DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

RCRA Corrective Action
Environmental Indicator (EI) RCRAInfo Code (CA725)
Current Human Exposures Under Control

Facility Name: **The Southland Corporation**
Facility Address: **Alphano Road, Great Meadows, New Jersey 07838**
Facility EPA ID#: **NJD092225721**

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 "Current Human Exposures Under Control" EI

A positive "Current Human Exposures Under Control" EI determination ("YE" status code) indicates that there are no unacceptable human exposures to "contamination" (i.e., contaminants in concentrations in excess of appropriate risk-based levels) that can be reasonably expected under current land- and groundwater-use conditions (for all 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 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 "Current Human Exposures Under Control" EI is for reasonably expected human exposures under current land- and groundwater-use conditions ONLY, and does not consider potential future land- or groundwater-use conditions or ecological receptors. The RCRA Corrective Action Program's overall mission–to protect human health and the environment–requires that final remedies address these issues (i.e., potential future human exposure scenarios, future land and groundwater uses, and ecological receptors).

Duration and Applicability of EI Determinations

EI determination status codes should remain in the Resource Conservation Recovery Act Information (RCRAInfo) national database system 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 Southland Corporation facility is located on Alphano Road, Great Meadows, in the Township of Independence, Warren County, New Jersey. The facility is situated in the Pequest River Valley adjacent to Bear Swamp, which borders the site to the north and west. Most of the adjoining land to the south and east is cultivated for agricultural and horticultural purposes. While the entire site encompasses approximately 277 acres, all activities associated with the chemical manufacturing operations and the

wastewater treatment plant (WWTP) occurred primarily within 100 acres on the site. A residential area of the town of Alphano is located approximately one-half mile east of the site. Agricultural buildings and private residences are located adjacent to the Southland property to the northeast and southwest. Land use south and southeast of the site is primarily agricultural, with aerial photographs indicating one residence located one and one-half miles southwest of the Southland site. Areas west and south of the site consist of wetlands, forests, and borrow pits for sand excavation. Southland has indicated that the nearest resident to the southern property line is located approximately one mile from the site.

From 1950 to 1966, Gamma Chemical Company owned and operated the facility as a specialty chemical manufacturing operation. In 1966, Ashland Chemical Company purchased the facility and continued to operate the facility as a specialty chemical manufacturing operation until May 1978, when the facility was sold to the Southland Corporation. Southland operated the facility for the production and processing of specialty organic chemicals, and manufactured chemical intermediates for dyestuffs, pharmaceuticals, and industrial products until October 1988, when all operations at the facility ceased. From 1988 to present, 7-Eleven, Inc. (formerly the Southland Corporation) has continued to maintain ownership and conduct remedial activities. All industrial structures, with the exception of the WWTP, were demolished and removed by 1997. The WWTP continued operations until July 2000, when it was completely decommissioned and demolished.

Southland entered into an Administrative Consent Order with New Jersey Department of Environmental Protection (NJDEP) on February 21, 1986, to conduct a Remedial Investigation (RI) at the facility. The facility is currently regulated under New Jersey Industrial Site Recovery Act (ISRA). Site characterization activities have determined that certain volatile organic compounds (VOCs), metals (primarily arsenic), and polychlorinated biphenyls (PCBs) in soil, and VOCs and metals in groundwater, are present at the former chemical manufacturing and waste disposal areas in concentrations exceeding applicable standards. NJDEP directed Southland to remediate surface soil at the site to New Jersey Non-Residential Direct Contact Soil Cleanup Criteria (NJ NRDCSCC). Use of these industrial criteria requires that Southland restrict the site to non-residential use. Thus, Southland will initiate the development of a Deed Notice to restrict site usage to non-residential upon completion of site remediation activities. The Deed Notice will indicate the areas at the site where contamination exists in excess of relevant NJDEP screening criteria.

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 (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 #8 and enter "IN" (more information needed) status code.

Summary of Contaminated Areas: In 1987, a RI was conducted and identified 19 areas of investigation based on geographical area and functional activities while the facility was in operation. Additional environmental sampling and delineation of the investigation areas were conducted as part of the 1991 sampling plan addendum (SPA), 1992 and 1993 additional delineation sampling (ADS), and 1995 supplemental site characterization. Surface soil was compared to NJ NRDCSCC and New Jersey Residential Direct Contact Soil Cleanup Criteria (NJ RDCSCC). Subsurface soil was compared to NJ Impact to Groundwater Soil Cleanup Criteria (NJ IGWSCC). As described below, soil has been remediated to NJ NRDCSCC. In addition, NJDEP has approved a site-specific cleanup level for arsenic of 56 mg/kg (based on the natural background of the area as determined by the NJDEP Technical Requirements for Site Remediation) (Ref. 18).

Only those areas that have not received a no further action (NFA) determination by NJDEP are described below. NJDEP has approved NFA for the following areas: A, B, E, Q, R, T, and U. In addition, there is no indication that any areas were ever designated as Areas N, O, P, V, W, and X. Area S included soil stockpiles that were situated in Areas G, H, and M. A facility map displaying all investigation areas is provided as Attachment A in a September 22, 1998, letter from Environ to NJDEP (Ref. 6).

Area C, Former Tertiary Ponds: This area is located south of the back ditch in the southeastern portion of the site and was historically used for facility-related wastewater treatment and management purposes. Area C consists of approximately 2.5 acres of heavily vegetated wetlands. Sampling results indicated that arsenic concentrations exceeded respective NJ standards in soil, sediment, and groundwater (Ref. 4). Other metals, including chromium, copper, and zinc, also exceeded the NJ RDCSCC. Between August and October 2001, contaminated soil was excavated from this area and consolidated to Area F, where eventual grading and soil cover placement occurred (Ref. 16). Soil used as cover and fill material for Area C was obtained from the excavation of former storm water retention basins in accordance with NJDEP approval (Ref. 16). Based on the Landfill, Pond, and Lagoon Construction Completion Report dated April 2002, remedial activities were performed in accordance with a NJDEP comment letter dated January 3, 1997 (Ref. 16). The contaminated soil was delineated and all soil impacted above NJ NRDCSCC has been consolidated in designated areas (Areas F, M, and H) and capped. Southland has indicated that this area will be included in the Deed Notice (also known as a Declaration of Environmental Restriction) that will be prepared for the site (Ref. 17).

Recent groundwater monitoring results (2002) indicated that benzene, 1,2-dichloroethane (1,2-DCA), and arsenic were detected in monitoring well MW-34S, and arsenic was detected at MW-50S, in excess of New Jersey Ground Water Quality Criteria (NJ GWQC). These data indicate that groundwater contamination is present at Area C as well as downgradient areas north and west leading towards the back ditch. However, recent surface water sampling performed in April 2002 at location S-3, downgradient from Area C in the back ditch, indicated no exceedences of the NJ Surface Water Quality Criteria (SWQC). In addition, wells N-13 and N-2R, which are located downgradient from this area, did not show detects of VOCs during the April 2002 sampling event. There is currently no groundwater remediation system in place in this area. Further discussion on groundwater contamination in this area is provided in response to Question No. 2.

Area D, Sludge Lagoons: This area is located in the western part of the site and includes two primary lagoons that contained wastewater and dewatering sludge from the WWTP until 1976. Recent groundwater monitoring data (April 2002) indicate no exceedences of NJ GWQC. Analysis of lagoon sediments revealed the presence of zinc, chromium, and arsenic. Only arsenic exceeded the NJ direct exposure criterion at Area D. A background soil investigation was conducted to determine if the elevated concentrations of arsenic at Area D and the surrounding area could be attributed to naturally occurring background conditions. Results indicated that the presence of arsenic above NJ direct exposure criterion in soil west of Area D is due to natural background. NJDEP concurred with this conclusion and agreed that no further remedial investigations were necessary in the area west of Area D. Between August and October 2001, excavation of Area D was performed in conjunction with closing the lagoons. Material excavated from Area D was consolidated to Area F, where grading and soil cover placement occurred (Ref. 16). Soil used as cover and fill material was obtained from the excavation of the former storm water retention basins in accordance with NJDEP approval (Ref. 16). Based on the Landfill, Pond, and Lagoon Construction Completion Report dated April 2002, remedial activities were performed in accordance with a NJDEP comment letter dated January 3, 1997 (Ref. 16). All soil impacted above NJ NRDCSCC has been consolidated in designated areas (Areas F, M, and H) and capped. Southland has indicated that this area will be included in the Deed Notice that will be prepared for the site (Ref. 17).

