DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

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

Facility Name:	**Dolan Wholers Corp. (Former Cessna Aircraft Facility, Aircraft Radio and Control Division)**
Facility Address:	**429 Rockaway Valley Road, Boonton Township, New Jersey**
Facility EPA ID#:	**NJD002155448**

Definition of Environmental Indicators (for the RCRA Corrective Action)

Environmental Indicators (EI) are measures being used by the RCRA Corrective Action program to go beyond programmatic activity measures (e.g., reports received and approved, etc.) to track changes in the quality of the environment. The two 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 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 Former Cessna Aircraft Facility is located on approximately 160 acres and consisted of several manufacturing and storage buildings, hangars, and runway areas. The Cessna facility commenced operations in 1941 and ceased operations in late 1983. No active aviation business or manufacturing processes currently operate at the site. Cessna manufactured electronic components for aircraft communications and navigation, including microcircuitry, metallic housings for circuit boards, and printed circuit boards, and performed assembly of components. The manufacturing processes generated hazardous solvent and plating wastes. Most of the plating wastes were discharged to a surface impoundment.

Groundwater at the site flows generally west-northwest, toward Stony Brook, which forms the northwestern site boundary. Rockaway Valley Road is located roughly 200 to 500 feet west of the site on the opposite side of Stony Brook. Land use in the surrounding area is mostly residential, with some other nearby industrial land uses.

See Figure 1 from the Quarterly Groundwater Remedial Progress Report for the Third Quarter of 2001 (dated November 13, 2001) for a layout of the site and surrounding areas, current groundwater flow direction, groundwater monitoring and recovery wells, and surface water monitoring points on Stony Brook.

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.

Summary of SWMUs and AOCs: The SWMUs and AOCs listed below have been identified at the facility and are considered for this evaluation. SWMU and AOC locations at the Cessna site are shown on Figures 2 and 3 in the Interim Final CA725, dated February 5, 1999.

SWMU #1 - Inactive Refuse Landfill: This former landfill encompassed approximately 14,000 square feet with an average thickness of five feet. Refuse material included construction and demolition material, printed circuit boards, and radio parts. Sampling revealed volatile organic compounds (VOCs) in soil and groundwater. Approximately 3,500 cubic yards of contaminated soil and refuse were removed. Post-excavation soil sampling confirmed all contaminated soil was removed. No further action was required for the soil. A groundwater pump and treat system operated in this area from 1992 to 1994. In December 1994, the New Jersey Department of Environmental Protection (NJDEP) allowed Cessna to shut the system down, on a trial basis, to determine whether the contaminant levels in the groundwater would continue to decline, remain stable, or increase following the cessation of pumping. Groundwater is being monitored in this area.

SWMU #2 - Inactive Sludge Landfill: This unit was a disposal area for sludge from SWMU #4. This SWMU encompassed approximately 7,000 square feet and was approximately three to six feet deep. Sampling revealed soil and groundwater contamination. Approximately 1,400 cubic yards of contaminated soil were excavated from the area. Post-excavation soil sampling showed no remaining soil contamination. No further action was required for the soil. Due to the proximity to SWMU #1, the contaminated groundwater from this SWMU is being addressed as described under SWMU #1, above.

SWMU #3 - Closed Wastewater Disposal Lagoon: This RCRA-regulated hazardous waste unit was used to contain facility wastewater discharges containing spent solvents, heavy metals, and cyanide. The unit had a capacity of 120,000 gallons, and had a 1/4-acre surface area. The unit was unlined, and operated from 1959 to 1983. Contaminated soil associated with the lagoon was excavated, and NJDEP required no further action. Dense non-aqueous phase liquid (DNAPL) was identified in subsurface soil during the drilling of monitoring well MW-33, downgradient of the former lagoon. Contaminated groundwater is being remediated in this area via a pump and treat system in operation since August 1992.

SWMU #4 - Four Infiltration/Percolation Underground Storage Tanks (I/P USTs): These RCRA-regulated tanks, with a total capacity of 10,000 gallons, were used for interim storage of

RCRA-regulated Wastewater Disposal Lagoon reached capacity. The tanks were taken out of service in 1984. One tank was removed and three tanks were emptied and filled with sand. Soil boring test results identified no contamination above NJDEP cleanup levels. No further action was required for the soil. Groundwater contamination from the tanks is being addressed by the groundwater remedial system described under SWMU #3.

SWMU #5 - Drum Storage Area (Basement Building No. 10): The former drum storage area is located in basement of the Hangar Building (Building #10). Core samples collected from beneath the drum storage pad showed contaminants of concern were either not detected or were below NJDEP cleanup standards. No further action was required.

SWMU #6 - Drum Storage Area (Maintenance Building No. 11): This building was used to store equipment and supplies for the maintenance of grounds and buildings. Materials stored included oils, grease, brake fluid, diesel fuel, gasoline, and paints. Approximately 20 cubic yards of VOC- and total petroleum hydrocarbon (TPH)-contaminated soil were excavated. Post-excavation soil sample results showed no contaminants. No further action was required.

SWMU #7 - Drum Storage Area (Behind the Maintenance Garage): NJDEP identified this drum storage area behind the maintenance garage. Investigations showed that the concentrations of contaminants in the soil were below NJDEP cleanup standards. No further action was required.

SWMU #8 - Nonhazardous Waste Incinerator/Former Incinerator Pad: The nonhazardous waste incinerator was used to burn miscellaneous trash and other nonhazardous solid waste generated at the facility. Soil and groundwater sample results showed either no contamination or contamination below NJDEP cleanup standards. No further action was required.

SWMU #9 - Two Aboveground Storage Tanks: These tanks had a total capacity of 1,100 gallons and stored only incoming raw materials (trichloroethane). No further action was required for this SWMU.

AOC #1 - Fenceline Areas: Past practices included dumping waste oil contaminated with waste solvents along property fence lines for the purpose of weed and dust control. Soil sampling indicated VOCs and semi-volatile organic compounds (SVOCs) below detection limits and non-detected, respectively. No further action was required for the soil. VOCs were detected in the groundwater in the Northern Runway Area portion of AOC #1. NJDEP has determined that the groundwater contamination in the Northern Runway Area is most likely due to both former dumping by Cessna and migration of contaminated groundwater from the upgradient Johanson Manufacturing site. The Northern Runway Area is not within the influence of the active groundwater pump and treat system at Cessna. The groundwater in this area is being monitored on a quarterly basis.

AOC #2 - Miscellaneous Subsurface Disposal Units: This AOC is comprised of 22 septic tanks, sumps, cesspools, dry wells, and seepage pits. The contents of the units were cleaned out and properly disposed. Results of soil, groundwater, and sludge/sediment sampling demonstrated that contaminant levels, where detected, were below applicable cleanup standards at all 22 units, except the Spray Booth Sump (SBS). The SBS reportedly received floor drainage from the former spray booth. Approximately 80 cubic yards of soil contaminated with polychlorinated biphenyls were

removed, along with sump materials, and the area was backfilled with clean fill. No further action was required for this AOC.

AOC #3 - Interior Basement Wall (Buildings 4 and 5): Operations conducted at these buildings consisted of metal plating, etching, and the use of lead-based paints. Results from core samples from beneath the concrete floor and a chip sample from material buildup on the wall were below NJDEP cleanup standards. No further action was required for this AOC.

