied by the facility's wastewater treatment facility, a former open-pit mine, and executive offices. The remainder of this area is either wooded or farmed (Ref. 1). Surrounding land use is generally agricultural and residential in a semi-rural setting. The Pemberton Township wastewater treatment facility is located on the NBRC, approximately one-quarter mile upstream (east) of the site (Ref. 1).

Sybron, formerly called the Ionac Chemical Company, manufactures resins at the facility. Operations began in the early 1900's, at which time the facility processed locally-mined glauconite. The processed glauconite, a natural resin, was marketed to the water treatment industry. The plant eventually converted to the production of synthetic resins in the 1940's (Ref. 1). Currently, only synthetic-based resins are manufactured.

In early 1986, Forstmann-Little, Inc., purchased a controlling interest of Sybron Corporation Stock, which triggered the requirements of New Jersey's Environmental Cleanup Responsibility Act (ECRA) for the Sybron facility. Subsequently, Sybron was involved in a leveraged buyout by management, which triggered ECRA again. The ECRA requirements are governed by two administrative orders on consent dated May 13, 1986, and June 23, 1987. On August 30, 2000, Sybron Chemicals merged with Bayer Corporation and the Project Toledo Acquisition Corporation (Ref. 3). Sybron is now a wholly-owned subsidiary of Bayer Corporation, and Bayer has assumed all environmental liability at the site. An Amended Remediation Agreement was signed on September 26, 2000 (Ref. 2). Remedial activities are currently ongoing at the site.

References:

1. Results of the Implementation of the Partial Cleanup and Phase II ECRA Soil Investigations at the Sybron Chemicals, Inc., Volume I of II. Prepared by Environ Corporation. Dated June 1991.
2. Telephone memorandum prepared by John McPeak, re: Sybron Stock Purchase and Remediation Agreement. Dated September 27, 2001.
3. Letter from John McPeak, Sybron, to Sheila Migliarino, NJDEP, re: Sybron Transition to Bayer Corporation. Dated October 19, 2001.

1. Has **all** available relevant/significant information on known and reasonably suspected releases to the groundwater media, subject to RCRA Corrective Action (e.g., from solid waste management units (SWMUs), regulated units (RUs), and areas of concern (AOCs)), 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 #8 and enter "IN" (more information needed) status code.

Thirty-five AOCs were identified during the Phase 1 (1988, 1989), Phase II (1990), and Phase III (1994) investigations (Refs. 1, 2, 3, 5). An additional AOC (AOC 36) was recently discovered during construction activities (Ref. 23). As of August 1995, 28 AOCs had received no further action (NFA) approval from the New Jersey Department of Environmental Protection (NJDEP) (Refs. 6, 8, 10). In general, NFA approvals were received because Sybron: (1) provided evidence that no release had occurred; (2) conducted sampling, the results of which indicated soil contaminant levels below New Jersey Residential Direct Contact Soil Cleanup Criteria (NJ RDCSCC); or (3) conducted remediation and post-remediation sampling, the results of which indicated contaminant levels in soil were below the NJ RDCSCC. The remaining eight AOCs (AOCs 2, 4, 23, 30, 31, 33, 34, 36) are either awaiting NFA approval from NJDEP or additional sampling and/or remedial activities (Refs. 9, 23). A description of these eight AOCs, along with their current status, based upon available documentation, is presented below. Location details for the remaining AOCs are not provided on one figure[1]; thus, the following is a list of figures depicting the eight remaining AOCs at the facility.

- AOCs 2, 4, 23 and 33 - Plate 1 of the Presentation of ECRA Sampling Results for Sybron Chemicals (Ref. 1).
- AOC 30 - Plate 22 of the Results of the Implementation of the Partial Cleanup and Phase II ECRA Soil Investigations (Ref. 2).
- AOC 34 - Figure 4 of the Report on Additional Remedial Investigations and Addendum to Cleanup Plan (Ref. 5).

A map showing the location of AOCs 31 and 36 was not found in the available file materials.

Note that AOC 21 (Two Abandoned Settling Basins) has received a conditional NFA approval from NJDEP; however, residual soil contamination (zinc) is present above NJ RDCSCC and New Jersey Non-Residential Direct Contact Soil Cleanup Criteria (NJ NRDCSCC). Residual contamination at AOC 21 has been covered with a soil cover and the area will be included in the planned deed notice. AOC 21 is also depicted on Figure 1 of the Presentation of ECRA Sampling Results for Sybron Chemicals (Ref. 1). No impacts at the approximately 410 acres on the north side of the NBRC are documented in available file materials; therefore this EI determination report focuses on the remaining property areas to the south.

[1] Note that Sybron has agreed to prepare an updated site survey map that will detail the location of current/historical AOCs on one figure, but such a map has not yet been provided (Ref. 21).

AOC 2, Tank (T-1) and Containment Area: AOC 2 is located in the southern portion of the production area and included an equalization tank (T-1) with a containment structure of large cedar beams resting on a concrete base (Ref. 14). Soil samples collected in the containment structure during Phase II investigations (1990) detected 1,2-dichloropropane (PDC), arsenic, zinc, and total petroleum hydrocarbons (TPHC) in excess of the informal ECRA guidelines[2]. The contaminated soil was removed, at which time degraded areas of concrete within the containment structure were observed. In addition, PDC was detected in well MW-25, located five feet downgradient (north) of the containment structure; thus, it was suspected that leakage from the tank and containment structure had impacted underlying groundwater (Ref. 2). The tank was cleaned, dismantled and demolished in August 1999 (Ref. 15). The most recent soil investigations conducted within AOC 2 (January/February 2002) indicate an area approximately 135 feet by 165 feet is impacted with PDC above the NJ RDCSCC, and an area 105 feet by 150 feet is impacted above the NJ NRDCSCC (See Plate 3, Ref. 18). During the February 2002 investigations, residual product was also found at two distinct intervals–a shallow zone and deep zone. The shallow zone was six inches to one foot thick, located between one to three feet below the water table, and extended beneath and just beyond the perimeter of the buildings east of the T-1 area. The deep zone was six inches to one foot thick, located between four and eight feet below the water table. No evidence of dense non-aqueous phase liquid (DNAPL) was noted at the base of the shallow aquifer. Additional groundwater investigations were conducted in early 2004 (January/February). Results indicated that there is an additional potential PDC source area located on the west side of the storm water bypass line. PDC concentrations were detected up to 1,300 mg/L in grab groundwater samples in the area, with decreasing detections west of the settling basins (see Figure 6, March 2004 Remedial Investigation [RI] Data Summary Package [April 2003 - February 2004 Activities]) (Ref. 22). Eight additional monitoring wells (MW-35 through MW-42) were installed in this area as part of the recent remedial investigation to better define flow direction beneath AOC 2 and further characterize groundwater conditions downgradient of AOC 2. Sybron plans to develop a RI work plan to further assess the T-1/Pilot Plant Lagoon Sources (which includes AOCs 2, 4, 30, and 34) (Ref. 22). Sybron also plans to develop a site-wide deed notice that will include all residual soil contamination at the site above NJ RDCSCC. The deed notice will be completed upon completion of any necessary soil remediation activities at the site (Ref. 21).