Area F, Unnamed Pond: This area is located just north of the main production area and south of the Former Tertiary Ponds (Area C), and was historically used for liquid waste disposal. Sample results collected in 1987 and 1990 indicated the presence of metals (arsenic, chromium, copper, and zinc) in sediments above the Ontario Sediment Screening Lowest Effects Level for ecological receptors. VOCs, PCBs, and arsenic were detected in surface soil at concentrations greater than NJ NRDCSCC. Surface water sampling showed no detectable levels of VOCs or PCBs, but some inorganics (lead, zinc, and copper) were detected above NJ SWQC during one of the three surface water sampling events (Ref. 9). VOCs and arsenic were detected in groundwater above NJ GWQC. Between August and October 2001, remedial activities were performed in this area. Based on the Landfill, Pond, and Lagoon Construction Completion Report dated April 2002, remedial activities were performed in accordance with a NJDEP comment letter dated January 3, 1997 (Ref. 16). The contaminated soil was delineated and all soil impacted above NJ NRDCSCC has been consolidated in designated areas (Areas F, M, and H) and capped. The unnamed pond was dewatered, and impacted sediments were excavated and consolidated above grade beneath a clean soil and vegetated cover in southern Area F (along with soil from Areas C and D) (Ref. 16). The remainder of the pond area was subsequently allowed

to refill with water naturally. Southland has indicated that this area will be included in the Deed Notice that will be prepared for the site (Ref. 17).

Area G, Fisher Pond: This area is located near the main production area and was used as a cooling water reservoir. The pond was subsequently filled with drums, railroad ties, and other debris material. Several VOCs and arsenic were detected in soil and sediment, but only benzene and PCBs exceeded NJ NRDCSCC in sediments (Ref. 4). VOCs were also detected in groundwater (Ref. 4). In September 2001, Fisher Pond closure activities occurred. Remedial activities included dewatering the pond, removing the debris and impacted sediment for off-site disposal, backfilling with clean fill from the former storm water retention basin, and installing a vegetative cover (Ref. 16). Based on the Landfill, Pond, and Lagoon Construction Completion Report dated April 2002, remedial activities were performed in accordance with a NJDEP comment letter dated January 3, 1997 (Ref. 16). The contaminated soil was delineated and all soil impacted above NJ NRDCSCC has been consolidated in designated areas (Areas F, M, and H) and capped. The soil stockpile located in this area (note that soil stockpiles in Areas G, H, and M were referred to as Area S) was used as a grading layer for the on-site landfill (Area M) per NJDEP approval (Ref. 6). Groundwater is being remediated in this area with the air sparging/soil vapor extraction (AS/SVE) system that has been installed along the location of the former groundwater containment well point and trench. Southland has indicated that this area will be included in the Deed Notice that will be prepared for the site.

Area H, Former Drum Storage Area Near Fisher Pond: This area is located in an unpaved area located between Fisher Pond and the fence line along the front ditch. This area was used for the storage of drums and used equipment. Approximately 500 to 600 drums containing off-specification solvents and production batches were once stored in this area. VOCs were detected in groundwater above the NJ GWQC, and VOCs, arsenic, and PCBs were detected in soil at levels in excess of the NJ NRDCSCC. Based on the October 29, 2002, Remedial Action Report, soil from Area Y was consolidated to Area H (see discussion under Area Y), a clean cover was placed over the excavated soil and seeded in accordance with the NJDEP approved work plan (Ref. 21). Since contamination in soil above NJ NRDCSCC remains at this area under a seeded cover, a Deed Notice will be implemented (Ref. 14). The soil stockpile located in this area (note that soil stockpiles in Areas G, H, and M were referred to as Area S) was used as a grading layer for the on-site landfill (Area M) per NJDEP approval (Ref. 6). Remedial efforts for groundwater include the installation and operation of an AS/SVE system to address groundwater contamination (Ref. 4). However, recent sampling data from monitoring well N-6RR, performed in July 2002, indicate that concentrations of benzene, chlorobenzene, and methylene chloride have increased from the prior quarter sampling round conducted during April 2002. While there are no wells downgradient of this location on the same side of the front ditch, well MW-39S, which is downgradient of N-6RR across the ditch, did not detect any VOCs during the April 2002 sampling event. Surface water sample S-8, which is in ditch and is in the discharge path of N-6RR, has not been sampled since 1992. However, surface water sample S-7 is located downstream of S-8 and has been sampled twice annually for the last seven years. The most recent documented sample results indicate that several VOCs (benzene, 1,2-DCA) and arsenic are present in surface water above New Jersey Surface Water Quality Criteria (NJ SWQC). Refer to Question No. 2 response for further discussion on groundwater contamination and surface water contamination in this area.

Area I, Western Section of Former Production Area: This area encompasses the paved, western portion of the production area located south of the former main production area tank farm. Historically, 1,2-DCA, PCBs, arsenic, and zinc were detected in soil above NJ NRDCSCC. Benzene, ethylbenzene, toluene, xylene (BTEX), chlorobenzene, and 1,2-DCA were detected at concentrations in excess of NJ GWQC. Relatively high concentrations of 1,2-DCA were detected in soil (40,000 mg/kg) and groundwater (48,000 µg/L). Remedial activities were performed in this area in 1999 and included the excavation of approximately 1,100 tons of impacted soil which was subsequently transferred off site. In addition, an AS/SVE system installed along the southern edge of the former production area was expanded to provide treatment of groundwater downgradient of any remaining secondary sources of contamination in this area after the excavation was completed. The remainder of the excavation was backfilled with clean on-site fill to grade (Ref. 10). Residual levels of 1,2-DCA and PCBs remain in subsurface soil at concentrations above the NJ IGWSCC. NJDEP indicated that the need for additional remediation will be contingent upon confirmatory sampling as well as future groundwater monitoring results (Ref. 12). Southland has indicated that Area I will be included in the Deed Notice for the site.

Area J, Former Tear Gas Manufacturing Area: This area was utilized to manufacture tear gas and was also the location of a RCRA-permitted drum storage area that closed in 1989. PCBs were detected in soil above NJ RDCSCC and NJ NRDCSCC, and VOCs (benzene, chlorobenzene, and 1,2-DCA) and manganese were detected in groundwater in excess of NJ GWQC. Between August and October 2001, remedial activities occurred for Area J. Remedial actions for soil included site clearing and removal of an existing stockpile to the landfill (Area M) (Ref. 16). After excavation of the existing soil stockpile, the area was capped with one foot of clean soil from the former storm water retention basins, and the area was re-seeded (Ref. 16). Per a July 2, 2002, letter, NJDEP required Southland to perform additional sampling to delineate PCB-contaminated soil in order to assess whether there had been off-site migration of contamination from the soil stockpile and to determine the boundaries for installing the soil cap (Ref. 18). In a September 19, 2002, letter to NJDEP Southland argued that additional soil samples were not necessary because the silten berm that was located around the soil stockpile prevented off-site runoff (Ref. 19). Southland also indicated this area would not be a human exposure concern because of the dense swamp vegetation and limited land use in the adjacent off-site area. In a September 25, 2002, letter NJDEP accepted this argument (Ref. 20) and indicated NFA is required for soil in Area J. Southland has indicated that this area will be included in the Deed Notice that will be prepared for the site (Ref. 17).

With regard to groundwater in Area J, NJDEP approved the Remedial Action Workplan (RAW) Addendum proposal to apply oxygen releasing compounds (ORC) to actively enhance ongoing biodegradation of VOCs in groundwater at this area (Ref. 13). The strong oxidant, namely potassium permanganate, is currently injected to address the high concentrations of VOCs in groundwater. Southland began ORC remedial efforts in mid-2000 and quarterly groundwater monitoring is still ongoing in this area. The October 2002 Remedial Action Report indicates that ORC treatment has reduced residual concentrations of VOCs (Ref. 21). However, the most recent sampling data from April 2002 indicates concentrations of VOCs (benzene, chlorobenzene, and 1,2-DCA) remain in excess of NJ GWQC at ORC-1, ORC-2, and N-16R. Manganese was also detected in concentrations in excess of the NJ GWQC; however, this is expected as it is used in the treatment process. In addition, manganese is a naturally occurring constituent in sedimentary sequences with reducing conditions, such as those found beneath the Southland

facility. In addition, although downgradient well MW-36S did not detect contaminants in excess of NJ GWQC or NJ SWQC, surface water from the agricultural ditch located downgradient of Area J was sampled in October 2002 and sample S-6 detected 1,2-DCA at concentrations slightly above the NJ SWQC. However, since contaminants have not been detected at the downgradient well (MW-36S) in excess of NJ GWQC, it can be concluded that the lateral extent of contamination in this area is now stable. It is also unlikely that current contaminant concentrations observed in Area J would migrate to the off-site downgradient well, as shallow groundwater in this area is expected to discharge to the front agricultural ditch. Based on these results, Southland proposed to continue the ORC for two years, and then implement monitored natural attenuation (MNA) for the remaining contaminant plume in Area J (Ref. 21). Southland also proposes to implement a groundwater Classification Exception Area (CEA) application for this area. Further discussion on groundwater contamination in this area is provided in Question No. 2. Further discussion of potentially complete exposure pathways to impacted surface water in the front ditch are discussed in Questions Nos. 3 and 4.