References:

1. Cleanup Plan prepared for Aircraft Radio and Control, Division of Cessna Aircraft Company. Prepared by Woodward Clyde Consultants. Dated September 25, 1985 and Revised April 23, 1986.
2. Work Plan for an Investigation of Former Drum Storage Areas. Prepared by Geraghty & Miller, Inc. Dated January 1991.
3. Letter from Stephen Maybury, NJDEP, to Robert Brayley, Textron Inc., re: Cessna Aircraft–ARC Avionics Div. Dated November 26, 1996.
4. Letter from Stephen Maybury, NJDEP, to Robert Brayley, Textron Inc., re: Spray Booth Sump Investigation, Sample Results and Remedial Action Work Plan. Dated May 13, 1997.
5. Final Hazardous and Solid Waste Amendments (HSWA) of 1984 Permit issued by USEPA on September 30, 1997, for the Former Cessna Aircraft Facility, Aircraft Radio and Control Division, EPA I.D. No. NJD002155448.
6. Letter from Thomas Waldron, Dan Raviv Associates, Inc., to Richard Burgos, NJDEP, re: Summary of Spray Booth Sump Excavation and Soil Removal. Dated January 8, 1998.
7. Letter from Daniel Nachman, Dan Raviv Associates, Inc., to Richard Burgos, NJDEP, re: Alternate Plume Containment Work Plan. Dated March 30, 1998.
8. Letter from Brian Moore, NJDEP, to Robert Brayley, Textron Inc., re: Summary of Spray Booth Sump Excavation and Soil Removal, and the Alternate Plume Containment Work Plan, March 30, 1998. Dated May 27, 1998.

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

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

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

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

Rationale:

An initial groundwater quality assessment for the Cessna site was completed in 1984. Numerous follow-on investigation efforts have since been implemented to provide a clearer picture of the hydrogeologic regime and groundwater quality beneath the site, adjacent properties, and nearby Stony Brook. Periodic groundwater monitoring began in 1990, and continues to date at up to 50 wells across the site and on adjacent property. A review of results from these investigation confirms that groundwater beneath the Cessna site and adjacent property has been negatively impacted by releases from SWMU #1 (Inactive Refuse Landfill), SWMU #2 (Inactive Sludge Landfill), SWMU #3 (Closed Wastewater Disposal Lagoon), SWMU #4 (Infiltration/Percolation Underground Storage Tanks), and AOC #1 (Fenceline Areas). Contaminant concentrations across the site have been reported above applicable NJDEP Ground Water Quality Criteria (NJ GWQC) for Class II-A groundwater as recently as July 2001–the most recent sampling round for which data are available.

To streamline ongoing investigation and corrective action at the site, impacted groundwater has been grouped into three localized areas of contamination: (1) the ECRA Area and Engle Property, (2) the RCRA Area, and (3) the Northern Runway Area along the northeastern property line. Figure 1 from the Quarterly Groundwater Remedial Progress Report for the Third Quarter of 2001 (Ref. 18) identifies the location of these general groundwater impact areas and presents specific monitoring well locations for each area. Current groundwater quality data for each area is discussed below.

ECRA Area and Engle Property Impacts

The ECRA Area encompasses the northern portion of the site, west of the hangar (Building 10). The Engle Property is situated west of the Cessna property and immediately south of the ECRA Area. Groundwater contamination in this area is believed to have originated at SWMUs #1 and #2. Quarterly groundwater monitoring results from July 2001 include exceedances of the NJ GWQC in several monitoring wells in the ECRA Area and Engle Property, as shown in Table 1 below. Tetrachloroethene

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

(PCE), trichloroethene (TCE) and 1,1-dichloroethene (1,1-DCE) are considered the primary constituents of concern (COCs) for the ECRA Area and Engle Property, but chloroform, 1,1,1-trichloroethane (TCA), and 1,1-dichloroethane (1,1-DCA) have also been reported above applicable NJ GWQC within the past year. Groundwater samples from the ECRA Area are also tested quarterly for the presence of total cadmium and total lead; neither metal was detected during the last four quarters for which data are available.

Table 1 – Groundwater Exceedances at the ECRA Area and Engle Property in July 2001

Well	Location	Constituent	Concentration (µg/L)	NJ GWQC (µg/L)
MW-21S	ECRA Area	PCE	11	1
MW-21S	ECRA Area	TCE	37	1
MW-23S	ECRA Area	1,1-DCE	4.7	2
TMW-E	Engle Property	1,1-DCE	2.1	2

Source: Third Quarter 2001 Quarterly Remediation Progress Report, Table 4. Dated November 20, 2001.

The highest contaminant concentrations in the ECRA Area have typically been reported in on-site wells MW-19SR and MW-21S (in the northeastern corner of the area). Available data suggests that most of the ECRA Area groundwater impacts are limited to shallower depths within the overburden (less than 20 feet below ground surface [bgs]). Indeed, over the last four sampling rounds for which data are available (October 2000 and January, March, and July of 2001), only chloroform was detected in the deeper overburden groundwater (20-30 feet bgs) and only at well MW-23D (along the southwestern edge of the ECRA Area near the Engle Property boundary). Regardless of depth, off-site wells on the Engle Property report significantly lower concentrations than those observed on site.

In order to determine if contamination from the ECRA Area was migrating beneath and beyond Stony Brook, Cessna installed well MW-25 on the western bank of Stony Brook, directly west of well MW-19SR. Quarterly groundwater samples were collected from this well between 1990 and 1994. These samples reported positive COC detections very sporadically and never above applicable NJ GWQC (Ref. 12). These findings, along with an evaluation of the local groundwater flow net (as described in the response to Question 3), confirm that groundwater contamination originating in the ECRA Area has not migrated beneath Stony Brook.

RCRA Area Impacts

The RCRA Area covers the southern portion of the Cessna site. Groundwater contamination in this area has been associated with historical activity at SWMU #3 and SWMU #4. Quarterly groundwater monitoring data from July 2001 reported contaminant concentrations above applicable NJ GWQC in a number of wells, as presented in Table 2 below. COCs identified for the RCRA Area are similar to those selected for the ECRA Area, with the exception of chloroform, which has not been reported in the southern half of the site. TCE and TCA are the primary VOCs in this area.

Table 2 – Groundwater Exceedances at the RCRA Area in July 2001

Well	Constituent	Concentration (µg/L)	NJ GWQC (µg/L)
MW-7	TCE	5.4	1
MW-8	1,1-DCA	69	50
MW-8	1,1-DCE	13	2
MW-8	cis-1,2-DCE	130	70
MW-8	TCE	12	1
MW-8	Vinyl Chloride	13	5
MW-9	1,1-DCA	170	50
MW-9	1,1-DCE	4.2	2
MW-9	PCE	4.9	1
MW-9	TCE	45	1
MW-9	Vinyl Chloride	7.6	5
MW-28S	1,1-DCE	16	2
MW-28S	TCE	23	1
MW-28M	1,1-DCE	4.9	2
MW-28M	TCE	5.1	1
MW-33	TCA	66,000	30
MW-33	TCE	2,400	1
MW-34S	PCE	1.7	1
MW-34S	TCE	2.5	1
MW-35S	TCE	5.2	1
MW-35D	TCE	1.9	1
MW-36S	1,1-DCA	81	50
MW-36S	1,1-DCE	5.3	2
MW-36S	cis-1,2-DCE	150	70
MW-36S	TCE	4.5	1
MW-36D	PCE	30	1
MW-36D	TCE	4.1	1
MW-37S	TCE	1.4	1
P-1	TCE	3.5	1

Source: Third Quarter 2001 Quarterly Remediation Progress Report, Table 4. Dated November 20, 2001.