AOC 4, Aboveground Tank Containments: AOC 4 consists of three areas located to the south, west, and southwest of AOC 2 in the southern portion of the plant area. This area contained two tanks: a Trimethylamine (TMA) Tank and a No. 2 Fuel Oil Tank. In the TMA Tank area, a small layer of resinous material was found adjacent to the aboveground storage tank in the tank containment area. During Phase II investigations all impacted soil within the containment structure and underlying the aboveground tank was excavated and disposed of off site. Based upon historic delineation sampling, all soil above the NJ RDCSCC was removed and no additional post-excavation sampling was required. On June 11, 1996, NJDEP approved a

[2] During the Phase I and II investigations, NJDEP ECRA cleanup guidelines were used to evaluate soil contamination at the site. Upon promulgation of the NJ Soil Cleanup Criteria (Cleanup Standards for Contaminated Sites, N.J.A.C. 7:26D, February 3, 1992), all contaminant levels at the site were compared to NJ RDCSCC and NJ NRDCSCC, and all future investigation and actions were based upon these criteria.

NFA recommendation for the TMA Tank area (Ref. 11). During the Phase II investigations in the No. 2 Fuel Oil Tank area, an area of TPHC soil contamination was found at levels up to 25,000 mg/kg (the NJDEP-approved TPHC cleanup criterion is 10,000 mg/kg). In-situ bioremediation was proposed to address the TPHC contamination as physical constraints in the area restrict full delineation of the TPHC contamination. NJDEP approved this proposal and indicated that post-remediation samples could be used to verify the lateral extent of TPHC contamination (Ref. 11). According to a NJDEP letter dated May 5, 1998, Sybron completed the in-situ bioremediation program (Ref. 13). Sybron recently reviewed the results of the in-situ bioremediation program and other remedial investigations in this area (AOC 2 and 34) and has determined additional action is necessary (Refs. 21, 22). Sybron plans to develop a RI work plan to further assess groundwater and soil impacts in the T-1/Pilot Plant Lagoon area (which include AOCs 2, 4, 30 and 34) (Ref. 22).

AOC 23, Neck Field: AOC 23 is located south of the NBRC and north of AOC 21. During the Phase I and II investigations, benzene, trichloroethylene (TCE), and chlorobenzene exceeded the NJ Impact to Ground Water Soil Cleanup Criteria (IGWSCC) and PDC exceeded IGWSCC (1.0 mg/kg) calculated by Sybron using NJDEP methodology. In 1994 and 1995, excavation and removal of buried materials were completed in the northwest portion of this AOC to depths of one to three feet below the water table. Crushed drums, scrap metal, plastic, broken glass bottles, empty fiber drums and off-specification ion-exchange resins were removed (Ref. 16). The excavation also removed free product encountered near soil sample PE05 and remaining residual product in other areas. Post-excavation samples at PE02 showed that residual antimony (max. of 23 mg/kg) and beryllium (max. of 5.10 mg/kg) concentrations exceeded the NJ RDCSCC (antimony = 14 mg/kg, beryllium = 2 mg/kg) and the NJ NRDCSCC (beryllium only, 2.0 mg/kg) in the area of soil sample PE02. NJDEP approved an NFA for soil in this area, with the exception of the PE02 sample area where metal exceedances were reported. It was agreed that a deed notice would be implemented for the residual metals contamination (Refs. 12, 13). Sybron plans to develop a site-wide deed notice that will include all residual soil contamination at the site above NJ RDCSCC. The deed notice will be completed upon completion of any necessary soil remediation activities at the site (Ref. 21).

In March 2001, two monitoring wells (MW-33 and MW-34) were installed to assess whether remaining source material and/or residual free product were present in the Neck Field area and whether well MW-23 was best suited to monitor contaminant concentrations. Wells MW-23, MW-33, and MW-34 were sampled as part of the investigation. Sampling results indicated volatile organic compounds (VOCs) including benzene, PDC, 1,1,2,2-tetrachloroethane (PCA), and TCE in well MW-33 above New Jersey Ground Water Quality Criteria (NJ GWQC). Concentrations of benzene and chlorobenzene were detected above NJ GWQC in well MW-23. These concentrations exceeded well MW-33 results, but no evidence of light non-aqueous phase liquid (LNAPL) or DNAPL was reported (Ref. 17). Subsequently, these wells were sampled in October 2001, December 2001, and January 2002. Based on a review of the resultant data, NJDEP concluded that the benzene and chlorobenzene concentrations detected in well MW-33 indicate that significant source material may remain at AOC 23 and required Sybron conduct further investigation and source delineation (Ref. 19). During RI activities in 2003/2004, additional soil borings, temporary wells, and Hydropunch® borings were advanced to further assess impacts in this area. VOC contamination was again reported in groundwater above NJ GWQC. Based upon the results of this investigation, Sybron concluded that the groundwater

VOC plume and potential source area have been delineated in this location. Sybron believes that a limited source area is present, given the saturated soil analytical results and field observations of staining and residual product (Ref. 22). Sybron submitted a report titled RI and Pilot Test Workplan for AOC 23 (Ref. 24) that summarizes the 2003/2004 field activities at AOC 23 and proposes a pilot study to evaluate the remedial effectiveness of in-situ ozone injection (Ref. 24).

AOC 30, Former Pilot Plant Lagoon and Section of Storm Sewer: AOC 30 consists of the area of the former pilot plant lagoon and the section of storm sewer line between the pilot plant lagoon and the NBRC. Soil sample results collected in this area during various investigations from the 1990 Phase II through May 1996 indicate that silver and several polynuclear aromatic hydrocarbons (PAHs) exceeded the NJ RDCSCC, NJ NRDCSCC, and/or NJ IGWSCC. Chlorobenzene has also been reported above NJ IGWSCC, and PDC has been reported above the IGWSCC (1.0 mg/kg) calculated by Sybron in pilot plant soil. Subsequently, in November 1996, VOC-contaminated soil was excavated to depths below the water table and treated via ex-situ bioremediation. In April 1997, soil from a small area at the eastern end of the excavation was excavated below the water table and treated via ex-situ bioremediation. The ex-situ bioremediation was not entirely successful. The excavated material was staged on site, until it was sent for off-site disposal in late 2003 (Ref. 21). In addition, Sybron reported removal of VOC-contaminated soil above the IGWSCC (Ref. 12), but residual levels of silver and PAH contamination remain. Sybron has installed an asphalt cap over impacted pilot plant lagoon soil. Sybron plans to develop a site-wide deed notice that will include all residual soil contamination at the site above NJ RDCSCC. The deed notice will be finalized upon completion of any necessary soil remediation activities at the site (Ref. 21).