Area K, Former Limefield: This area is situated in a wooded area, north and northeast of the former production areas, and was used for disposal of lime slurry wastes from chemical production processes. Several VOCs (BTEX, chlorobenzene, 1,2-dichlorobenzene, and 1,4-dichlorobenzene) were detected in soil and groundwater above relevant NJ standards. Approximately 3,600 cubic yards of soil were excavated from two areas and placed in biopiles for ex-situ bioremediation. The remedial action was completed in July 1999. Post-excavation sample results demonstrated that VOCs, primarily chlorobenzene, remained in subsurface soil at concentrations in excess of their respective NJ IGWSCC. Based on the horizontal and vertical delineation of these sample results, it was determined that the VOC-impacted soil was limited to a small amount of saturated soil. Southland proposed that the installation of an AS/SVE system will reduce the VOC residuals in the excavated areas. NJDEP conditionally approved this proposal with the requirement that at the termination of AS/SVE, post-remediation sampling be conducted to determine the necessity of institutional controls, such as a CEA (Ref. 12). Because Area K overlies the groundwater mound between the ditches, some of the groundwater beneath Area K may flow toward the back ditch, and toward the western property boundary at the Southland site. NJDEP has informed Southland that the need for additional action will depend upon results from post-remedial sampling and groundwater monitoring (Ref. 12).

Area L, Main Production Area including Tank Farm: This area includes most of the main production area and tank farm near the southeast boundary of the site. The majority of this area is covered by asphalt. Several VOCs were detected in subsurface soil above the NJ IGWSCC. VOCs were detected in groundwater at concentrations exceeding relevant NJ GWQC. In addition, monitoring wells (MW-18S, ASW-5) downgradient of Area L detected dense non-aqueous phase liquid (DNAPL). Remedial efforts for soil and groundwater include the installation of the AS/SVE system. Area L will also be included in the Deed Notice for the site (Ref. 4).

Area M, Landfill: The landfill covers approximately two acres and was active from 1954 to 1974. Historically, material placed in the landfill consisted of solid waste (e.g., cardboard, glass jars, plastic bags and sheeting, rubber hose). Soil and groundwater investigations indicated that VOCs and metals do not occur at concentrations in excess of the NJ RDCSCC, with the exception of the base neutral compound phenyl ether. Because there is a lack of adequate toxicity data to develop a specific soil criterion for this compound, NJDEP developed a residential

alternative criterion of 30 mg/kg based on the National Institute of Occupational Safety and Health (NIOSH) time-weighted average and other compounds that have similar time-weighted average concentrations (Ref. 3). It was determined that residuals of phenyl ether do not pose a significant risk, and NFA with regard to this compound was required (Ref. 3). Approximately 330 drums with residuals and approximately 14,000 square feet of soil were excavated during the drum removal action. Between September and October 2001, landfill closure activities occurred. Remedial activities included site clearing, soil stockpile relocation and consolidation to the landfill, and placement of a soil cap (Ref. 16). Area S soil stockpiles, which were situated at Areas G, H, and M, were approved for use by NJDEP as soil to regrade Area M and cap the landfill portion of this area (Ref. 6). Based on the Landfill, Pond, and Lagoon Construction Completion Report dated April 2002, remedial activities were performed in accordance with a NJDEP comment letter dated January 3, 1997 (Ref. 16). The landfill portion of this area is now capped and Southland has indicated that this area will be included in the Deed Notice for the site (Ref. 17). Groundwater remediation is being addressed by the AS/SVE system installed along the location of the former groundwater containment well point and trench (just north of the front ditch), which will capture contaminated groundwater from this area.

Area Y, Off-Site Farmland: This area consists of off-site farmland just south of the facility boundary adjacent to the former production areas. An agricultural ditch also runs along the southern property boundary and is included as part of Area Y. In January 1997, NJDEP accepted a proposal for NFA in this area based upon samples results indicating no contaminants were present above NJ RDCSCC (Ref. 5). However, in March 1998, Southland proposed to perform additional off-site soil sampling because numerous sediment and soil samples collected along the front ditch contained high concentrations of arsenic. NJDEP accepted this proposal by wanting verification that the front ditch functioned as an effective barrier to contain the migration of contaminants in shallow groundwater (Ref. 5). Results indicated that VOCs (primarily benzene and chlorobenzene) and arsenic were detected in subsurface soil in excess of NJ IGWSCC. Arsenic was also detected in surface soil above the site-specific cleanup level of 56 mg/kg, which was chosen based on the natural background of the area as determined by the NJDEP Technical Requirements for Site Remediation (Ref. 18). Based on these results, Southland submitted a Remedial Investigation Report/Remedial Action Workplan (RIR/RAW) for soil in the off-site area in October 2001. This report indicated that VOCs detected in subsurface soil are most likely due to impacted groundwater migrating off site prior to the installation of the interim remediation measure (IRM) of groundwater containment in 1993 and the current AS/SVE system. Southland proposed that the AS/SVE system and natural attenuation processes will substantially reduce residual concentrations of VOCs in soil. NJDEP has agreed with Southland's proposal (Ref. 16). Southland also proposed to delineate arsenic contaminated surface soil in excess of the site-specific criterion, excavate the impacted soil from this off-site area and place it in Area H beneath a soil cap (Ref. 16). This proposal was approved by NJDEP on July 2, 2002, when the site-specific remedial goal for arsenic was set at 56 mg/kg (Ref. 18). As documented in the October 29, 2002, Remedial Action Report, soil was excavated from this off-site area and consolidated into Area H, where it was covered with clean soil obtained from the former storm water retention basins and seeded. The excavated areas were backfilled with clean soil from the former storm water retention basins and seeded (Ref. 21). Southland has requested NFA with regard to soil for this area (Ref. 21).

With regard to groundwater, there are two off-site monitoring wells located in Area Y (MW -38S and MW-39S). These wells are located outside of and downgradient of the AS/SVE system, as

well as outside of the property boundary. Southland monitors these wells on a semi-annual basis. In July 2002, MW-38S detected 1,2-DCA (3.4 µg/L). NJDEP has required Southland continue groundwater monitoring in this area (Ref. 1).

The most recent surface water sampling from April 2002 detected benzene (6.5 µg/L), 1,2-DCA (14 µg/L), and arsenic (51.9 µg/L) at surface water sample location S-7 in excess of NJ SWQC (0.150 µg/L, 0.291 µg/L, and 0.0170 µg/L, respectively). In addition, downstream surface water sample location S-6 (which is discussed as part of Area J) also detected 1,2-DCA (1.7 µg/L) in excess of NJ SWQC (0.291 µg/L). Surface water sampling at these locations will continue as part of the required groundwater monitoring.

Sediment sampling results from 1997 on the southern bank of the front ditch indicated that 1,2-DCA and benzene (sample DS11 only, which is south of well PX-3) were present at levels in excess of NJ RDCSCC. Southland has indicated that dredging upstream of S7 (which includes sample location DS11) was performed infrequently (interval > 10 years) and contaminated material was consolidated on site within Area H prior to placement of the required soil cover (Ref. 24). Southland also indicated that dredging of the sediment in the front ditch from sample location S7 to S6 (where no contamination has been detected) has occurred routinely every two to three years for the past 15 years (Ref. 24). The dredged material from sample location S7 to S6 was placed on the north bank of the ditch. Thus, Southland has indicated that all impacted sediment has been removed from the front ditch and no additional sediment sampling has been required.

Based on the information provided above, remedial activities for soil have been completed at Areas C, D, F, G, H, J, M, and Y. Contaminants remain in subsurface soil in excess of NJ IGWSCC at Areas I, K, and L. Groundwater remedial activities, including an AS/SVE system is ongoing and includes groundwater from Areas G, H, I, K, L, and M. Groundwater in Area J is being remediated by ORC injection. In addition, Southland plans to implement a Deed Notice at various areas on site; however, the Deed Notice will not be finalized at this time (Ref. 22).

References:

1. Letter from NJDEP to Southland Corporation, re: Southland Corporation. Dated September, 1993.
2. Letter from Environ to NJDEP, re: Results of Further Soil Delineation Sampling in Area R at the Great Meadows, NJ ISRA Site. Dated February 3, 1995.
3. Letter from Environmental Liability Management, Inc., to NJDEP, re: Development of Soil Criteria for Phenyl Ether. Dated October 31, 1996.
4. Letter from NJDEP to Southland Corporation, re: Southland Chemicals. Dated January 3, 1997.
5. Letter from Southland Chemical to NJDEP, re: Responses to NJDEP Conditions, dated October 30, 1997, Semi-annual Groundwater and Surface Water Monitoring Results, dated October 20, 1997, and Quarterly Progress Report, Fourth Quarter 1997, dated January 30, 1998. Dated March 26, 1998.
6. Letter from NJDEP to Southland Corporation, re: Responses to the March 26, 1998, NJDEP Letters, August 21, 1998, Site Visit and the 1998 Third Quarter Progress Report. Dated February 3, 1999.
7. Letter from Environmental Liability Management to NJDEP, re: Quarterly Progress Report, Second Quarter 1999. Dated July 30, 1999.