Groundwater samples from RCRA Area wells are also tested annually (during the fourth quarter) for total cadmium, total lead, and fluoride. Over the past four years, lead has only been reported above the NJ GWQC of 10 µg/L once, with a concentration of 11.2 µg/L in well MW-33 in the fourth quarter of 1997 (Ref. 7). Cadmium and fluoride, on the other hand, have occasionally exceeded the NJ GWQC. Table 3 below presents maximum concentrations reported for the two inorganics in recent years.

Table 3 – Maximum Cadmium and Fluoride Concentrations in RCRA Area Wells*

Constituent	NJ GWQC (µg/L)	Well	Concentration (µg/L)
Cadmium	4	MW-1R	170
		MW-7	82.4
		MW-11	14.5
		MW-28S	20
		MW-36D	20.2
		MW-37S	5.7
		P-1	20.4
Fluoride	2	MW-8	2.1
		MW-9	2.7

*Note: Reported maximums represent data from 1997, 1999, and 2000 sampling rounds. Data for 1998 and 2001 were not available in the file materials.

Sources: Fourth Quarter 2000 Quarterly Remediation Progress Report, Appendix A; Fourth Quarter 1999 Quarterly Remediation Progress Report, Appendix C; and Baseline Ecological Risk Assessment, Tables 3-6 through 3-28.

The highest organic contaminant concentrations in the RCRA Area have typically been reported in well MW-33, located downgradient of the former lagoon. Odor and field screening measurements obtained during installation of this well in November 1994 suggested the presence of DNAPL in a narrow vertical horizon approximately 56-58 feet bgs (Ref. 4). This depth corresponds to deeper sections of the overburden aquifer. The likelihood of DNAPL in the subsurface is further indicated by detection of dissolved contaminant concentrations in groundwater that exceed one percent of the associated COC's aqueous solubility (Ref. 3). Nevertheless, no free product has been observed, and Cessna believes that the DNAPL "exists as residual isolated droplets that would be impossible to delineate or remediate" given currently proven recovery techniques, without mobilizing additional contamination in groundwater (Ref. 5).

Average VOC concentrations in RCRA Area overburden groundwater are at least one order of magnitude lower than those found in well MW-33. Contamination throughout the RCRA Area has been associated both with historic releases from the former surface impoundment (SWMU #3) and dissolved-phase VOCs emanating from the DNAPL-impact area (Ref. 6). With the exception of contamination observed in deeper well MW-33, the bulk of dissolved groundwater contamination in the RCRA Area has been reported at shallow or intermediate depths within overburden groundwater (as shown on Figures 9 and 10 from Reference 9). Historically, deeper overburden wells within the main impact area (including wells MW-28M, MW-31D, and MW-35D) have generally shown lower levels of VOC contamination than the co-located shallower wells (MW-28S, MW-31S, and MW-35S).

To identify any impacts that RCRA Area contamination may be having on groundwater quality west of Stony Brook, Cessna installed a monitoring well cluster (MW-17S, MW-17D, and MW-17DD) directly west of and on the opposite side of the brook from well cluster MW-34. Samples collected from the well cluster MW-17 reported only sporadic VOC detections, with contaminant concentrations only slightly

exceeding applicable NJ GWQC (Ref. 12). Over the ten years that these wells have been sampled, TCE was detected only once at the NJ GWQC concentration of 1 µg/L, and no exceedances were reported. Methylene chloride has been detected five times, up to a maximum concentration of 5.4 µg/L, as compared to its NJ GWQC of 2 µg/L. Finally, 1,1-DCE was reported above the NJ GWQC of 2 µg/L eight times in the past ten years, with a maximum concentration of 3.7 µg/L. Contaminant concentrations have been steadily declining in the MW-17 well cluster, and no NJ GWQC exceedances have been reported since July 1999. Cessna contends that low level contamination previously reported at well cluster MW-17 is associated with a former gas station site in the area, rather than with known impacts in the RCRA Area (Ref. 19). Although this assertion has not been proven, an evaluation of the local groundwater flow net (which is described in the response to Question 3) supports this conclusion by showing that overburden groundwater does not flow beyond Stony Brook. The fact that contaminant concentrations in well cluster MW-17 continue to decline while concentrations in the central RCRA Area remain elevated also suggests that the groundwater contamination is not coming from Cessna.

Northern Runway Area Impacts

This groundwater impact area, originally identified as a component of AOC #1, is situated northeast of the ECRA Area along the Cessna property boundary. Two on-site wells, MW-5 and MW-14, provide groundwater quality data for the Northern Runway Area. Cessna monitors these wells on a quarterly basis. The most recent available results (from July 2001) are presented in Table 4 below.

Table 4 – Groundwater Exceedances in the Northern Runway Area in July 2001

Well	Constituent	Concentration (µg/L)	NJ GWQC (µg/L)
MW-5	TCE	34	1
MW-14	TCE	2.4	1

Source: Third Quarter 2001 Quarterly Remediation Progress Report, Table 4. Dated November 20, 2001.

Groundwater contamination in the Northern Runway Area is believed to be associated with both residual soil contamination on the Cessna property and contamination moving on site from the upgradient Johanson Manufacturing Corporation (Johanson) site (Ref. 3). Groundwater beneath and downgradient of a waste lagoon on the Johanson site has been contaminated with TCE, chloroform, and other chlorinated VOCs. All impacts observed in well MW-14 (the well furthest north on the Cessna property) are believed to be associated with contamination migrating from the Johanson site. Higher contaminant concentrations in well MW-5 have been attributed both to contamination from the Johanson site and to Cessna's historical dumping of solvent-contaminated waste oil on the ground surface between wells MW-5 and MW-14 for weed control (Ref. 3).

According to samples collected in 1991, domestic potable wells adjacent to and north of the Northern Runway Area have also been impacted by VOCs. Two of the residential wells reported concentrations of TCE above the NJ GWQC of 1 µg/L (Ref. 11), and alternate drinking water supplies were provided to each home. As part of the Johanson site investigation, samples were collected from nine private residential wells in the Northern Runway Area in 1994 (Ref. 13). No organic compounds were detected at six of the sampling locations. TCE ranging from 1.8 to 2.1 µg/L was reported in one residential well, and a water filtration system was installed in December 1995. Sampling of one of the residential wells,

that was contaminated in 1991, contained TCE ranging from 1.6 to 2.2 µg/L, as well as lower levels of PCE, 1,2-DCE, and TCA, but the homeowner declined installation of a water filtration system and further testing. A sample collected from the other residential well, that was contaminated in 1991, indicated the presence of TCE at a concentration of 3.4 µg/L, along with lower concentrations of 1,2-DCE and TCA. No further action was necessary on Johanson's part, however, because the homeowner already maintained a carbon treatment system on the potable water intake.