Sybron was required to monitor groundwater in this AOC to confirm the lack of residual source material and to justify a monitored natural attenuation (MNA) approach for remedial action. Sybron collected samples from wells MW-6 and MW-17, located downgradient of this AOC, to document a decreasing trend in contaminant concentrations. However, based on a review of 2001 analytical results, NJDEP has concluded that MNA is not an appropriate remedial action (Ref. 19). NJDEP argued that the MNA approach is not appropriate because: (1) PDC concentrations in well MW-17 exceed one percent of its effective solubility and suggest the existence of product, and (2) it is likely that groundwater seepage from AOC 30 is partially responsible for elevated PDC concentrations detected in the NBRC at sampling location STR-5 (Ref. 19). In September 2003, Sybron collected soil and grab groundwater samples in this area to further define the PDC contamination. Based upon the results, Sybron plans to develop a RI work plan to further assess the T-1/Pilot Plant Lagoon Sources (which include AOCs 2, 4, 30 and 34) (Ref. 22).

AOC 31, Underground Process Wastewater Lines: In 1991, as part of Phase III investigations, a video inspection of the underground process wastewater lines revealed some pipeline deterioration and cracking between Manhole 13 and Manhole 12, and that solids buildup was generally greater in this section (Ref. 5). In July 1995, Sybron cleaned the lines and reportedly repaired one section of the line (Ref. 17). Sybron concluded that soil sampling along the line was not necessary given that the sewer line was generally located at or below the water table, thus impacts would generally be to groundwater and not soil, and should be detected in downgradient well MW-24. NJDEP conditionally approved the NFA for soil; however, as part of the conditional approval, NJDEP requested that Sybron sample well MW-24 (Ref. 11). NJDEP

also requested that Sybron add well MW-24 to the groundwater monitoring program to ensure that any potential contamination associated with this AOC would be monitored. The most recent, available groundwater sampling results (January 2004) detected PDC in well MW-24 at 9.9 µg/L, which is above the NJ GWQC of 1.0 µg/L (Ref. 22). No further actions are currently planned at this AOC, and this area will likely be incorporated with the site-wide groundwater remediation effort.

AOC 33, North Branch of Rancocas Creek: The NBRC meanders across the Sybron facility and bisects the eastern part of the facility. During the Phase I and II investigations, a total of 34 surface water samples were collected from the NBRC. Low levels of cadmium were detected, but not at concentrations above relevant standards (Ref. 5). Cadmium was not detected in any of the Phase III surface water samples. At the request of NJDEP, additional surface water samples were collected in 1995 to confirm that constituents were below the New Jersey Surface Water Quality Criteria (NJ SWQC). Lead was the only constituent that exceeded NJ SWQC. The lead occurrence was attributed to elevated background concentrations (Ref. 9).

A total of 17 sediment samples were collected as part of the Phase I and II investigations. A few samples contained contaminants (including PDC, ethylene dichloride, chromium, beryllium, and silver) above informal ECRA guidelines for soil. Methanol was also detected in one sample location at 145 mg/kg (no ECRA guideline was presented). However, Sybron argued that detected concentrations were relatively low and were not shown to impact surface water quality, thus no further actions were recommended for sediment at the time. In 1994, per NJDEP's request, additional sediment samples were collected for methanol. Sample results were non-detect (Ref. 6). Per a February 21, 1995 NJDEP letter, a stream sampling program was required for NBRC; however, no additional sediment sampling was required (Ref. 7). Based upon available documentation, it appears that NJDEP has not required additional sediment sampling since the 1994 samples for methanol.

Sybron is currently sampling surface water in the NBRC on a semi-annual frequency, with the most recent sampling events conducted in October 2003 and February 2004 (Ref. 22). The highest levels of PDC (4.3 µg/L in October 2003 and 26 µg/L in February 2004) were detected in sample location STR-5, which is located immediately downstream of the storm water bypass line outfall. These concentrations exceed the recommended SWQC (1.0 µg/L) recently provided by NJDEP[3] (Ref. 19). PDC concentrations downstream of STR-5 ranged from non-detect to 1.2 µg/L (October 2003). No surface water samples downstream of location STR-5 were collected in February 2004. Only one upstream sample location (STR-8) detected PDC during the October 2003 (1.4 µg/L) and February 2004 (2.2 µg/L) sampling events.

Sybron states that increases in total dissolved solids (TDS) along the NBRC adjacent to the site are due to the permitted wastewater treatment discharge, and possibly to groundwater discharge. TDS increased from 99 mg/L at an upstream location (STR-1A) to 216 mg/L at the outfall (STR-

[3] No NJ SWQC is available for PDC. Thus, NJDEP asked Sybron to calculate a health-based SWQC for PDC for NJDEP review. Sybron proposed a SWQC of 4.8 µg/L; however, NJDEP did not approve this criterion. NJDEP selected a criterion of 0.5 µg/L, based on exposure factors used by NJDEP in developing human health-based water quality criteria and the bio-concentration factor and cancer slope factor provided by EPA. NJDEP indicated that the higher of the 0.5 µg/L criterion or the practical quantitation limit for PDC (1.0 µg/L) can be used. Thus, the site-specific SWQC for PDC is 1.0 µg/L (Ref. 19).

5), and then continues to be detected at elevated levels to the furthest downstream location (STR-26) at 232 mg/L, based upon October 2003 sample results. The highest TDS detection was 248 mg/L at STR-24, located approximately 500 feet upstream of STR-5 and north of AOC 23 (Ref. 22). Sybron proposed to drop TDS from the long-term surface water monitoring program; however, NJDEP deemed this unacceptable (Ref. 19). NJDEP has requested that Sybron determine whether TDS concentrations are having an adverse impact on aquatic biota (Ref. 19). Sybron is currently evaluating the ecological impacts in the NBRC and plans to submit an Ecological Risk Assessment Report (Ref. 22).

AOC 34, Low pH Discharge Area: This AOC is located at the storm water outfall. Available documentation indicates that pH values of waters discharging from this outfall have consistently been below the New Jersey Pollutant Discharge Elimination System (NJPDES) permit limit of 6.5. In 1993, a Hydropunch® investigation was conducted to determine if groundwater influx to the storm water bypass ditch was the source of the low pH. Groundwater sampling results obtained from this investigation indicate that local groundwater is the source of the low pH, but that the lateral extent of the plume is localized. The investigation indicated that all affected groundwater appears to discharge to the storm water bypass, which is subsequently treated in Sybron's wastewater treatment facility (Ref. 5). Subsequent sampling results obtained in February 1998 and on June 6 and July 6, 2001 indicated elevated concentrations of chloride and sulfate (Ref. 17) and that the area of low pH has not changed significantly since 1998. In a 2001 letter, Sybron proposed that the future monitoring and potential remedial actions for this area be incorporated into the program for the T-1 area (AOC 2) (Ref 17). A March 2004 report states that Sybron is currently developing a RI work plan to further assess the T-1/Pilot Plant Lagoon Sources (which include AOCs 2, 4, 30 and 34) (Ref. 22).