8. Letter from Southland Chemical to NJDEP, re: Ecological Assessment for Arsenic Area C and D Soils, dated April 30, 1999, and the Quarterly Progress Report, Second Quarter 1999, dated July 30, 1999. Dated August 11, 1999.
9. Unnamed Pond Remedial Action Workplan Summary, Great Meadows ISRA Site. Prepared by Environ Corporation. Dated January 2000.
10. Letter from the IT Group to Environmental Liability Management, Inc., re: Excavation and Disposal of Impacted Soil in the Former Building No. 2 Area. Dated January 26, 2000.
11. Letter from NJDEP to Southland Chemical, re: Southland Chemical, Inc. Dated April 14, 2000.
12. Letter from Southland Chemical to NJDEP, re: Remedial Action Reports dated February 1, 2000, May 1, 2000 and July 31, 2000. Dated August 21, 2000.
13. Area J Remedial Investigation Report. Prepared by Environmental Liability Management, Inc. Dated January 31, 2001.
14. Letter from Environmental Liability Management to NJDEP, re: Quarterly Progress Report, 4th Quarter 2000. Dated January 31, 2001.
15. Remedial Investigation Report/Remedial Action Workplan for Off Site Area: Former Rail Line/Siding. Prepared by Environmental Liability Management. Dated October 31, 2001.
16. Landfill, Pond & Lagoon Closer Construction Completion (As-Built) Report. Prepared by ENSR International. Dated April 2002.
17. Letter from Environmental Liability Management to NJDEP, re: Biannual Progress Report: October 2001 to March 2002. Dated April 30, 2002.
18. Letter from NJDEP to Environmental Liability Management, re: Remedial Report dated October 31, 2002. Dated July 2, 2002.
19. Letter from Environmental Liability Management to NJDEP, re: Area J Soil Sampling. Dated September 19, 2002.
20. Letter from NJDEP to Environmental Liability Management, re: Area J Soil Sampling. Dated September 25, 2002.
21. Remedial Action Report for Off-site Area - Former Railroad Right-of-Way. Environmental Liability Management. Dated October 29, 2002.
22. E-mail from Alan Straus, EPA Region 2, to Barry Tornick, EPA Region 2, re: Southland CA725 Update. Dated October 31, 2002.
23. E-mail from Alan Straus, EPA Region 2, to Barry Tornick, EPA Region 2, re: Southland CA50 Update. Dated January 16, 2003.
24. Letter from Phil Sandine, Environmental Liability Management to Alan Straus, EPA Region 2, re: Southland Requested Information. Dated February 25, 2003.

2. Are groundwater, soil, surface water, sediments, or air **media** known or reasonably suspected to be "**contaminated**"[1] above appropriately protective risk-based levels (applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action (from SWMUs, RUs or Areas)?

Media	Yes	No	?	Rationale/Key Contaminants
Groundwater	X			VOCs, Metals
Air (indoors)[2]		X		
Surface Soil (e.g., < 2 ft)	X			VOCs, Metals, PCBs
Surface Water	X			VOCs, Metals
Sediment		X		
Subsurface Soil (e.g., > 2 ft)	X			VOCs, Metals, PCBs
Air (Outdoor)		X		

____ If no (for all media) - skip to #6, and enter YE, status code after providing or citing appropriate levels, and referencing sufficient supporting documentation demonstrating that these levels are not exceeded.

__X__ If yes (for any media) - continue after identifying key contaminants in each contaminated medium, citing appropriate levels (or provide an explanation for the determination that the medium could pose an unacceptable risk), and referencing supporting documentation.

____ If unknown (for any media) - skip to #6 and enter IN status code.

Rationale:

Groundwater

The site is located in the Pequest River Valley, which occupies a broad lowland area underlain by unconsolidated alluvial and glacial deposits. A natural groundwater flow divide trends northeast to southwest across the site sub-parallel to the front and back ditches (Ref. 3). Thus, groundwater recharges surface water in the vicinity of the front ditch at the southeastern edge of the site and to the back ditch in the northwestern portion of the site. Groundwater flows radially from a groundwater mound

[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 appropriately protective risk-based "levels" (for the media, that identify risks within the acceptable risk range).

[2] Recent evidence (from the Colorado Dept. of Public Health and Environment, and others) suggest that unacceptable indoor air concentrations are more common in structures above groundwater with volatile contaminants than previously believed. This is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration necessary to be reasonably certain that indoor air (in structures located above (and adjacent to) groundwater with volatile contaminants) does not present unacceptable risks.

north of the former production areas towards the back ditch, the front ditch, and the western site boundary. Groundwater is closest to the ground surface at the eastern end of the site, and the depth of the water table increases beneath the south-central portion of the site. In the eastern area, the depth to groundwater is five to seven feet below ground surface (bgs) (Ref. 5). Areas formerly developed for manufacturing operations contain as much as six feet of fill material. Where fill material is not present, the uppermost deposits consist of a heterogeneous mixture of discontinuous gray sand lenses with varying proportions of silt and clay. The thickness of this unit is typically 10 feet (Ref. 5). The surficial deposits are underlain by a low permeability lacustrine clay layer at a depth of approximately 10 to 12 feet bgs. The uppermost aquifer beneath the site is located in the unconsolidated fill and alluvial deposits overlying the clay layer, and ranges up to 28 feet in thickness (Ref. 2). The aquifer and fill materials include silt, silty clay, and sand lenses. The estimated hydraulic conductivity of the shallow deposits range from 0.09 ft/day to 0.81 ft/day; thus, the shallow deposits are unsuitable for potable or agricultural use. However, data collected from the AS/SVE system estimated hydraulic conductivity at 6 ft/day for sandy materials in the uppermost aquifer. Potable water wells cannot be completed in the uppermost aquifer because state well construction standards require at least 50 feet of casing for wells completed in unconsolidated materials (NJAC 7:9D-2.3(a)3.i). The agricultural drainage ditches north and south of the contaminated areas are generally seven to nine feet deep (Ref. 9). Given the depth to groundwater (five to seven feet bgs) and the depth of the ditches (at seven to nine feet bgs), the front and back ditch extend through the fill and alluvial materials and into the surficial deposits where the watertable is present. Thus, groundwater recharges surface water in the front and back ditches. The shallow fill and alluvial deposits overlie a glaciolacustrine clay sequence that is over 200 feet thick. Bedrock beneath the site is a consolidated limestone that was used as the source for the former water supply well at the facility.

A number of disposal practices and releases have resulted in contamination of the shallow aquifer at the site and a limited extent of downgradient areas. Because many of the areas of contamination at the site are co-located in the former production areas of the facility, individual sources and their related contaminant plumes cannot be distinguished at the site. However, groundwater contamination from multiple sources has been detected in three primary areas of the site: the former production areas (Areas G, H, I, K, L, M and U) in the southern portion of the site, areas north of the former production areas (Areas C, F and K) in the central portion of the site, and the Former Tear Gas Manufacturing Area (Area J) at the southwestern end of the site. Recent groundwater monitoring data from April and July 2002 indicate that concentrations of contaminants in groundwater are still exceeding NJ GWQC at the site.

Monitoring wells are sampled routinely on either a semi-annual or quarterly basis. Monitoring wells sampled on a semi-annual basis include: N-13, MW-25, SMW-26S, MW-32WP, MW-33S, MW-34S, MW-50S, N-2R, N-16R, MW-28S, MW-36S, MW-23S, N-16R, MW-24R, and MW-36S. Monitoring wells sampled on a quarterly basis include: MW-18S, MW-23S, MW-38S, MW-39S, ORC-3, ASMW-1, ASMW-2, ASMW-3, ASMW-4, ASMW-5, ASMW-6, N-4, N-5, N-6RR, PX-2, PX-3, MW-18S, MW-38S, MW-39S, and MW-43WPR. Attachment 1 provides a table identifying those contaminants detected above the NJ GWQC during the most recent 2002 quarterly groundwater monitoring events (Ref. 4).

Area J is located in the southwestern corner of the site. Remediation of groundwater at this site has been performed by injection of ORC potassium permanganate to actively enhance ongoing biodegradation of VOCs in groundwater in this area. Benzene, chlorobenzene, 1,2-dichloropropane, and manganese were detected in excess of the NJ GWQC in MW-28S and N-16R, which are downgradient from the source area of contamination Area J. In addition, wells ORC-1 through ORC-3, which are located within Area J, also show exceedences of the NJ GWQC for 1,2-DCA, benzene, chlorobenzene, and manganese. Contaminant concentrations have decreased by several orders of magnitude at the wells in the source

area since the initiation of the ORC injection. Although manganese was detected in concentrations in excess of the NJ GWQC, this is expected as it is used in the treatment process, and manganese is also a naturally occurring constituent in sedimentary sequences with reducing conditions, such as those found beneath the Southland facility. While these wells at Area J show exceedences of the NJ GWQC, contaminants have not been detected at downgradient well (MW-36S) in excess of NJ GWQC, indicating that the lateral extent of contamination in this area is now stable.