NJDEP has previously indicated that it is impossible to assign responsibility for contamination in the private residential wells to either Cessna or Johanson "due to the proximity of the sites, the overlapping areas of groundwater contamination emanating from the sites, the similarity of contaminants detected at the two sites, and the direction of groundwater flow" (Ref. 4). However, NJDEP has requested that Johanson continue monitoring the situation. Specifically, in a letter to the Johanson facility dated June 7, 2001 (Ref. 15), NJDEP requested that additional samples be collected at Cessna Northern Runway Area monitoring well MW-29 (one round) and at the Bott residence on Rockaway Valley Road (two rounds). The letter also indicates that although Johanson has been asked to take the lead in investigating and/or remediating contamination in the private domestic wells and surrounding area, Cessna may also be held jointly responsible for remediation at some point. Additionally, NJDEP and USEPA are currently evaluating the need to resample a residential well located 120 feet downgradient of Cessna well MW-5 (Ref. 17). This well reported no contamination when it was originally tested in 1991; however, current conditions are unknown.

References:

1. Cleanup Plan Prepared for Aircraft Radio and Control Division of Cessna Aircraft Company. Prepared by Woodward-Clyde Consultants. Dated September 25, 1985 and Revised April 23, 1986.
2. Plume Definition Report for the ECRA Site. Prepared by Geraghty & Miller, Inc. Dated August 1990.
3. Letter from Mary Hrenda, NJDEP, to Richard Burgos, NJDEP, re: Addendum to the RAW/NJPDES/DGW Permit Renewal and the Fifth Annual Report on the Effectiveness of the Ground Water Monitoring System and the Interim Remedial Measures. Dated October 23, 1995.
4. Letter from Stephen Maybury, NJDEP to Robert Bradley, Textron Inc., re: Cessna Aircraft NJPDES/DGW Permit #NJ0099074. Dated November 26, 1996.
5. Letter from John Potenza, Terra Incognita, Inc., to Wayne Horowitz and Richard Burgos, NJDEP, re: Comments Submitted in Response to the Draft NJPDES-DGW Permit No. NJ0099074. Dated February 14, 1997.
6. Letter from Daniel Nachman, Dan Raviv Associates, Inc., to Richard Burgos, NJDEP, re: Alternate Plume Containment Work Plan. Dated March 30, 1998.
7. Baseline Ecological Evaluation for the Former Cessna/ARC Facility. Prepared by IT Corporation. Dated August 1998.
8. Determination of Environmental Indicator Determination for Current Human Exposures Under Control (CA725) -- Interim Final. Prepared by USEPA Region 2. Dated February 5, 1999.
9. Letter from Daniel Nachman, Dan Raviv Associates, Inc., to Richard Burgos, NJDEP, re: Response to NJDEP's Letter Regarding DRAI's Detailed Recovery Well Design Report. Dated July 26, 1999.
10. Annual Groundwater Remedial Progress Report for Fourth Quarter 1999. Prepared by IT Corporation. Dated January 7, 2000.

11. Letter from Raymond Basso, USEPA, to Thomas Gilmartin, Lincoln Park Health Department, re: Former Cessna Aircraft Facility – Private Potable Wells. Dated November 20, 2000.
12. Annual Groundwater Remedial Progress Report for Fourth Quarter 2000. Prepared by IT Corporation. Dated January 18, 2001.
13. Letter from Stephen Maybury, NJDEP, to Alan Straus, USEPA, re: Cessna Aircraft Company -- Residential Well Sampling. Dated March 29, 2001.
14. Quarterly Remediation Progress Report for the First Quarter 2001. Prepared by IT Corporation. Dated April 25, 2001.
15. Letter from Mark Walters, NJDEP, to Silvio Marin, Johanson Manufacturing Company, re: Groundwater Monitoring/Remediation. Dated June 7, 2001.
16. Quarterly Remediation Progress Report for the Second Quarter 2001. Prepared by IT Corporation. Dated August 23, 2001.
17. RCRA Quarterly Meeting Minutes for the Meeting Held on August 20, 2001. Prepared by USEPA. Dated August 23, 2001.
18. Quarterly Remediation Progress Report for the Third Quarter 2001. Prepared by IT Corporation. Dated November 20, 2001.
19. Electronic Message from Bryan Moore, NJDEP, to Dhruva Kanjarpane and Richard Burgos, NJDEP, re: Further Follow-up on EI Issues Requested from NJDEP. Dated January 8, 2002.

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

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

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

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

Rationale:

Site-related impacts to groundwater at Cessna have been stabilized within the existing area of contamination, and continuing migration beyond this area is not expected to occur. This conclusion is based on several key considerations including hydrogeological conditions beneath the site, interactions between groundwater and nearby surface water bodies, and historic/ongoing groundwater treatment operations at the Cessna site. Each of these factors is discussed in greater detail below.

Hydrogeological Impediments to Vertical Contaminant Migration

The uppermost geological unit beneath the Cessna site is approximately 10 to 40 feet thick and made up of relatively permeable glacofluvial and lacustrine deposits of coarse sand and silt. Irregular layers of silty clay are also present within this depositional zone. A fine to very fine sand layer, with moderately reduced permeability, is situated beneath the coarser sand and silt unit; this layer ranges from 4 to 20 feet thick across the site. Together, these layers comprise the uppermost water bearing zone beneath the Cessna site, herein referred to as "overburden groundwater." Permeabilities calculated from slug test data collected in 1984 range from 51.8 to 84.5 feet per day for this overburden layer (Ref. 1).

Underlying the fine sand layer is a varved silt/very fine sand/clay unit. This layer is uniformly present across the site, although it occurs at varying depths and widely varying thicknesses depending on location at the site, as shown on Figure 3 of Reference 16. Generally, the clay layer is thicker and deeper in the RCRA Area, and thinner and closer to the ground surface in the ECRA Area. A layer of sandy/cobbly glacial till, less than four feet thick, is situated beneath the varved silt/sand/clay unit. A second zone of groundwater flow has been observed in this till layer, herein referred to as the "deeper till groundwater."

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

The mean permeability of this unit is approximately 7.7 ft/day (Ref. 1). Bedrock is encountered immediately below the till layer, at a depth approximately 120 and 140 feet bgs in the RCRA Area (Ref. 7). Bedrock also occurs beneath the till layer in the ECRA Area, although more shallowly. As it crosses the Cessna site boundaries, the bedrock surface slopes up to the northwest and southeast, outcropping near Rockaway Valley Road roughly 200 to 500 feet west of the site and on the neighboring property southeast of Cessna (Ref. 7).