AOC 36 - No. 6 Fuel Oil AST: This fuel oil aboveground storage tank (AST) is located in the courtyard on the south side of site. The AST was installed in the early 1940s to fuel facility boilers and has a 20,000-gallon capacity. The tank rests on five concrete cradles located within an 18-inch deep sub-grade sump-like structure. Indications of a release were revealed during construction activities in the vicinity. Sybron proposed partial excavation of TPHC- and PAH-impacted soil because complete excavation is currently not possible due to concerns about the structural integrity of adjacent building foundations. A partial remedial action work plan was approved by NJDEP in a letter dated September 2, 2004 (Ref. 23). Impacted soil was excavated within and outside of the sump. Confirmatory samples collected outside the sump reported results below NJDEP soil cleanup criteria. Soil within the sump remains visibly contaminated and will be addressed by Sybron at a later date (Ref. 23).

References:

1. Presentation of ECRA Sampling Results for Sybron Chemicals. Prepared by Environ Corporation. Dated April 1989.
2. Results of the Implementation of the Partial Cleanup and Phase II ECRA Soil Investigations at the Sybron Chemicals, Inc., Volume I of II. Prepared by Environ Corporation. Dated June 1991.
3. Letter from John Cherry, Geoflux, Ltd., to John Sandstedt, Sybron Chemicals, Inc. Dated June 11, 1991.
4. Underground Storage Tank Closure Report. Prepared by MARCOR of Pennsylvania, Inc. Dated January 27, 1994.

5. Report on Additional Remedial Investigations and Addendum to Cleanup Plan. Prepared by Environ Corporation. Dated May 1994.
6. Letter from Wayne Howitz, NJDEP, to John Sandstedt, Sybron, re: Remedial Investigation Workplan Approval and Report on Additional Remedial Investigations and Addendum to Cleanup Plan. Dated December 16, 1994.
7. Letter from Douglas Stuart, NJDEP, to John Sandstedt, Sybron, re: Report on Additional Remedial Investigation and Addendum to Cleanup Plan. Dated February 21, 1995.
8. Letter from Douglas Stuart, NJDEP, to John Sandstedt, Sybron, re: Review of Remedial Action Report, February 2, 1995. Dated May 4, 1995.
9. Restated and Supplemental Remedial Action Workplan. Prepared by Environ Corporation. Dated June 1995.
10. Letter from Stephen Maybury, NJDEP, to John Sandstedt, Sybron Chemicals, re: Administrative Consent Order (ACO) in the Matter of Sybron Chemicals, Inc., Pemberton Twp., Burlington County, Restated and Supplemental Remedial Action Workplan, Dated June 30, 1995, ISRA Case E86097. Dated August 7, 1995.
11. Letter from Stephen Maybury, NJDEP, to John Sandstedt, Sybron Chemicals, re: Administrative Consent Order (ACO) in the Matter of Sybron Chemicals, Inc., Pemberton Twp., Burlington County, Response to NJDEP's 8/7/95 and 11/15/95 Letters, Dated April 22, 1996, ISRA Case E86097. Dated June 11, 1996.
12. Letter from Bryan Moore, NJDEP, to John Sandstedt, Sybron Chemicals, re: Administrative Consent Order (ACO) in the Matter of Sybron Chemicals, Inc., Pemberton Twp., Burlington County, Response to NJDEP's 10/16/96 Letter Dated July 15, 1997 (Original Copy Received August 12, 1997; Two Required Copies and Analytical Data received October 10, 1997), ISRA Case E86097. Dated December 22, 1997.
13. Letter from Bryan Moore, NJDEP, to John Sandstedt, Sybron Chemicals, re: Administrative Consent Order (ACO) in the Matter of Sybron Chemicals, Inc., Pemberton Twp., Burlington County, Response to NJDEP's 12/22/97 Letter Dated March 16, 1998, ISRA Case E86097. Dated May 5, 1998.
14. Letter from Robert North, Environ, to Steve Myers, NJDEP, re: AOC 2 and Deed Notice. Dated November 19, 1999.
15. Letter from Bryan Moore, NJDEP, to John Sandstedt, Sybron, re: Response Letter Dated November 19, 1999. Dated December 16, 1999.
16. Letter from Bryan Moore, NJDEP, to John Sandstedt, Sybron Chemicals, re: Administrative Consent Order (ACO) in the Matter of Sybron Chemicals, Inc., Pemberton Twp., Burlington County, Response to NJDEP's August 15, 2000 Letter, Dated November 29, 2000, ISRA Case E86097. Dated April 4, 2001.
17. Letter from Robert North, Environ Corporation, to Stephen Myers, NJDEP, re: Sybron Chemicals, Inc., Pemberton Twp., Burlington County, ISRA Case E86097. Dated July 31, 2001.
18. Letter from Robert North, Environ Corporation, to Stephen Myers, NJDEP, re: Sybron Chemicals, Inc., Pemberton Twp., Burlington County, ISRA Case E86097. Dated April, 12, 2002.
19. Letter from NJDEP, Bryan Moore, to John McPeak, Sybron, re: Remediation Agreement Amendment in the Matter of the Pemberton Site Sybron Chemicals, Inc., Birmingham Road, Pemberton Twp., Burlington County. Documents including: Response to NJDEP's April 4, 2001 Letter Dated May 11, 2001; Document Summarizing Outstanding Issues, Dated July 31, 2001; Technical Basis for Water-Quality Based Effluent Limit for 1,2-Dichloropropane, resubmitted September 5, 2001; Results from October 2001 Sampling Event, Dated December 3, 2001; and

Former T-1 Tank Area Report, Dated April 2, 2002. ISRA Case E86097. Dated November 26, 2002.

20. Letter from Robert North, Environ, to Stephen Myers, NJDEP, re: Response to NJDEP's November 26, 2002 Letter. Dated March 26, 2003.
21. Letter from Michael Kozar, O'Brien & Gere Engineers, Inc., to Stephen Myers, NJDEP, re: Response to Environmental Indicator (EI) Data Needs. Dated September 22, 2003.
22. Remedial Investigation Data Summary Package (April 2003 - February 2004 Activities). Prepared by O'Brien & Gere Engineers, Inc. Dated March 2004.
23. Letter from Stephen Myers, NJDEP, to John McPeak, Sybron, re: Partial Remedial Action Report for AOC 36 dated March 15, 2004, Proposed Well Abandonment Letter dated July 12, 2004. Dated September 2, 2004.
24. Neck Field Area (AOC 23) Remedial Investigation Report / Pilot Test Workplan. Prepared by O'Brien & Gere Engineers, Inc. Dated December 2004.