At the Former Tertiary Ponds (Area C), MW-34S showed detects of benzene, 1,2-DCA, and arsenic (total) above NJ GWQC. Arsenic (total) was also detected in excess of NJ GWQC at MW-50S. These data indicate that groundwater contamination is present at Area C as well as downgradient areas north and west leading towards the back ditch. However, recent surface water sampling performed in April 2002 at location S-3, downgradient from Area C in the back ditch, indicated no exceedences of the NJ SWQC at areas where groundwater discharges from Area C to the back ditch. In addition, data from wells N-13 and N-2R, which are located further downgradient from this area, did not contain detectable concentrations of VOCs during the April 2002 sampling event.

In the former production areas (Areas G, H, I, K, L, and M) located at the southeastern portion of the site, VOCs and arsenic are present in groundwater up to four orders of magnitude above NJ GWQC. Monitoring wells ASMW-1 through 6, PX-1 through 3, and MW-18S reflect the highly contaminated areas in the shallow aquifer associated with the former manufacturing area. These wells are monitored on quarterly basis. DNAPL was also detected at MW-18S and ASW-5. Recent sampling data from monitoring well N-6RR, performed in July 2002, indicate that concentrations of benzene, chlorobenzene, and methylene chloride have increased from the prior quarter sampling round conducted during April 2002. However, these results are still several orders of magnitude below the maximum contaminant concentrations detected at this portion of the site during the Remedial Investigation performed in 1992. While there are no wells downgradient of this location on the same side of the front ditch, monitoring well MW-39S, which is downgradient of N-6RR across the ditch, did not detect any VOCs during the April 2002 sampling event. However, monitoring well MW-38S, which is located outside of and downgradient of the AS/SVE system as well as outside of the property boundary, show concentrations of 1,2-DCA (3.4 µg/L) above NJ GWQC (2 µg/L), indicating that contamination is present on the opposite side of the front ditch. The presence of contaminants in MW-38S below 10 µg/L likely reflects residual contamination that migrated beyond the hydraulic barrier of the ditch due to diffusive transport from the production area when contaminant concentrations were orders of magnitude higher prior to installation of the AS/SVE system. The migration of 1,2-DCA contamination in MW-38S is not expected to be significant for several reasons. First, water level measurements in this area indicate that groundwater flows from the vicinity of MW-38S is also towards the front ditch. Second concentrations in MW-38S are expected to naturally decline given that the contaminant source is being addressed by the AS/SVE system. Finally, the front ditch serves as a point of discharge for shallow groundwater along the southern property boundary, and Southland has indicated that, based on the most recently available data and the groundwater treatment system, it is reasonable to conclude that ongoing off-site migration of contaminated groundwater is not occurring (Ref. 9).

The most recent documented well survey for the property and surrounding area was conducted in 1991. A total of 23 properties were identified, and nine property owners granted permission for sampling. Iron (max of 0.53 µg/L) and manganese (> 0.1 µg/L) were the only detected constituents at concentrations above the NJ GWQC (0.3 µg/L and 0.5 µg/L, respectively). However, these analytes are considered essential nutrients, have been observed in background locations, and Southland has indicated that they are typically elevated in groundwater in glacial sediments under swampy conditions (Ref. 1). Although VOCs

were not detected in any of the off-site supply wells, methylene chloride was detected in two wells below the laboratory reporting limit (< 1 µg/L). It was concluded that these results were suspect because of the low concentrations and frequency of occurrence of methylene chloride as a laboratory contaminant. Additionally, 1,2-DCA was detected in one well but below the established maximum contaminant level for drinking water (2 µg/L).

Air (Indoors)

The maximum concentrations of VOCs detected from the most recent rounds of quarterly groundwater monitoring sampling in April and July 2002 were compared to the State of Connecticut Groundwater Standards for Protection of Indoor Air under the Industrial/Commercial (CT I/C VC) scenario to identify constituents that may be a concern due to potential migration into indoor air. Table 1 displays those contaminants that exceed CT I/C VC and their maximum detected concentration.

Table 1 - Groundwater Exceedences of the Connecticut Groundwater Standards for the Protection of Indoor Air - Industrial Scenario (µg/L)

Contaminant	CT I/C VC	Maximum Concentration
Benzene	530	7,200
Carbon Tetrachloride	40	19,000
Chlorobenzene	6,150	42,000
Chloroform	710	10,000
1,2-DCA	90	24,000

Although there are several VOCs that exceed the CT I/C VC, indoor air is currently not a medium of concern at the site. All buildings have been demolished and only remedial activities are being performed at the site. Because there are no receptors utilizing buildings above the plumes, VOC migration from groundwater into indoor air is not currently of concern at the site.

Surface/Subsurface Soil

Numerous soil investigations have been conducted at the site. Detected concentrations in surface soil (zero to two feet below ground surface [bgs]) were compared to the NJ RDCSCC and the NJ NRDCSCC. Subsurface soil concentrations (> 2 ft bgs) were compared to the NJ IGWSCC.

Numerous soil remedial activities (e.g., excavation, placement of a clean soil cap) were performed during 2001 and 2002. Based on the Landfill, Pond, and Lagoon Construction Completion Report dated April 2002, remedial activities were performed in accordance with a NJDEP comment letter dated January 3, 1997 (Ref. 3). This letter indicates that the non-residential criteria (e.g., NJ NRDCSCC) will apply to all site remedial activities. According to Southland, all remedial activities were conducted in accordance with area-specific remedial action plans (see response to Question No. 1 for area-specific information). As of 2002, remedial activities for soil have been completed at Areas C, D, F, G, H, J, M, and Y. Although no confirmatory samples were required post-remediation, NJDEP approved the remedial action plans that were based upon sampling conducted as part of the delineation process. Thus, based on the NJDEP approved plans and subsequent remedial action reports, remedial activities have been completed and all

soil impacted above NJ NRDCSCC has been consolidated in designated areas (Areas F, M, and H) and capped. A deed notice will be prepared which will outline all residual levels of contamination in the future.

At Areas I, K, and L, residual VOC contaminants remain in subsurface soil in excess of NJ IGWSCC. Additionally, PCBs remain in excess of NJ IGWSCC at Area I. Although specific concentrations are not documented, Southland has indicated that VOCs in subsurface soil in these areas are due to VOCs in groundwater, and are therefore being remediated by the AS/SVE system.

Surface Water/Sediment

The site is situated in a flat, marshy area known as Bear Swamp. During the 1930s, a network of drainage channels were excavated across the valley. Facility operations and waste disposal primarily occurred between two parallel drainage ditches (front and back ditches) that ultimately discharge to the Pequest River. A stormwater management system was installed in 1987 and was designed to collect most of the surface water runoff in the former production areas. Runoff collected in the system was pumped to the on-site WWTP and ultimately discharged to the back ditch. Based on the depth of the ditch (seven to nine feet bgs) and depth to groundwater (five to seven feet bgs), a majority of shallow groundwater likely discharges to both the front and back agricultural ditches (see groundwater section for a complete discussion).

Recent quarterly surface water monitoring performed in October 2002 detected VOCs and arsenic in excess of NJ SWQC (Ref. 7). VOCs exceeded NJ SWQC at the agricultural drainage ditch (front ditch) at sample location S-6 and S-7, while arsenic exceeded NJ SWQC only at sample location S-7 (Ref. 9). During the April 2002 surface water sampling event, sample S-5 (back ditch) detected benzene in excess of NJ SWQC (Ref. 7). Table 2 identifies the contaminant concentrations recently detected in surface water exceeding relevant NJ SWQC (Refs. 7, 9).

Table 2 - Constituents Detected in Surface Water Above the NJ SWQC at the Southland Site (µg/L)

Sample ID/Location	Contaminant	Detected Concentration	NJ SWQC
S-7/Front Ditch	Benzene 1,2-DCA Arsenic	6.5 14 51.9	0.150 0.291 0.0170
S-6/Southeast corner of Front Ditch	1,2-DCA	1.7	0.291
S-5/Back Ditch	Benzene	2.7	0.150

Sediment sampling was performed in November 1997. For the front ditch, sediment sample DS11, located on the south bank of the front ditch (immediately south of well PX-3) detected concentrations of 1,2-DCA (15 mg/kg), benzene (17 mg/kg), and arsenic (43.2 mg/kg) in excess of NJ RDCSCC (Ref. 4). Arsenic (20.9 mg/kg) was also detected in excess of NJ RDCSCC at sediment sample S9, which was considered a background location upgradient from the site. However, sediment concentrations of arsenic do not exceed the NJ recommended site-specific action level for arsenic (56 mg/kg). Thus, Southland recommended that any further sediment action should focus on the front ditch after the installation of the

AS/SVE system, which would intercept groundwater that would otherwise discharge to the ditch. No additional sampling has been performed by Southland since 1997, nor has any been required by NJDEP. Southland indicated that routine dredging of the sediment in the front ditch from sample location S7 to S6 (where no contamination has been detected) has occurred every two to three years for the past 15 years. Dredged material is then placed on the north bank of the ditch (Ref. 9). In addition, dredging upstream of S7 (which includes sample DS11 where 1,2-DCA and benzene were detected) was performed infrequently (interval > 10 years) and material was consolidated on site within Area H prior to placement of the NJDEP soil cover (Ref. 9). Based upon this information provided by Southland, no contamination is considered to remain within the sediment in the front ditch.