Although specific hydraulic conductivity values were not found in the record file, the varved silt/sand/clay layer beneath the Cessna site appears to act as an aquitard, hindering groundwater movement from the overburden to the deeper till groundwater (Ref. 3). Nearly all of the wells advanced to date at the Cessna site, including DNAPL-impacted well MW-33, are screened at shallow, intermediate, and deep intervals within the overburden and above the varved silt and clay confining layer. Figures 2 and 3 from Reference 16 show screening depths for wells in the RCRA Area; ECRA Area screening depths were inferred from discussion and well logs in various documents. The only on-site wells believed to be screened below the aquitard in the deeper till groundwater are MW-19DR, MW-21D, and MW-28D (Refs. 1, 16, and 18). Wells MW-19DR and MW-21D are both located along Stony Brook in the northern corner of the ECRA Area, and well MW-28D is situated in the RCRA Area adjacent to Stony Brook and southwest of DNAPL-impacted well MW-33. Quarterly groundwater data from these wells, dating back to 1990, indicate only a few isolated detections of Cessna COCs (Ref. 24). Furthermore, contaminant concentrations equaled or slightly exceeded applicable NJ GWQC only three times: TCE was reported in well MW-21D at 1 µg/L in October 1995, and 1,1-DCE was reported in well MW-28D at 2.29 and 3.1 µg/L in April 1990 and July 1991, respectively. Methylene chloride was also reported above the NJ GWQC in two of the wells in 1995, but this constituent is not considered a COC for Cessna. Because more widespread NJ GWQC exceedances have been reported in wells screened above the clay layer (including shallow and intermediate wells clustered with the three deep till groundwater wells identified above), the varved silt/sand/clay layer does appear to effectively confine significant dissolved contamination to the overburden groundwater zone. Vertical migration of DNAPL in the vicinity of well MW-33 would also be inhibited by the underlying silt/sand/clay layer which is approximately 40 feet thick in this area. In the Final Report for Alternate Plume Containment (Ref. 18), Cessna also contends that a bowl-shaped depression in the very fine sand layer (25 to 30 feet thick) immediately below monitoring well MW-33 further inhibits both vertical and horizontal DNAPL migration from the known impact area. Refer to Figure 3 from Reference 16 to view the geological cross-section. Although NJDEP did not question this assertion in their comments on the report (Ref. 19), available file materials do not indicate whether the report has since been approved.

In addition to the apparent aquitard, vertical contaminant migration at Cessna is limited to the existing impact areas by an upward groundwater flow gradient. The upward component of groundwater flow is generally observed across the entire Cessna site, but is most pronounced in the well clusters closest to Stony Brook (Ref. 3). Hydraulic gradients based on water level measurements collected in the ECRA Area well clusters in 1990 range from 0.25 ft/ft upward at well cluster MW-26, approximately 300 feet from Stony Brook, to 1.81 ft/ft upward at well cluster MW-19, less than 50 feet from Stony Brook (Ref. 3). Upward groundwater flow has also been observed in the RCRA Area, as documented on a vertical flow net diagram Figure 4 prepared by Geraghty and Miller in November 1989 (Ref. 2). An internal NJDEP memo from October 23, 1995 (Ref. 5) confirms that upward vertical hydraulic gradients exist in RCRA Area well clusters MW-1R/P-1/MW-31 and MW-7/MW-8/MW-33. According to the memo, groundwater in the deeper fine/very fine sand layer just above the confining clay layer is moving upward into the shallower, coarse-grained bedding sequences. Given these documented groundwater flow

patterns, it appears unlikely that dissolve-phase contamination from the site will move vertically into deeper unimpacted areas.

Hydraulic Barrier for Horizontal Contaminant Migration

Groundwater flow conditions beneath the Cessna property and surrounding areas have been documented from the results of water level measurements in the on- and off-site monitoring well clusters and stream staff gauges, as well as pumping and slug tests. These data indicate that, under static environmental conditions, Stony Brook is a gaining stream that receives water from the overburden aquifer from all directions (Ref. 8). See the previously mentioned vertical flow net diagram to view the groundwater migration pattern along and beneath the brook in the absence of groundwater pumping (Ref. 2). As shown on the diagram, shallow overburden groundwater east of Stony Brook flows in a westerly direction from the Cessna site, discharging directly into the surface water body. Deeper groundwater within the overburden also flows horizontally westward, except in the immediate vicinity of Stony Brook, where an upward gradient induces vertical discharge to surface water (Ref. 4).

Overburden groundwater on the opposite side of Stony Brook flows eastward and into Stony Brook. Although limited groundwater level measurements have been collected west of the stream, convergent flow toward Stony Brook from the west is indicated by two key factors. First, the hydraulic head measured in each of the three wells comprising monitoring well cluster MW-17 are higher than that measured in Stony Brook, indicating flow toward the surface water discharge boundary. Second, as stated in Reference 8, "it seems unlikely that groundwater would flow beneath the stream, where the overburden aquifer is 105 feet thick, and into a thinning wedge of the aquifer [with diminishing saturated volume] that pinches out where bedrock emerges at land surface only 200 feet west of the well cluster."

With groundwater flow converging from both the east and west sides, Stony Brook appears to serve as a natural hydraulic boundary for groundwater contaminant migration from the Cessna site. Contamination documented in overburden groundwater at the Cessna site is not expected to move beyond the brook and toward well cluster MW-17.

[Note: While the record file does not clearly indicate the direction of flow in the deeper till groundwater, current data from wells monitoring this aquifer indicate an overall lack of significant contamination beneath the clay aquitard; therefore, this groundwater unit is not a concern for the Cessna site at this time.]

Groundwater Treatment and Contaminant Stabilization in the ECRA Area

In 1992, Cessna installed and initiated operation of a pump and treat system in the ECRA Area to capture, contain, and remediate impacted groundwater. Treatment operations included recovery of impacted groundwater, iron pretreatment, oil absorption, removal of VOCs using a granular activated carbon filtration system, and reinjection of treated effluent into the subsurface via permitted injection wells. Figure 1 from the Quarterly Groundwater Remedial Progress Report for the Third Quarter of 2001 (Ref. 24) shows the location of recovery wells ERW-1 and ERW-3, and injection wells IW-C and IW-D. Between 1992 and 1994, the ECRA system treated over 12.5 million gallons of impacted groundwater (Ref. 8).

In December 1994, NJDEP gave Cessna permission to suspend groundwater recovery in the ECRA Area on a trial basis because influent VOC concentrations were very low. Monthly total VOC averages were less than 22 parts per billion (ppb) throughout 1994 (Ref. 7), down from the low parts per million (ppm) range prior to treatment system startup (Ref. 5). The system was placed on standby, and remains

so to date, such that treatment operations can be resumed in the event that contaminant concentrations increase significantly or begin to threaten a sensitive receptor, including Stony Brook (into which groundwater from the ECRA Area and Engle Property currently discharge). As discussed in the response to Question 7, groundwater monitoring is ongoing in the ECRA Area.

A review of ECRA groundwater data from 1990 to July 2001 indicates that, following system shut down at the end of 1994, contaminant concentrations in the upper groundwater zone rebounded somewhat from their lowest levels. Although concentration trends have not yet fully stabilized for certain COCs, contaminant concentrations reported during the last four sampling rounds have generally not been as high as those measured prior to or during treatment operations. For example, total VOC concentrations in heavily impacted well MW-19SR were reported at 1,519 µg/L in 1990, at 17 µg/L in the middle of treatment operations in January 1994, and at 69.1 µg/L in April 2001. Similarly, total VOC concentrations as high as 1,008 µg/L in well MW-21S prior to treatment operations (October 1991) were reduced to a low of 36 µg/L by April 1994; the current (July 2001) measurement for total VOCs in well MW-21S is 101.1 µg/L. As these data show, significant reductions in total VOC mass have been achieved in the ECRA Area, and NJDEP has not required Cessna to resume treatment operations.