2. Is **groundwater** known or reasonably suspected to be "**contaminated**"[4] 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:

Groundwater Conditions

Three aquifers are present at the site: a shallow unconfined aquifer and two confined aquifers (Ref. 1). The shallow aquifer consists of up to 12 feet of recent alluvial deposits and from 18 to 28 feet of the uppermost portion of the Hornerstown Sand, which is the unit formerly mined for glauconite supply to the Sybron facility. Depth to groundwater ranges from approximately 3 feet to 11 feet below ground surface (bgs). The Mount Laurel-Wenonah (MLW) aquifer underlies the shallow aquifer and is comprised of grey, calcareous, medium- to fine-grained sands interbedded with clay layers. Depth to the top of the MLW aquifer varies from 47 feet to 70 feet bgs. The thickness of the MLW aquifer is approximately 83 feet. A third aquifer, referred to as the Potomac-Raritan-Magothy (PRM) aquifer, occurs below the MLW aquifer. Although the depth to the top of the aquifer is not provided in file materials, it is known that on-site production wells that have been completed in this aquifer extended to depths ranging from 521 feet to 839 feet bgs (Ref. 4).

The shallow aquifer and MLW aquifer are separated by a confining unit that is comprised of the base of the Hornerstown Sand and the underlying Navesink Formation (Ref. 1). This low permeability confining unit is continuous across the site and has a thickness of 40 to 60 feet. The base of the Hornerstown Sand consists of blue to dark green clayey sands with abundant silt and clay units. The Navesink Formation, which is generally 30 to 35 feet thick, is lithologically similar to the Hornerstown Sand, but with a higher percentage of clay and silt. The base of the Navesink Formation is characterized by a two to six-foot layer of semi-consolidated, fine-grained, clayey sand with up to 60 percent shell fragments. Laboratory tests performed on Navesink Formation core samples reveal hydraulic conductivity values that range from 1×10^{-7} to 2×10^{-5} centimeters per second (cm/sec). Slug tests in the combined Hornerstown and Navesink confining unit report values in the range of 1×10^{-9} to 3×10^{-8} cm/sec. Flow estimates indicate that flow through the Navesink portion of the confining layer would take 16 years.

[4] "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).

Groundwater in the shallow aquifer in the northern portion of the site flows in a radial pattern towards and discharges completely into the NBRC (Ref. 1). A groundwater divide trends east/west along the southern portion of the facility that separates the radial flow towards the NBRC from a flow regime to the south across the property boundary. The area of southern flow direction is defined by wells MW-5, MW-25, and MW-32 (in the vicinity of AOC 2 and 34). Refer to Figure 4 in the March 2004 RI Data Summary Package (April 2003 - February 2004 Activities) for a graphical depiction of groundwater flow in the southern portion of the Sybron site (Ref. 6).

Groundwater Quality

Quarterly groundwater monitoring of the shallow aquifer began in 1988 under the former NJPDES permit. Following the termination of this permit, a site-wide groundwater monitoring program was implemented in October 2001. The program included groundwater sampling and water level measurement of ten on-site monitoring wells (MW-06, MW-08, MW-17, MW-19, MW-20, MW-23, MW-24, MW-25, MW-32, and MW-33) completed in the shallow aquifer. During recent RI activities in 2003 and early 2004, eight additional monitoring wells were installed (MW-35 through MW-42). Well locations are presented in Figure 2 of the March 2004 RI Data Summary Package (April 2003 - February 2004 Activities) (Ref. 6). The most recent data available in file materials were collected in January 2004 (Ref. 6), except for AOC 23 where data from April and July 2004 are available (Ref. 7). Table 1 identifies each well where hazardous constituent concentrations were detected above NJ GWQC and the maximum concentration during the three 2004 sampling events. In addition to the above-mentioned monitoring wells, the table summarizes data from wells sampled in January 2004 that are not part of the quarterly monitoring program (wells MW-7, MW-13, and MW-15). Table 1 also includes results obtained from temporary well points (PDB-1, PDB-2, PDB-3, and PDB-6) installed in the creek bank at locations along the NBRC to assess the groundwater to surface water discharge. Wells MW-5 and MW-17, which are also not part of the quarterly monitoring program, were most recently sampled in October 2003 (Ref. 6), but VOCs were not detected and therefore these wells are not included in Table 1.

A review of Table 1 indicates VOC concentrations above the NJ GWQC for 1,2-dichloroethane (DCA), cis-1,2-dichloroethene (DCE), PDC, benzene, chlorobenzene, ethyl benzene, styrene, and TCE. The highest VOC concentrations are reported in wells MW-32 and MW-41 (located in the vicinity of the main production area), well MW-17 (located along the storm water bypass line), and well MW-23 (located in the northwest portion of the site near AOC 23). Sulfate and TDS concentrations also exceed relevant standards in wells distributed across the facility, with the exception of AOC 23. Aluminum concentrations exceed relevant standards in wells in the vicinity of the production areas (AOCs 2, 4, and 34).

There is a potential for off-site migration of VOC-impacted groundwater in the vicinity of AOCs 2 and 34 because, as discussed above, there is a south/southeast component of groundwater flow from these impacted areas towards the storm water ditch and off site. However, water quality results from a recently installed downgradient well (MW-38) indicate that groundwater impacts have not extended to off-site areas to the south (Ref. 6). In addition, surface water samples collected from the west and east ends of the storm water ditch (SWD-03 and SWD-04, respectively) indicate that significant quantities of contaminated groundwater are not discharging to the storm water ditch as it flows south and southeast from the vicinity of AOCs 2 and 34. Ditch samples reported no detections of VOCs in October 2003 and only one detection of PDC at 0.7 µg/L (below the recommended screening criteria of 1.0 µg/L) in the west ditch sample in February 2004 (Ref. 6).

Sybron states that vertical downward migration of contaminated groundwater is prevented by the presence of a confining layer of low conductivity that is continuous across the site, and by upward hydraulic gradients from the MLW aquifer across the confining layer to the shallow aquifer. Sybron references historical water quality results from wells completed in the MLW aquifer (SMC-TW1, SMC-MW1D, SMC-MW2D, SMC-MW3D, MW-26, MW-27, MW-28) that indicated that water quality in this aquifer has not been impacted by facility activities (Refs. 2, 3, 5). However, sporadic detections of PDC have been reported in on-site production well PW01. Well PW01 is one of several wells that historically extracted water from the MLW aquifer, and is the only production well that remains at the site. The most recent sampling of this well occurred in March and May of 2001 as part of the Safe Drinking Water Act (SDWA) sampling. In March 2001, PDC was detected at a concentration of 0.9 µg/L, which is below the NJ GWQC for PDC of 1.0 µg/L. In May 2001, no detection of PDC was reported (Ref. 4). Thus, based on the occurrence of upward vertical gradients, coupled with the existence of a thick (40 to 60 feet), continuous, low hydraulic conductivity confining layer across the site, and recent and historical water quality results in the MLW aquifer below NJ GWQC, only the shallow aquifer is considered currently impacted above relevant criteria. The MLW and PRM aquifers are not considered currently impacted and will not be evaluated further in this EI determination.