For the back ditch, sediment sample S5, detected arsenic (20.9 mg/kg) above the NJ RDCSCC site-specific action level (56 mg/kg). Sample location S5 is considered a background sample location upgradient of the site.

Air (Outdoors)

No assessment of impacts to outdoor air has been conducted at this property. However, limited migration of contaminants bound to airborne particulate matter is expected at this site given that contaminated surface soil has been excavated and backfilled with clean fill or capped with a vegetative soil cover or pavement. Migration of VOCs in soil and groundwater to outdoor air is not expected to be of concern due to the natural dispersion of contaminants once they reach the surface. Thus, the migration of particulates entrained on dust and/or volatile emissions are not expected to be significant exposure pathways of concern at the Southland site.

References:

1. Results of the Sampling Plan Addendum and Interim Remedial Measures at the Southland Corporation Facility. Geraghty & Miller. Dated April 1991.
2. Proposed Cleanup Plan for the Great Meadows, New Jersey, ECRA Site, ECRA Cases #87596 and 88646. Prepared by Environ Corporation. Dated July 10, 1992.
3. Letter from NJDEP to Southland Corporation, re: Southland Chemicals. Dated January 3, 1997.
4. Letter from ENVIRON to NJDEP, re: Field Sampling Program for Front and Back Ditch Sediments. Dated April 21, 1998.
5. Remedial Action Work Plan Addendum/Remedial Design Report, 7-Eleven Site, Great Meadows, New Jersey. Prepared by the IT Group. Dated June 16, 1999
6. Quarterly Progress Report, First Quarter 2001, 7-Eleven, Inc., Great Meadows Facility. Prepared by Environmental Liability Management. Dated April 2001.
7. Biannual Progress Report for Period 4/1/02 to 9/30/02, 7-Eleven, Inc., Great Meadows Facility. Prepared by Environmental Liability Management. Dated November 2002.
8. E-mail from Alan Straus, EPA Region 2, to Barry Tornick, EPA Region 2, re: Southland CA750 Update. Dated January 16, 2003.
9. Letter from Phil Sandine, Environmental Liability Management, to Alan Straus, EPA Region 2, re: Great Meadows Requested Information. Dated February 25, 2003.

3. Are there **complete pathways** between "contamination" and human receptors such that exposures can be reasonably expected under the current (land- and groundwater-use) conditions?

Summary Exposure Pathway Evaluation Table
*Potential **Human Receptors** (Under Current Conditions)*

"Contaminated" Media	Residents	Workers	Day-Care	Construction	Trespasser	Recreation	Food[3]
Groundwater	No	No	–	Yes	–	–	–
Air (indoor)							
Surface Soil (e.g. < 2 ft)	No	No	–	Yes	No	No	–
Surface Water	No	No	–	Yes	Yes	Yes	–
Sediment							
Subsurface Soil (e.g., > 2 ft)	–	No	–	Yes	–	–	–
Air (outdoors)							

Instruction for Summary Exposure Pathway Evaluation Table:

1. Strike-out specific Media including Human Receptors' spaces for Media which are not "contaminated" as identified in #2 above.

2. Enter "yes" or "no" for potential "completeness" under each "Contaminated"Media — Human Receptor combination (Pathway).

Note: In order to focus the evaluation to the most probable combinations some potential "Contaminated" Media - Human Receptor combinations (Pathways) do not have check spaces. These spaces instead have dashes ("–"). While these combinations may not be probable in most situations they may be possible in some settings and should be added as necessary.

____ If no (pathways are not complete for any contaminated media-receptor combination) - skip to #6, and enter "YE" status code, after explaining and/or referencing condition(s) in-place, whether natural or man-made, preventing a complete exposure pathway from each contaminated medium (e.g., use optional Pathway Evaluation Work Sheet to analyze major pathways).

__X__ If yes (pathways are complete for any "Contaminated" Media - Human Receptor combination) - continue after providing supporting explanation.

____ If unknown (for any "Contaminated" Media - Human Receptor combination) - skip to #6 and enter "IN" status code

[3] Indirect Pathway/Receptor (e.g., vegetables, fruits, crops, meat and dairy products, fish, shellfish, etc.)

Rationale:

Groundwater

Groundwater contamination associated with the Southland site is limited to three areas within site boundaries, including the Former Tear Gas Manufacturing Area (Area J), the former production areas (Area G, H, I, K, L, and M), and the area north of the former production area (Areas C). NJDEP and Southland continue to investigate groundwater contamination via a semiannual and quarterly groundwater monitoring program and currently have a groundwater remediation system in place in two of these areas. In Area J, where VOCs are present in groundwater, remediation includes the injection of ORC. This remedial activity, which began in mid-2000, actively enhances ongoing biodegradation of VOCs in groundwater. The most recent available groundwater monitoring data from April and July 2002 indicate that contaminants are still present in this area, and also indicate that a downgradient well (N-16R) has detected VOCs in excess of NJ GWQC. In the former production areas, two groundwater recovery trenches were operated as an Interim Remedial Measure (IRM) at the former production areas until July 2000, when they were replaced with an AS/SVE system. Groundwater sampling data from April and July 2002 indicate contamination is present at concentrations in excess of the NJ GWQC downgradient of the AS/SVE system (Ref. 5). Currently obtained groundwater and surface water sampling data indicate that there is a limited exceedence of NJ GWQC at one off-site locations (e.g., MW-38S). Southland has indicated that groundwater recharges surface water in the vicinity of the front ditch. The presence of contamination beyond the ditch likely reflects residual contamination that migrated beyond the hydraulic barrier of the ditch due to diffusive transport from the production area when contaminant concentrations were orders of magnitude higher prior to installation of the AS/SVE system. Given that the AS/SVE system is currently operational, and based upon the minimal exceedences of only one contaminant (1,2-DCA = 3.2 µg/L) above the NJ GWQC (2.0 µg/L), the extent of this contamination is not expected to be significant. Additionally, MW-38S, with a depth of eight feet, resides between two tributaries (agricultural drainage ditches) that range in depth from seven to nine feet, and therefore contamination is not expected to migrate beyond these surface water bodies. Concentrations of 1,2-DCA are also expected to naturally decline given the minimal exceedence of the NJ GWQC and the volatile nature of the contaminant. Southland has indicated that, based on the most recently available data and the AS/SVE system, it is reasonable to conclude that off-site migration of contaminated groundwater is not occurring (Ref. 6).

The most recent documented well survey for the property and surrounding area was conducted in 1991. Only one well detected one contaminant (1,2-DCA), but it was below the established maximum contaminant level for drinking water (2 µg/L). These off-site wells are not located downgradient of the contaminated groundwater, with the exception of one well which is downgradient of Area J. However, this well is located over 5,000 feet from the facility property boundary. Concentrations in wells located at the southwestern-most portion of the site in Area J (N-16R) detected benzene (22 µg/L), chlorobenzene (51 µg/L), 1,2-dichloropropane (2.4 µg/L), and manganese (961 µg/L) in excess of NJ GWQC. However, contaminants have not been detected at downgradient well (MW-36S) in excess of NJ GWQC, indicating that the lateral extent of contamination in this area is now stable. It is also unlikely that current contaminant concentrations observed in Area J would migrate to the off-site downgradient well, as shallow groundwater in this area is expected to discharge to the front agricultural ditch. If any impacted groundwater were to migrate beneath this ditch, there is no concern that the off-site residential well would be impacted given that it is located 5,000 feet from this area.

The facility is currently inactive and all buildings have been demolished at the facility, thus there are no on-site workers present at the site. However, remediation at the site is ongoing by skilled remedial

workers, who will be classified as construction workers for the purposes of this EI Determination. There are no production or potable wells that are currently in use at this site, thus there is not a concern for remedial workers to obtain potable water from on-site sources. However, there is the potential for remedial workers to come into contact with contaminated groundwater during shallow excavation/remedial activities, as shallow groundwater is located at a depth of approximately five to seven feet bgs.

Surface/Subsurface Soil

As presented in response to Question 1, Areas C and D have been excavated and contaminated soil above the NJ NRDCSCC has been relocated to Area F, where a soil cap with vegetative cover has been installed to preclude direct exposures. Soil above NJ NRDCSCC was also excavated from Areas G and I and sent off site; each area was subsequently backfilled with clean soil. Area H received contaminated soil above NJ NRDCSCC from Area Y, and all contaminated soil above NJ NRDCSCC in Area H was subsequently capped with clean soil and a vegetative cover to preclude exposures. Impacted soil in area J above NJ NRDCSCC was excavated and relocated to Area M, and all impacted soil above NJ NRDCSCC in Area M was capped with clean soil and a vegetative cover to preclude direct exposures. Area K contaminated soil was treated by ex-situ bioremediation which was completed in July 1999. An asphalt cap is present at Area L to preclude direct exposures. Thus, all contaminated surface soil has been remediated (e.g., excavation, bioremediation) or covered with engineering controls (e.g., soil capping, asphalt cap) to prevent any direct exposure to contamination above the NJ NRDCSCC. Additionally, Southland will prepare and file a Deed Notice in the future that will identify those areas where residual contamination exists above NJ RDCSCC.