As noted in the response to Question 2, some COCs in the ECRA Area overburden are still detected at concentrations exceeding NJ GWQC and have the potential to impact surface water quality. Although typically reporting the most significant contamination, wells MW-21 and MW-5 are located approximately 90 and 500 feet upgradient of Stony Brook, respectively. COC concentrations are generally lower in wells closer to the brook, including wells MW-19SR and MW-20. According to the most recent year's worth of data for the ECRA Area and Engle Property, none of the wells along Stony Brook contained COCs at concentrations exceeding ten times the applicable NJ GWQC. However, in April 2001, the concentration of vinyl chloride in MW-19SR was greater than ten times the applicable NJ Surface Water Quality Criteria (SWQC) of 0.083 µg/L. The significance of groundwater discharges to Stony Brook will be further evaluated in the response to Question 5.

According to an internal message from NJDEP (Ref. 25), the current remedial strategy for groundwater beneath the ECRA Area and Engle Property remains monitored natural attenuation, as discussed in 1994 and 1997. [It should be noted that if this is to become the final corrective action for ECRA Area groundwater, Cessna must move forward with documenting that natural attenuation is occurring in the ECRA Area groundwater through statistical analysis, biochemical testing of the aquifer, and other means, and establishing a Classification Exception Area (CEA) for the northern part of the site.]

Groundwater Treatment and Groundwater Stabilization in the RCRA Area

Cessna has also installed a pump and treat system in the RCRA Area to capture, contain, and remediate impacted overburden groundwater. The treatment program was initiated in 1992 and continues to date, with groundwater currently being pumped from two recovery wells (RW-5 and RW-6) and routed through an iron pretreatment system, clarifiers, oil absorbers, and granular activated carbon adsorbers for VOC removal. Treated groundwater is then reinjected into the subsurface pursuant to Cessna's New Jersey Pollutant Discharge Elimination System (NJPDES) permit at wells IW-E and IW-F. The injection wells are situated upgradient of all suspected sources in the RCRA Area, as shown on Figure 1 from the Quarterly Groundwater Remedial Progress Report for the Third Quarter of 2001 (Ref. 24).

Through the third quarter of 2001, approximately 83,286,700 gallons of groundwater have been recovered by the system, and over 2,763 pounds of VOCs have been removed from overburden groundwater in the RCRA Area (Ref. 24). Although the record file does not provide a detailed discussion or statistical analysis of contamination trends in the RCRA Area by individual constituents or individual wells, Appendix E from the Fourth Quarter 2000 Annual Groundwater Remedial Progress Report (Ref. 20) presents a tabular listing of such data. These tables suggest that, although many of the RCRA Area wells experienced increasing contaminant concentrations in 1997 and/or 1998, overall COC levels are stabilizing with or declining from earlier reported concentrations. For example, TCE concentrations in DNAPL-impacted well MW-33 have declined from a maximum of 28,000 µg/L in 1995 to a maximum of 2,400 µg/L during the first three quarters of 2001. Concentrations of TCA in the same well have also dropped an order of magnitude from a maximum of 780,000 µg/L in 1995 to a maximum of 66,000 µg/L during the first three quarters of 2001. Individual COC concentrations have also generally stabilized or fallen in wells farther from the groundwater recovery wells and closer to Stony Brook, including well clusters MW-28, MW-35, MW-36, and MW-37. At well MW-28S, TCA concentrations have dropped from a high of 2,238.6 µg/L in 1990 to a maximum of 9.4 µg/L in the first three quarters of 2001. Also, while the maximum TCE concentration in well MW-28S rose from 200.4 µg/L in 1990 to 610 µg/L in 1997, the highest TCE concentration reported during the first three quarters of 2001 was only 26 µg/L. These results indicate that, while several COCs remain above NJ GWQC in overburden groundwater, significant VOC reductions have been achieved for the RCRA Area, and concentrations should continue to decline with further treatment. Along with continuing treatment operations, Cessna plans to establish a CEA for contamination in the southern portion of the site.

Cadmium and fluoride concentrations in the RCRA Area also appear to be stabilizing somewhat and/or declining since 1997 (through the fourth quarter of 2000 -- the most recent inorganics data available for RCRA wells). Slight fluoride exceedances in wells MW-8 and MW-9 in October 1999 (2.1 and 2.7 µg/L, respectively) dropped below the NJ GWQC of 2 µg/L by October 2000. Cadmium concentrations measured in 1997 at 170 µg/L dropped to 10.6 µg/L by 1999, and then below the NJ GWQC in 2000. Although not detected during the 1997 sampling round, cadmium concentrations in well MW-7 remained fairly stable at 82.4 µg/L in 1999 and 79.3 µg/L in 2000. Although rising from the 1997 detection of 12.9 µg/L, cadmium concentrations measured in well P-1 remained fairly stable between 1999 and 2000 at 18.3 and 20.4 µg/L, respectively.

Groundwater Capture by Pumping Activity in the RCRA Area

Pump tests completed when recovery well RW-6 was installed in August of 1999 indicated that impacted overburden groundwater in the RCRA Area (from well cluster MW-34 on the east to well cluster MW-37 on the west) could be effectively captured by running the recovery well pumps at a combined rate of 24 gallons per minute (gpm) (Ref. 18). Groundwater elevations measured at that pumping rate were presented on Figure 12 of the Alternate Plume Containment Work Plan Final Report (Ref. 18). As shown, impacted groundwater from the RCRA Area is drawn away from Stony Brook by the pumping activity, and contaminant migration away from the site or into surface water could be mitigated by continuous pumping. However, as indicated in a letter to the facility dated July 12, 2000 (Ref. 19), NJDEP has some concerns with Cessna's assumptions used to calculate the capture zone. Furthermore, the most recent groundwater monitoring report notes some difficulty in keeping both recovery wells in operation and in maintaining the target pumping rate of 24 gpm (Ref. 24). The record file does not indicate that these concerns have been resolved and, therefore, the system has not been shown to completely capture current RCRA Area contamination. As such, some groundwater from the RCRA

Area may be discharging into Stony Brook. Because Stony Brook serves as a hydraulic barrier to westward groundwater flow in the overburden, such discharges (if they do occur) are not expected to cause RCRA Area COCs to migrate beyond the existing area of contamination. The significance of such discharges is further evaluated in the response to Question 5.

CEA for Fluoride in the RCRA Area

In July 1999, a CEA of indeterminate duration was established for fluoride concentrations exceeding the NJ GWQC of 2,000µg/L in the area immediately surrounding injection wells IW-E and IW-F (Ref. 15). Because Cessna demonstrated that natural groundwater dispersion would reduce fluoride concentrations below the NJ GWQC within 37 feet of the injection well (Ref. 9), elevated fluoride levels are not expected to pose a risk to Stony Brook, which lies over 1,000 feet away from the injection wells (Ref. 26).