Table 1. Maximum Hazardous Constituent Concentrations Detected in the Shallow Aquifer in 2004 - µg/L

Contaminant	Maximum Concentration	Well I.D.	NJ GWQC
1,2-DCA	3,000	MW-6, MW-7, MW-8, *MW-17*, MW-23, MW-37, **MW-41**	2
PDC	240,000	MW-6, MW-7, MW-8, MW-9, MW-15, MW-17, MW-23, MW-24, MW-25, MW-32, MW-33, MW-35, MW-36, MW-37, MW-39, MW-40, **MW-41**	1*
Benzene	130	*MW-6*, MW-12, MW-17, **MW-23**, MW-33, *MW-36*, MW-37, MW-39	1
Cis-1,2-DCE	91	**PDB-6**	70
Chlorobenzene	1,300	MW-6, MW-12, MW-15, MW-17, MW23, MW-33, **MW-41**	50**
Ethyl Benzene	10,000	**MW-32**, MW-40	700
Styrene	12,000	**MW-32**, MW-40	100
TCE	140	*MW-6*, **MW-17,** MW-33	1
Vinyl Chloride	ND (11)	*PDB-2*	5

Well locations in **bold** reported the maximum detected concentration.
Well locations in *italics* were reported as non-detects, but the detection limits exceeded the NJ GWQC.
* NJDEP-approved site-specific SWQC for PDC is also 1.0 µg/L.
** NJDEP Interim Specific groundwater criterion.
Data collected in January 2004 (Refs. 6 and 7). Data for AOC 23 also collected in April and July 2004 (Ref. 7)
Well MW-41 was completed in a PDC hotspot (1,300 mg/L) identified in early 2004 by a grab sample in AOC 2.
Temporary points PDB-1, PDB-2, PDB-3, and PDB-6 were re-sampled in February 2004 using passive diffusion bag samplers (Ref. 6). Due to the significant differences in sample collection methodologies, these results are not summarized in Table 1.

References:

1. Summary Report of Ground Water, Surface Water and Sediment Quality Data for Sybron Chemicals, Inc., Volume I of IV. Prepared by Environ Corporation. Dated June 1991.
2. Letter from John Cherry, Geoflux, Ltd., to John Sandstedt, Sybron Chemicals, Inc. Dated June 11, 1991.
3. Restated and Supplemental Remedial Action Workplan. Prepared by Environ Corporation. Dated June 1995.
4. Letter from Robert North, Environ Corporation, to Stephen Myers, NJDEP, re: Sybron Chemicals, Inc., Pemberton Twp., Burlington County, ISRA Case E86097. Dated July 31, 2001.
5. Letter from Michael Kozar, O'Brien & Gere Engineers, Inc., to Stephen Myers, NJDEP, re: Response to Environmental Indicator (EI) Data Needs. Dated September 22, 2003.
6. Remedial Investigation Data Summary Package (April 2003 - February 2004 Activities). Prepared by O'Brien & Gere Engineers, Inc. Dated March 2004.

7. Neck Field Area (AOC 23) Remedial Investigation Report / Pilot Test Workplan. Prepared by O'Brien & Gere Engineers, Inc. Dated December 2004.

3. Has the **migration** of contaminated groundwater **stabilized** (such that contaminated groundwater is expected to remain within "existing area of contaminated groundwater"[5] 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:

Groundwater level data illustrate that groundwater in the shallow aquifer over much of site fully discharges to the NBRC (Ref. 1). Discharge of contaminated groundwater to the NBRC was further characterized during the most recent RI investigations through the installation and sampling of temporary well points in the creek bank at locations along the NBRC. These well points were installed downgradient of the Pilot Plant Lagoon Area (AOC 30) and adjacent to the storm water bypass line outfall (Ref. 1). Investigation results confirmed that VOC contamination is migrating from the shallow aquifer to the NBRC, with the highest concentration reported in temporary well PDB-2 (2,600 µg/L of PDC), which is screened from 5.2 to 6.8 feet bgs in the lower portion of the shallow aquifer (Hornerstown Formation). PDC concentrations in the upper portion of the shallow aquifer (PDB-1, PDB-3, and PDB-6) were considerably lower due to dilution effects and ranged from 11 µg/L to 98 µg/L. The highest PDC concentrations adjacent to the NBRC were reported in well MW-6 (5,000 µg/L in January 2004), which is located approximately 20 feet upgradient of PDB-2. Based on these flow direction and water quality results, it is apparent that the lateral extent of contaminant migration in the shallow aquifer over much of the northern portion of the site is laterally contained by the NBRC.

As mentioned in the response to Question 2, groundwater flow direction in the vicinity of wells MW-5, MW-25, and MW-32 is to the south and southeast towards the storm water ditch and the southern property boundary. During the most recent RI investigations, Sybron installed and sampled an additional well (MW-38) and sampled an existing well (MW-29) along the southern property boundary to assess the potential for off-site migration of contaminants in this area. Neither well reported any detection of VOC contamination (Ref. 1). Based upon these results, it appears that groundwater contamination is not migrating across the southern property boundary.

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[5] "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.

As discussed in the response to Question 2, vertical migration of contaminated groundwater is limited to the base of the shallow aquifer. Supportive evidence includes the occurrence of upward vertical gradients, the existence of a thick, continuous, low hydraulic conductivity confining layer across the site, and recent and historic water quality results below NJ GWQC in the MLW aquifer.

References:

1. Remedial Investigation Data Summary Package (April 2003 - February 2004 Activities). Prepared by O'Brien & Gere Engineers, Inc. Dated March 2004.

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

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

____ 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:

The NBRC meanders through the Sybron site with a westerly flow. The NBRC is classified by NJDEP as a FW2-NT (Freshwater Class 2 - Non-trout) waterway (Ref. 1). Along the southern boundary of the facility, there is a storm water ditch that extends east-west for approximately 120 feet. The storm water ditch drains to the NBRC via the storm water bypass line that runs north-south directly to the NBRC.

Water level data indicate that groundwater flow direction in the shallow aquifer is towards the NBRC, except for a small area along the southern site boundary where flow is to the south and southeast (Ref. 2). As noted in the response to Question 3, downgradient groundwater quality data indicate that this divergent flow component is not causing groundwater contamination to spread beyond the existing area of impact at this time.

Review of water quality data collected from permanent and temporary monitoring wells located hydraulically downgradient of facility AOCs and adjacent to the NBRC (wells MW-6, MW-7, MW-8, MW-13, MW-15, MW-19, MW-23, MW-24, PDB-1, PDB-2, PDB-3, and PDB-6) indicate VOC concentrations that exceed NJ GWQC (Ref. 2). Based on these findings, contaminated groundwater in the shallow aquifer at Sybron appears to discharge to surface water in the NBRC.

References:

1. Summary Report of Ground Water, Surface Water and Sediment Quality Data for Sybron Chemicals, Inc., Volume I of IV. Prepared by Environ Corporation. Dated June 1991.
2. Remedial Investigation Data Summary Package (April 2003 - February 2004 Activities). Prepared by O'Brien & Gere Engineers, Inc. Dated March 2004.

5. Is the **discharge** of "contaminated" groundwater into surface water likely to be **"insignificant"** (i.e., the maximum concentration[6] 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.