VOCs in subsurface soil exceed NJ IGWSCC at Areas I, K, and L. In these areas, Southland has proposed that the AS/SVE system is addressing VOCs in subsurface soil and concentrations are also being reduced by natural attenuation.

The facility is currently closed and the only on-site activities being conducted are remedial investigations and activities being performed by skilled remedial workers. Remedial workers are not expected to disturb the engineering controls that have been put in place at the site. However, for conservative purposes, potential for direct exposure to impacted surface and subsurface soil is being considered a potentially complete exposure pathway for an on-site remedial worker at this time, given that the Deed Notice has not yet been implemented at the site to prevent disturbance of the engineering controls.

The site is completely surrounded by a chain link fence which precludes other receptors (e.g., trespassers) to exposures from contamination in on-site areas. Furthermore, all contaminated surface soil has been remediated (e.g., excavation, bioremediation) or covered with engineering controls (e.g., soil capping, asphalt cap) to prevent any direct exposure to contamination above the NJ NRDCSCC.

Surface Water

As indicated in response to Question No. 2, there is no contaminated sediment remaining on site. However, surface water (front and back ditch) has exceedences of several VOCs and arsenic above the NJ SWQC. Thus, there is the potential for on-site remedial worker, off-site worker (e.g., agricultural workers [note that agricultural workers are captured under the construction worker category for purposes of this EI Determination]), trespasser, and recreator exposure to contaminated surface water in the front ditch. Only on-site remedial workers are considered potential receptors to contamination in the back ditch

given that the facility is surrounded by a chain link fence. Thus, surface water may represent a potentially complete exposure pathway.

References:

1. Results of the Sampling Plan Addendum and Interim Remedial Measures at the Southland Corporation Facility. Geraghty & Miller. Dated April 1991.
2. Letter from NJDEP to Southland Corporation, re: Southland Chemicals. Dated January 3, 1997.
3. Letter from NJDEP to Southland Chemicals, re: Responses to the March 26, 1998 NJDEP Letters, dated August 27, 1998. Dated February 3, 1999.
4. Quarterly Progress Report, First Quarter 2001, 7-Eleven, Inc., Great Meadows Facility. Prepared by Environmental Liability Management. Dated April 2001.
5. Biannual Progress Report for Period 4/1/02 to 9/30/02, 7-Eleven, Inc., Great Meadows Facility. Prepared by Environmental Liability Management. Dated November, 2002.
6. Letter from Phil Sandine, Environmental Liability Management, to Alan Straus, EPA Region 2, re: Great Meadows Requested Information. Dated February 25, 2003.

4. Can the **exposures** from any of the complete pathways identified in #3 be reasonably expected to be **significant**[4] (i.e., potentially "unacceptable" because exposures can be reasonably expected to be: 1) greater in magnitude (intensity, frequency and/or duration) than assumed in the derivation of the acceptable "levels" (used to identify the "contamination"); or 2) the combination of exposure magnitude (perhaps even though low) and contaminant concentrations (which may be substantially above the acceptable "levels") could result in greater than acceptable risks?

   _X_ If no (exposures cannot be reasonably expected to be significant (i.e., potentially "unacceptable") for any complete exposure pathway) - skip to #6 and enter "YE" status code after explaining and/or referencing documentation justifying why the exposures (from each of the complete pathways) to "contamination" (identified in #3) are not expected to be "significant."

   ____ If yes (exposures could be reasonably expected to be "significant" (i.e., potentially "unacceptable") for any complete exposure pathway) - continue after providing a description (of each potentially "unacceptable" exposure pathway) and explaining and/or referencing documentation justifying why the exposures (from each of the remaining complete pathways) to "contamination" (identified in #3) are not expected to be "significant."

   ____ If unknown (for any complete pathway) - skip to #6 and enter "IN" status code

Rationale:

Groundwater

As discussed in response to Question No. 3, the potential for on-site remedial workers to come in direct contact with contaminated groundwater is being considered a potentially complete exposure pathway. However, any exposures that may occur for remedial workers to impacted groundwater are not expected to be significant. Remedial workers are assumed to wear personal protective equipment (PPE) and adhere to strict Occupational Safety and Health Association (OSHA) guidelines. Thus, exposures to contaminated groundwater for construction (e.g., remedial) workers conducting remedial activities is not expected to pose a significant risk.

Surface/Subsurface Soil

As discussed in response to Question No. 3, the potential for on-site remedial workers to come in direct contact with contaminated surface and subsurface soil at the site is being considered a potentially complete exposure pathway for conservative analysis purposes. Generally, it is not expected that on-site remedial workers would disturb the engineering controls already put in place at the site. However, due to the lack of a registered Deed Notice, it is not documented at this time that intrusive activities are restricted.

However, any exposures that may occur for on-site remedial workers to impacted soil at the site are not expected to be significant. Remedial workers are assumed to wear PPE and adhere to strict OSHA

[4] If there is any question on whether the identified exposures are "significant" (i.e., potentially "unacceptable") consult a human health Risk Assessment specialist with appropriate education, training and experience.

guidelines. Thus, exposures to surface or subsurface soil on site for construction (e.g., remedial) workers conducting remedial activities is not expected to pose a significant risk.

Surface Water

Data indicate there is arsenic, benzene, and 1,2-DCA contamination in surface water in the front ditch, and benzene contamination in surface water in the back ditch in excess of NJ SWQC.

With regard to the back ditch–contamination has only been recently detected in sample location S-5, which is completely located within the property boundary. Although benzene (2.7 µg/L) exceeds the NJ SWQC (0.150 µg/L), the NJ SWQC considers primary and secondary contact recreation and industrial and agricultural water supply. Thus, the NJ SWQC is overly conservative considering the uses and types of exposure in the ditch. As discussed in response to Question No. 3, only on-site remedial workers may come in contact with impacted surface water in the back ditch. However, exposures to on-site remedial workers are not expected to be significant as remedial workers are expected to wear PPE and follow strict OSHA guidelines. Thus, exposures would be limited and not likely significant.

With regard to the front ditch–the impacted area is outside the property fence line, thus there is a potential for on-site remedial workers (while conducting sampling activities), off-site workers (agricultural workers), trespassers, and recreators to potentially contact impacted surface water within the limited area (S-6, S-7) where contaminants (benzene, 1,2-DCA, arsenic) have been detected above NJ SWQC . As with the back ditch, exposure to on-site remedial workers in the front ditch are not expected to be significant as remedial workers utilize PPE and follow strict OSHA guidelines thus minimizing potential exposure to contaminants in the front ditch.

With regard to off-site workers, trespassers, and recreators, Southland has indicated that the potential human exposures in the front ditch are also predicted to be "effectively zero" for several reasons. First, during the last 10 years no one has been observed entering the front ditch, other than the on-site remedial workers who were collecting samples or dredging from the area. Second, the banks of the ditch are steep and vegetated (as visibly seen in photographs provided by Southland in Ref. 1), thus rending the front ditch not an aesthetically pleasing or easily accessible area for trespassers or recreators to frequent. Third, the nearest residence is approximately 3,500 feet from the front ditch making it unlikely that an off-site residential receptor would recreate or trespass in this area. Fourth, the farm fields located just south of the ditch are infrequently maintained–generally only in the spring (planting), summer (fertilizers and pesticide application), and fall (harvesting), thus minimizing the exposure frequency and duration that potential agricultural workers may experience. And finally, the width of the front ditch at the bottom is only about three feet wide, and during base flow the depth of water in the ditch is only about two inches resulting in extremely minimal water flow. Additionally, during dry periods there is little or no flow in the ditch and sections become dry. Thus, recreational activities are not feasible in this ditch, nor can the ditch be used as a irrigation or drinking water supply. Based upon all the information provided by Southland, it is reasonable to assume that the potential for exposures in the front ditch area insignificant.

References:

1. Letter from Phil Sandine, Environmental Liability Management, to Alan Straus, EPA Region 2, re: Great Meadows Requested Information. Dated February 25, 2003.

5. Can the "significant" **exposures** (identified in #4) be shown to be within acceptable limits?

___ If yes (all "significant" exposures have been shown to be within acceptable limits) - continue and enter "YE" after summarizing and referencing documentation justifying why all "significant" exposures to "contamination" are within acceptable limits (e.g., a site-specific Human Health Risk Assessment).

____ If no (there are current exposures that can be reasonably expected to be "unacceptable")- continue and enter "NO" status code after providing a description of each potentially "unacceptable" exposure.