References:

1. Cleanup Plan Prepared for Aircraft Radio and Control Division of Cessna Aircraft Company. Prepared by Woodward-Clyde Consultants. Dated September 25, 1985 and Revised April 23, 1986.
2. Vertical Flow Net Diagram for the RCRA Site based on Water Level Measurements dated October 7, 1989. Prepared by Geraghty and Miller, Inc. Dated November 1989.
3. Plume Definition Report for the ECRA Site. Prepared by Geraghty & Miller, Inc. Dated August 1990.
4. Work Plan for an Investigation of Former Drum Storage Areas at the Former Cessna ARC Facility. Prepared by Geraghty & Miller, Inc. Dated January 1991.
5. Letter from Mary Hrenda, NJDEP, to Richard Burgos, NJDEP, re: Addendum to the RAW/NJPDES/DGW Permit Renewal and the Fifth Annual Report on the Effectiveness of the Ground Water Monitoring System and the Interim Remedial Measures. Dated October 23, 1995.
6. Letter from John Potenza and Daniel Nachman, Dan Raviv Associates, Inc., to Richard Burgos, NJDEP, re: Classification Exception Areas at the RCRA Site. Dated March 22, 1996.
7. Letter from Stephen Maybury, NJDEP to Robert Bradley, Textron Inc., re: Cessna Aircraft NJPDES/DGW Permit #NJ0099074. Dated November 26, 1996.
8. Letter from John Potenza, Terra Incognita, Inc., to Wayne Horowitz and Richard Burgos, NJDEP, re: Comments Submitted in Response to the Draft NJPDES-DGW Permit No. NJ0099074. Dated February 14, 1997.
9. Letter from Daniel Nachman, Dan Raviv Associates, Inc., to Richard Burgos, NJDEP, re: Application for a Classification Exception Area for Fluoride at the RCRA Site. Dated May 29, 1997.
10. Letter from Daniel Nachman, Dan Raviv Associates, Inc., to Richard Burgos, NJDEP, re: Proposal for Natural Attenuation on the Engle Property and ECRA Site. Dated June 10, 1997.
11. Final HSWA Permit issued by USEPA on September 30, 1997, for the Former Cessna Aircraft Facility, Aircraft Radio and Control Division, EPA I.D. No. NJD002155448.
12. Letter from Daniel Nachman, Dan Raviv Associates, Inc., to Richard Burgos, NJDEP, re: Alternate Plume Containment Work Plan. Dated March 30, 1998.
13. Baseline Ecological Evaluation for the Former Cessna/ARC Facility. Prepared by IT Corporation. Dated August 1998.
14. Determination of Environmental Indicator Determination for Current Human Exposures Under Control (CA725) -- Interim Final. Prepared by USEPA Region 2. Dated February 5, 1999.
15. Letter from Bryan Moore, NJDEP, to Robert Brayley, Textron Inc., re: Detailed Recovery Well Design Report. Dated July 1, 1999.
16. Letter from Daniel Nachman, Dan Raviv Associates, Inc., to Richard Burgos, NJDEP, re: Response to NJDEP's Letter Regarding DRAI's Detailed Recovery Well Design Report. Dated July 26, 1999.

17. Annual Groundwater Remedial Progress Report for Fourth Quarter 1999. Prepared by IT Corporation. Dated January 7, 2000.
18. Alternate Plume Containment Work Plan (Final Report). Prepared by Dan Raviv Associates, Inc. Dated January 12, 2000.
19. Letter from Bryan Moore, NJDEP, to Robert Brayley, Textron Inc., re: Final Report – Alternate Plume Containment Work Plan. Dated July 12, 2000.
20. Annual Groundwater Remedial Progress Report for Fourth Quarter 2000. Prepared by IT Corporation. Dated January 18, 2001.
21. Letter from Stephen Maybury, NJDEP, to Alan Straus, USEPA, re: Cessna Aircraft Company -- Residential Well Sampling. Dated March 29, 2001.
22. Quarterly Remediation Progress Report for the First Quarter 2001. Prepared by IT Corporation. Dated April 25, 2001.
23. Quarterly Remediation Progress Report for the Second Quarter 2001. Prepared by IT Corporation. Dated August 23, 2001.
24. Quarterly Remediation Progress Report for the Third Quarter 2001. Prepared by IT Corporation. Dated November 20, 2001.
25. Electronic Message from Bryan Moore, NJDEP, to Dhruva Kanjarpane and Richard Burgos, NJDEP, re: Further Follow-up on EI Issues Requested from NJDEP. Dated January 8, 2002.
26. Memo from Mary Hrenda, NJDEP, to Richard Burgos, NJDEP, re: Draft HSWA Permit. Undated.

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:

As discussed in the response to Question 3, under static flow conditions, overburden groundwater beneath the Cessna site moves toward and discharges into Stony Brook. Because groundwater is no longer pumped from the subsurface as part of treatment operations in the ECRA Area, natural groundwater flow patterns prevail. Therefore, groundwater from the ECRA Area, the eastern portion of the Engle Property, and the Northern Runway Area is expected to discharge completely into surface water (Ref. 2).

As discussed in the response to Question 3, impacted overburden groundwater in the RCRA Area is being withdrawn at recovery wells RW-5 and RW-6. According to pump test data from 1999, when the recovery system is operating overburden groundwater should be moving away from Stony Brook, effectively containing contamination in the RCRA Area (Ref. 8). However, complete capture has not yet been fully demonstrated by Cessna. Consequently, some groundwater from the RCRA Area may be discharging into Stony Brook.

References:

1. Vertical Flow Net Diagram for the RCRA Site based on Water Level Measurements dated October 7, 1989. Prepared by Geraghty and Miller, Inc. Dated November 1989.
2. Plume Definition Report for the ECRA Site. Prepared by Geraghty & Miller, Inc. Dated August 1990.
3. Work Plan for an Investigation of Former Drum Storage Areas at the Former Cessna ARC Facility. Prepared by Geraghty & Miller, Inc. Dated January 1991.
4. Letter from Stephen Maybury, NJDEP to Robert Bradley, Textron Inc., re: Cessna Aircraft NJPDES/DGW Permit #NJ0099074. Dated November 26, 1996.
5. Letter from John Potenza, Terra Incognita, Inc., to Wayne Horowitz and Richard Burgos, NJDEP, re: Comments Submitted in Response to the Draft NJPDES-DGW Permit No. NJ0099074. Dated February 14, 1997.
6. Letter from Daniel Nachman, Dan Raviv Associates, Inc., to Richard Burgos, NJDEP, re: Proposal for Natural Attenuation on the Engle Property and ECRA Site. Dated June 10, 1997.
7. Letter from Daniel Nachman, Dan Raviv Associates, Inc., to Richard Burgos, NJDEP, re: Alternate Plume Containment Work Plan. Dated March 30, 1998.
8. Alternate Plume Containment Work Plan (Final Report). Prepared by Dan Raviv Associates, Inc. Dated January 12, 2000.

9. Letter from Bryan Moore, NJDEP, to Robert Brayley, Textron Inc., re: Final Report – Alternate Plume Containment Work Plan. Dated July 12, 2000.

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

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

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

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

Rationale:

As stated in the response to Question 4, impacted groundwater beneath the Cessna site discharges into Stony Brook from the ECRA Area, Engle Property, and Northern Runway Area. Impacted groundwater from the RCRA Area also has the potential to discharge into the brook. Available groundwater and surface water data have been evaluated to determine if such discharges are likely to have a significant impact on surface water quality.