_X_ 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:

The significance of discharge of contaminants from the shallow aquifer at Sybron to surface water can be evaluated by reviewing water quality data collected from permanent (MW prefix) and temporary (PDB prefix) monitoring wells adjacent to the NBRC. Table 2 presents a list of groundwater contaminants detected at concentrations above the NJ GWQC (or other applicable screening criteria) in wells located adjacent to the NBRC during the most recent comprehensive groundwater monitoring event (January 2004) (Ref. 1). The data in Table 2 indicate that contaminant concentrations exceed 10 times the NJ GWQC for benzene, 1,2-DCA, PDC, and TCE. Consequently, the discharge of VOC-contaminated groundwater from the shallow aquifer to the NBRC cannot be considered "insignificant" and will be further assessed in the response to Question 6.

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

Table 2 - Groundwater Contaminant Concentrations Detected Adjacent to the NBRC (January 2004 - µg/L)

Constituent	Well ID	Concentration	NJ GWQC	10x NJ GWQC
Benzene	MW-23	**13**	1	10
	MW-6	***ND (13)***		
	PDB-1	**13**		
	PDB-2	5.2		
	PDB-3	1.5		
	PDB-6	**14**		
Chlorobenzene	MW-6	240	50*	500
	MW-15	120		
	MW-23	370		
	PDB-1	150		
	PDB-6	220		
1,2-DCA	MW-6	**370**	2	20
	MW-7	**21**		
	MW-8	**21**		
	PDB-1	20		
	PDB-2	**250**		
	PDB-3	**96**		
	PDB-6	2.4		
PDC	MW-6	**5,000**	1**	10
	MW-7	**14**		
	MW-8	**240**		
	MW-15	**27**		
	MW-24	9.9		
	PDB-1	**11**		
	PDB-2	**2,600**		
	PDB-3	**64**		
	PDB-6	**98**		
TCE	PDB-1	**26**	1	10
	PDB-2	3.6		
	PDB-3	4.6		
	PDB-6	9		
Vinyl Chloride	PDB-2	*ND (11)*	5	50
cis-1,2-DCE	PDB-6	91	70	700

Data Source is Ref. 1.

Bold formatting indicates that the detected concentration is greater than 10 x NJ GWQC.

Italics formatting indicates that the results were reported as non-detects, but the detection limit exceeds the NJ GWQC.

* NJDEP Interim Specific groundwater criterion.

** NJDEP-approved site-specific SWQC for PDC is also 1.0 µg/L.

July 2004 analytical results from wells MW-8 and MW-23 indicate decreases in contaminant concentrations (Ref. 2)

References:

1. Remedial Investigation Data Summary Package (April 2003 - February 2004 Activities). Prepared by O'Brien & Gere Engineers, Inc. Dated March 2004.
2. Neck Field Area (AOC 23) Remedial Investigation Report / Pilot Test Workplan. Prepared by O'Brien & Gere Engineers, Inc. Dated December 2004.

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[7])?

   _X_ 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[8], 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:

Sybron is currently sampling surface water from 11 stations on the NBRC on a semi-annual frequency; the most recent sampling events were conducted in October 2003 and February 2004 (Ref. 3). Two

[7] Note, because areas of inflowing groundwater can be critical habitats (e.g., nurseries or thermal refugia) for many species, an 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.

[8] 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.

locations are located upgradient of the facility (STR-1 and STR-1A), three stations are adjacent to the main production areas (STR-5, STR-8, and STR-24), two stations are downgradient of the main production areas but adjacent to on-site areas (STR-7 and STR-20), and four stations are downgradient of the facility (STR-22DS, STR-23, STR-25, and STR-26). Station STR-1A is located the furthest upgradient (approximately 1,000 feet from the main production area) and STR-26 is located furthest downgradient (approximately 5,200 feet from the downstream facility boundary). See Figure 5 of the March 2004 RI Data Summary Package (April 2003 - February 2004 Activities) for surface water sample locations and results (Ref. 3). These surface water data indicate that the constituents that exceeded 10 times the NJ GWQC in adjacent groundwater (benzene, 1,2-DCA, PDC, and TCE, as discussed in the response to Question 5) were not reported in surface water at concentrations above laboratory reporting limits, with the exception of PDC. The highest levels of PDC (4.3 µg/L in October 2003 and 26 µg/L in February 2004) were detected at sample location STR-5, immediately downstream of the storm water bypass line outfall. PDC concentrations downstream of STR-5 ranged from non-detect to 1.2 µg/L (October 2003 data). Only one sample location (STR-8) upstream of STR-5 detected PDC in the October 2003 (1.4 µg/L) and February 2004 (2.2 µg/L) sampling events. This sample location is immediately downgradient of the facility production area. These detected PDC concentrations exceed the recommended SWQC (1.0 µg/L) provided by NJDEP[9] (Ref. 2). However, quantitative human health risk calculations conducted in fulfilment of the Current Human Exposures Under Control (CA725) EI determination indicate that cancer and non-cancer risks associated with ingestion, inhalation, and dermal contact with surface water for both adults and children are within acceptable limits (Ref. 5). In addition, the PDC concentrations detected in the NBRC are well below the ecological screening criteria of 1,270 µg/L proposed by Sybron (Ref. 4) and accepted by NJDEP.

The elevated levels of PDC at NBRC sampling station STR-5 have been associated with the storm water bypass line that connects the storm water ditch to the NBRC (Ref. 3). Based on sample results from the storm water ditch, and upstream and downstream of the bypass line outfall, the elevated PDC concentrations at STR-5 appear to be the result of leakage into the line and preferential flow along the line backfill. The contaminant concentrations discharging to the NBRC at the bypass line outfall are significant, as illustrated by elevated concentrations reported at wells MW-6, PDB-1 through PDB-3, and PDB-6 (Table 2). However, the elevated PDC concentration of 5,000 µg/L in well MW-6 decreases along the NBRC to 27 µg/L approximately 50 feet to the east at well MW-15 and to 14 µg/L within approximately 15 feet to the west at well MW-7 (Ref. 3). Therefore, it appears that the discharge of significantly contaminated groundwater is limited to a small area along the NBRC.

Based on the above-mentioned results, it appears that the discharge of contaminated groundwater to surface water in the NBRC can be considered “currently acceptable”. Surface water impacts in the NBRC are generally confined to the area of the storm water bypass line outfall (surface water station STR-5). Furthermore, throughout the entire Sybron NBRC study area, PDC concentrations range from slightly above the SWQC to non-detect. PDC concentrations at STR-5 exceed SWQC, but are considered acceptable from a human health perspective and are well below the ecological screening criteria. The investigation into potential impacts to the NBRC is ongoing. According to a recent facility

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[9] No NJ SWQC is available for PDC. Thus, NJDEP asked Sybron to calculate a health-based SWQC for PDC for NJDEP review. Sybron proposed a SWQC of 4.8 µg/L; however, NJDEP did not approve this criterion. NJDEP selected a criterion of 0.5 µg/L, based on exposure factors used by NJ in developing human health-based water quality criteria and the bio-concentration factor and cancer slope factor provided by EPA. NJDEP indicated that the higher of the 0.5 µg/L criterion and the practical quantitation limit for PDC (1.0 µg/L) can be used. Thus, the site-specific SWQC for PDC is 1.0 µg/L (Ref. 2).

update, Sybron plans to perform a baseline ecological evaluation to determine the potential ecological impacts of facility activities on the NBRC adjacent to the site (Ref. 3).