____ If unknown (for any potentially "unacceptable" exposure) - continue and enter "IN" status code

Rationale:

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

6. Check the appropriate RCRIS status codes for the Current Human Exposures Under Control EI event code (CA725), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (and attach appropriate supporting documentation as well as a map of the facility):

__X__ YE - Yes, "Current Human Exposures Under Control" has been verified. Based on a review of the information contained in this EI Determination, "Current Human Exposures" are expected to be "Under Control" at the Southland Corporation, EPA ID# NJD092225721, located on Alphano Road, Great Meadows, in the Township of Independence, Warren County, New Jersey, under current and reasonably expected conditions. This determination will be re-evaluated when the Agency/State becomes aware of significant changes at the facility.

____ NO - "Current Human Exposures" are NOT "Under Control."

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

Completed by: _____ Date:_____

Kathy Rogovin
Risk Assessor
Booz Allen Hamilton

Reviewed by: _____ Date:_____

Kristin McKenney
Risk Assessor
Booz Allen Hamilton

Also Reviewed by: _____ Date:_____

Alan Straus, RPM
RCRA Programs Branch
EPA Region 2

_____ Date:_____

Barry Tornick, Section Chief
RCRA Programs Branch
EPA Region 2

Approved by: Original signed by: _____ Date: 6/5/2003

Adolph Everett, Acting 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 RPM
(212) 637-4160
straus.alan@epa.gov

FINAL NOTE: THE HUMAN EXPOSURES EI IS A QUALITATIVE SCREENING OF EXPOSURES AND THE DETERMINATIONS WITHIN THIS DOCUMENT SHOULD NOT BE USED AS THE SOLE BASIS FOR RESTRICTING THE SCOPE OF MORE DETAILED (E.G., SITE-SPECIFIC) ASSESSMENTS OF RISK.

Attachments

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

- Attachment 1 - Contaminants Exceeding NJ GWQC During April and July 2002 Quarterly Sampling Program
- Attachment 2 - Summary of Media Impacts Table

Attachment 1

Contaminants Exceeding NJ GWQC during the April and July 2002 Quarterly Sampling Program (Most Recent Sampling Data) (µg/L)

Monitoring Well	Area	Date Sampled	Contaminant	Concentration	NJ GWQC
N-16R	J	4/22/02	Benzene Chlorobenzene 1,2-Dichloropropane	22 51 2.4	1 50* 1
MW-18S	K, L	7/29/02	Benzene Chlorobenzene 1,4-Dichlorobenzene	970 6,000 300	1 50* 75
MW-24R	F, K	4/22/02	Benzene Chlorobenzene 1,2-DCA Methylene Chloride	370 900 50 45B	2 50* 2 3*
MW-25S	M	4/22/02	Benzene	6.5	1
MW-32WP	K	4/22/02	Benzene Chlorobenzene 1,2-Dichlorobenzene 1,4-Dichlorobenzene 1,2-DCA Methylene Chloride Toluene	1,800 930 1,700 630 42 24B 1,400	1 50* 600 75 2 3* 1,000
MW-34S	C, F	4/22/02	Benzene 1,2-DCA Arsenic (total)	65 18 300	1 2 8
MW-38S	Y	7/29/02	1,2-DCA	3.4	2
MW-50S	C, F	4/22/02	Arsenic (total)	139	8
ORC-1	J	4/22/02	Benzene Chlorobenzene	32 650	1 50*
ORC-2	J	4/22/02	Benzene Chlorobenzene 1,2-DCA	150 370 3.9	1 50* 2
ASMW-1	I, K, L	7/29/02	Benzene Chlorobenzene 1,2-Dichlorobenzene 1,4-Dichlorobenzene Toluene	1,300 42,000 4,300 2,000 2,800	1 50* 600 75 1,000

Monitoring Well	Area	Date Sampled	Contaminant	Concentration	NJ GWQC
ASMW-2	I, K, L	7/29/02	Benzene	1,400	1
			Chlorobenzene	150	50*
			Ethylbenzene	7,600	700
			Total Xylenes	31,000	1,000*
ASMW-3	I, K, L	7/29/02	Ethylbenzene	810	700
ASMW-4	I, K, L	7/29/02	Chlorobenzene	550	50*
			Ethylbenzene	6,000	700
			Methylene Chloride	570	3*
			Total Xylenes	27,900	1,000*
ASMW-5	I, K, L	7/29/02	Benzene	470	1
			Chlorobenzene	730	50*
			Tetrachloroethene	15	1
			Trichloroethene	11	1
ASMW-6	I, K, L	7/29/02	Benzene	200	1
			Toluene	3,600D	1,000
N-4	U, L	7/29/02	Benzene	10	1
N-5	L	7/29/02	Benzene	53	1
			Chlorobenzene	630	50*
			Methylene Chloride	35	3*
			Trichloroethene	8.2	1
N-6RR	G	7/29/02	Benzene	470	1
			Chlorobenzene	800	50*
			Methylene Chloride	35	3*
PX-2	I, L	7/29/02	Benzene	44	1
			Chlorobenzene	150	50*
			1,2-DCA	990	2
			Methylene Chloride	53	3*
PX-3	I, L	7/29/02	Acetone	1,200	700
			Benzene	7,200	1
			Carbon Tetrachloride	19,000	2
			Chlorobenzene	4,000	50*
			Chloroform	10,000	6
			1,4-Dichlorobenzene	110	75
			1,2-DCA	24,000	2
			Ethylbenzene	1,000	700
			Methylene Chloride	200	3*
			Toluene	4,200	1,000
			1,1,2-Trichloroethane	47	3*
			Total Xylenes	3,770	1,000*
MW-43WPR	K	1/15/01	Benzene	4.2	1
			Chlorobenzene	260	50*

B = Indicates constituent was detected in the field and/or laboratory blank samples.

D = Constituent was detected in an analysis at a secondary dilution factor (specific dilution factor unknown).

* Interim specific criterion, developed by NJDEP on an as-needed basis for constituents with no criteria in the GWQS.

Attachment 2 - Summary of Media Impacts Table
Southland Corporation

	GW	AIR (Indoors)	SURF SOIL	SURF WATER	SED	SUB SURF SOIL	AIR (Outdoors)	CORRECTIVE ACTION MEASURE	KEY CONTAMINANTS
Area A. Hair Dye Disposal Area	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA
Area B. Former Effluent Spray Irrigation Field	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA
Area C. Former Tertiary Ponds	Yes	No	No	No	No	Yes	No	▸ Soil excavated and consolidated to Area F ▸ Clean soil cover installed ▸ Deed Notice planned	Metals, VOCs
Area D. Sludge Lagoons	No	No	No	No	No	No	No	▸ Soil excavated and consolidated to Area F ▸ Clean soil cover installed ▸ Deed Notice planned	Metals
Area E. Former Drum Storage Area	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA
Area F. Unnamed Pond	Yes	No	No	No	No	Yes	No	▸ Soil/sediment removal ▸ Clean soil cover installed ▸ Deed Notice planned ▸ AS/SVE system	VOCs, PCBs, Metals
Area G. Fisher Pond	Yes	No	No	No	No	Yes	No	▸ Pond dewatering and debris removal ▸ Clean soil cover installed ▸ Deed Notice planned ▸ AS/SVE system	VOCs, PCBs, Metals
Area H. Former Drum Storage Area near Fisher Pond	Yes	No	No	No	No	Yes	No	▸ Drum and soil removal ▸ Clean soil cover installed ▸ Deed Notice planned ▸ AS/SVE system	VOCs, PCBs, Metals
Area I. Southern Section of Former Production Area	Yes	No	No	No	No	Yes	No	▸ Soil removal ▸ Deed Notice planned ▸ AS/SVE system	VOCs, PCBs, Metals

	GW	AIR (Indoors)	SURF SOIL	SURF WATER	SED	SUB SURF SOIL	AIR (Outdoors)	CORRECTIVE ACTION MEASURE	KEY CONTAMINANTS
Area J. Former Tear Gas Manufacturing Area	Yes	No	No	No	No	Yes	No	▸ Soil excavated and consolidated to Area M ▸ Clean soil cover installed ▸ Deed Notice planned ▸ ORC injection	VOCs, PCBs, Metals
Area K. Former Limefield	Yes	No	No	No	No	Yes	No	▸ Ex-situ bioremediation ▸ AS/SVE system	VOCs
Area L. Main Production Area including Tank Farm	Yes	No	No	No	No	Yes	No	▸ Pavement cap ▸ Deed Notice planned ▸ AS/SVE system	VOCs
Area M. Landfill	Yes	No	No	No	No	Yes	No	▸ Drum and soil removal ▸ Clean soil cover installed ▸ Deed Notice planned ▸ AS/SVE system	Phenyl ether
Area Q. Fire Pond	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA
Area R. Former Process Waste Lines and Sludge Pipelines	Yes	No	No	No	No	Yes	No	NFA	TPH, VOCs
Area S. Soil Stockpile	No	No	No	No	No	Yes	No	NFA	NFA
Area T. Six Aboveground Storage Tanks	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA
Area U. Building 3 Sump	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA
Area Y. Off-Site Farmland	Yes	No	NFA	No	NFA	Yes	No	▸ Soil excavated and consolidated to Area H ▸ Clean soil cover installed ▸ AS/SVE system	VOCs, Metals