References:

1. Letter from Wayne Howitz, NJDEP, to John Sandstedt, Sybron, re: Remedial Investigation Workplan Approval and Report on Additional Remedial Investigations and Addendum to Cleanup Plan. Dated December 16, 1994.
2. Letter from NJDEP, Bryan Moore, to John McPeak, Sybron, re: Remediation Agreement Amendment in the Matter of the Pemberton Site Sybron Chemicals, Inc., Birmingham Road, Pemberton Twp., Burlington County. Documents including: Response to NJDEP's April 4, 2001 Letter dated May 11, 2001; Document Summarizing Outstanding Issues, dated July 31, 2001; Technical Basis for Water-Quality Based Effluent Limit for 1,2-Dichloropropane, re-submitted September 5, 2001; Results from October 2001 Sampling Event, dated December 3, 2001; and Former T-1 Tank Area Report, dated April 2, 2002. ISRA Case E86097. Dated November 26, 2002.
3. Remedial Investigation Data Summary Package (April 2003 - February 2004 Activities). Prepared by O'Brien & Gere Engineers, Inc. Dated March 2004.
4. Proposed Ecologically-Based Surface Water Quality Criteria for 1,2-Dichloropropane for the North Branch of the Rancocas Creek. Prepared by O'Brien & Gere Engineers, Inc. Dated October 2004.
5. Documentation of Environmental Indicator Determination, Environmental Indicator (EI) RCRIS Code (CA725), Current Human Exposures Under Control, Sybron Chemicals, Inc. Prepared by Booz Allen Hamilton. Dated June 29, 2004.

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 groundwater monitoring is conducted at the facility pursuant to the NJDEP-approved Industrial Site Recovery Act (ISRA) monitoring program and includes sampling and water level measurement at wells MW-6, MW-8, MW-17, MW-19, MW-20, MW-23, MW-24, MW-25, MW-32, and MW-33. More recently, wells MW-35 through MW-42 have been added to the program as part of the ongoing RI activities (Ref. 1). The samples are laboratory analyzed for VOCs and certain wet chemistry parameters. Additionally, well MW-19 is analyzed for naphthalene and well MW-32 is analyzed for total aluminum (Ref. 1). Surface water sampling from the NBRC is conducted on a semi-annual basis. Samples are collected from 11 surface water sampling stations (STR-1, STR-1A, STR-5, STR-7, STR-8, STR-20, STR-22DS, STR-23, STR-24, STR-25, and STR-26). Surface water samples are analyzed for VOCs and TDS (Ref. 1). (It should be noted that surface water sampling locations STR-22DS and STR-23 are not routinely sampled due to accessibility issues). It is anticipated that the final monitoring network will be developed and approved following the conclusion of RI activities and the development of a Corrective Measures Study (CMS).

References:

1. Remedial Investigation Data Summary Package (April 2003 - February 2004 Activities). Prepared by O'Brien & Gere Engineers, Inc. Dated March 2004.

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 Sybron Chemicals, Inc., EPA ID #NJD002339406, located at **Box 66, Birmingham Road, Birmingham**, 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:_____
Lucas Kingston
Hydrogeologist
Booz Allen Hamilton

Reviewed by: _____ Date:_____
Michele Benchouk
Environmental Engineering Consultant
Booz Allen Hamilton

Also reviewed by: _____ Date:_____
Alan Straus, Project Manager
RCRA Programs Branch
EPA Region 2

_____ Date:_____
Barry Tornick, Section Chief
RCRA Programs Branch
EPA Region 2

Approved by: Signed by:_____ Date: 4/18/2005
Adolph Everett, Chief
RCRA Programs Branch
EPA 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 EPA 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: Alan Straus, EPA Remedial Project Manager
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Attachments

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

- Attachment 1 - Summary of Media Impacts Table

Attachment 1 - Summary of Media Impacts Table
Sybron Chemicals, Inc.

	GW	AIR (Indoors)	SURF SOIL	SURF WATER	SED	SUB SURF SOIL	AIR (Outdoors)	CORRECTIVE ACTION MEASURE	KEY CONTAMINANTS
AOC 2. Tank (T-1) and Containment Area	Yes	No	No	NA	NA	Yes	No	▸ Contaminated soil removed ▸ Tank cleaned, dismantled, and demolished ▸ Soil and groundwater investigations (ongoing) ▸ Deed notice (planned)	PDC (groundwater and soil)
AOC 4. Aboveground Tank Containments	Yes	No	No	NA	NA	Yes	No	▸ Impacted soil removal (TMA tank) ▸ NFA approved for TMA Tank Area ▸ In-situ bioremediation (No. 2 Fuel Oil Tank) – program complete ▸ Soil and groundwater investigations (ongoing)	VOCs
AOC 23. Neck Field	Yes	No	No	NA	NA	Yes	No	▸ Soil, free product, and waste removal ▸ Partial NFA approved for soil ▸ Source area investigations ▸ Remedial action pilot study (planned) ▸ Deed notice (planned)	VOCs (groundwater) beryllium, antimony (soil)
AOC 30. Former Pilot Plant Lagoon and Section of Storm Sewer	Yes	No	Yes	NA	NA	Yes	No	▸ Soil excavation, ex-situ bioremediation and off-site disposal ▸ Asphalt cap installed ▸ Deed notice (planned) ▸ Soil and groundwater investigations (ongoing)	PDC (groundwater) PAHs, silver (soil)
AOC 31. Underground Process Wastewater Lines	Yes	No	No	NA	NA	No	No	▸ NFA conditionally approved for soil ▸ Groundwater investigation (ongoing)	PDC

	GW	AIR (Indoors)	SURF SOIL	SURF WATER	SED	SUB SURF SOIL	AIR (Outdoors)	CORRECTIVE ACTION MEASURE	KEY CONTAMINANTS
AOC 33. North Branch of Rancocas Creek	NA	NA	NA	Yes	Yes	NA	NA	▸ Sediment sampling ▸ Surface water sampling (ongoing) ▸ Ecological Risk Assessment (underway)	PDC, lead (surface water - attributed to background) PDC, chromium, beryllium, silver (sediment)
AOC 34. Low pH Discharge Area	Yes	No	No	NA	NA	No	No	▸ Groundwater investigations (ongoing)	Low pH
AOC 36. No. 6 Fuel Oil AST	No	No	Yes	NA	NA	Yes	No	▸ Impacted soil removal (ongoing)	TPHC PAHs