Evaluating Groundwater Data for Surface Water Impact Potential

As the first step in this analysis, known groundwater contaminant concentrations in wells closest to Stony Brook (which are most likely to represent groundwater quality at the point of discharge into surface water) were compared with groundwater and surface water criteria. Specifically, the groundwater concentrations were evaluated against NJ GWQC and NJ SWQC (as presented in N.J.A.C. 7:9-6 and N.J.A.C. 7:9B, respectively). Stony Brook is classified as a FW2-NT water body with designated uses

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

including primary and secondary contact recreation, industrial/agricultural water supply, and public potable water supply after treatment (Ref. 3). To account for dilution and mixing as groundwater enters the brook, which tend to reduce COC concentrations, the criteria were multiplied by a factor of 10. The 23 wells adjacent to Stony Brook which were considered in the assessment included:

- ECRA Area wells P-6, P-7, P-8, MW-19SR, MW-19DR, MW-20, MW-23S, and MW-23D
- Engle Property wells TMW-B, TMW-E, and TMW-G
- RCRA Area wells P-1, MW-28S, MW-28M, MW-28D, MW-34S, MW-34D, MW-35S, MW-35D, MW-36S, MW-36D, MW-37S, and MW-37D

The locations of these wells are shown on Figure 1 from the Quarterly Groundwater Remedial Progress Report for the Third Quarter of 2001 (Ref. 9).

According to the most recent year's worth of data (Refs. 6-9), all COC concentrations in the ECRA Area and Engle Property wells along the brook were less than ten times the relevant NJ GWQC. Even wells MW-19SR and MW-20, situated directly downgradient of the most significantly impacted wells in the northern portion of the Cessna site (MW-5 and MW-21), reported no contamination ten times higher than the relevant NJ GWQC. However, in April 2001, vinyl chloride was detected in well MW-19SR (southwest of well MW-21) at 1.9 µg/L. This concentration is greater than ten times the relevant SWQC of 0.083 µg/L. Thus, groundwater discharges into Stony Brook from the ECRA Area have the potential to be significant.

Current data for RCRA Area wells along Stony Brook (Refs. 6-9) were also evaluated against NJ GWQC and NJ SWQC (multiplied by a factor of 10) in making this EI determination. While most of the reported COC concentrations were below the screening levels, potentially significant VOC concentrations have been reported within the past year in wells MW-28S, MW-36S, and MW-36D, as shown in Table 5 below. Each of these wells is located south of recovery well RW-6 and may be discharging to Stony Brook where it curves around to the east. Such discharges to Stony Brook from the RCRA Area also have the potential to be significant. Available data indicate that neither cadmium or fluoride exceeded screening levels in the RCRA wells closest to Stony Brook; thus, the presence of these constituents in groundwater beneath the RCRA Area is not expected to have a negative impact on surface water quality.

Table 5 – COC Concentrations in RCRA Area Groundwater Exceeding Relevant Surface Water Quality Screening Levels (µg/L)

Well	Constituent	Maximum Detection (October 2000 through July 2001)	NJ GWQC	NJ SWQC
MW-28S	TCE	29	1	1.09
MW-36S	TCE	14	1	1.09
	Vinyl Chloride	5.9	5	0.083
MW-36D	PCE	180	1	0.38

Source: Third Quarter 2001 Quarterly Remediation Progress Report, Table 4 and Appendix C, Table C. Dated November 20, 2001.

Evaluation of Actual Surface Water Data

The long-term groundwater monitoring program for the Cessna site includes collection of surface water samples. Five sampling locations have been established on Stony Brook. The locations are shown on Figure 1 of from the Quarterly Groundwater Remedial Progress Report for the Third Quarter of 2001 (Ref. 9) and have been designated as "Upstream," "Downstream," "SW-1," "Valley Road," and "Gate." As noted in the response to Question 7, the first three locations continue to be sampled quarterly and annually.

As part of the Baseline Ecological Evaluation (BEE) completed in August 1998, Cessna reviewed surface water sample data from 1997 and early 1998 for each of the five sampling locations. VOC concentrations at each sampling point were averaged by constituent and compared with applicable SWQC to determine if site-related groundwater contaminants were also present at above relevant standards in Stony Brook. None of the averaged VOC values exceeded the NJ SWQC (Ref. 3). In a letter to the facility shortly after completion of the BEE, NJDEP agreed that "the surface water sampling conducted in Stony Brook does not indicate a discharge [of impacted groundwater] above the appropriate screening criteria" (Ref. 4).

Surface water samples collected subsequent to the BEE have also been reviewed as part of this EI determination. The recent surface water samples from monitoring point SW-1 (next to the RCRA Area) did not contain VOC or inorganic contamination above NJ SWQC. Surface water samples from the upstream and downstream monitoring points (in the ECRA Area and northward) reported occasional TCE and PCE concentrations above SWQC (Ref. 9). However, as shown in Table 6 below, VOC concentrations in the upstream sampling location (nearly 500 feet north of Cessna well MW-14) have consistently been higher than those measured in the downstream location immediately adjacent to ECRA Area well MW-23S. Furthermore, in most of the sampling rounds, PCE in the downstream surface water sample has been reported as non-detect, even though PCE in the upstream sample has been greater than the NJ SWQC of 0.388 µg/L. This concentration pattern suggests that Stony Brook surface water quality is impacted prior to reaching the Cessna property, and that overburden groundwater discharges from the site are not negatively impacting water quality in Stony Brook.

Table 6 – Recent COC Concentrations in Surface Water Above NJ SWQC (µg/L)

Constituent	NJ SWQC	Sample Date	Upstream Concentration	Downstream Concentration
TCE	1.09	7/14/99	2.8	BS (1)
		7/14/98	2.1	BS (0.9)
PCE	0.388	10/13/00	0.9	0.4
		7/14/00	2	ND
		4/28/00	0.4	ND
		7/14/99	4.5	ND
		4/28/99	0.4	ND
		10/29/98	0.5	ND

BS – below standards; ND – not detected
Source: Third Quarter 2001 Quarterly Remediation Progress Report, Appendix C, Table C, pp. 67-71. Dated November 20, 2001.

Because available data from Stony Brook shows no negative impacts from contaminated groundwater beneath Cessna, theoretical assessment of potential risks to surface water quality from groundwater discharges (described at the beginning of this response) becomes moot and unnecessary. At the present time, the impacts of groundwater discharges into Stony Brook are insignificant. Nevertheless, to allow for detection of any changing conditions in water quality, Cessna is required to continue surface water monitoring (as discussed in the response to Question 7).

References:

1. Final HSWA Permit issued by USEPA on September 30, 1997, for the Former Cessna Aircraft Facility, Aircraft Radio and Control Division, EPA I.D. No. NJD002155448.
2. Letter from Bryan Moore, NJDEP, to Robert Brayley, Textron Inc., re: Baseline Ecological Assessment Work Plan. Dated June 11, 1998.
3. Baseline Ecological Evaluation for the Former Cessna/ARC Facility. Prepared by IT Corporation. Dated August 1998.
4. Letter from Bryan Moore, NJDEP, to Robert Brayley, Textron Inc., re: Baseline Ecological Evaluation. Dated September 29, 1998.
5. Annual Groundwater Remedial Progress Report for Fourth Quarter 1999. Prepared by IT Corporation. Dated January 7, 2000.
6. Annual Groundwater Remedial Progress Report for Fourth Quarter 2000. Prepared by IT Corporation. Dated January 18, 2001.
7. Quarterly Remediation Progress Report for the First Quarter 2001. Prepared by IT Corporation. Dated April 25, 2001.
8. Quarterly Remediation Progress Report for the Second Quarter 2001. Prepared by IT Corporation. Dated August 23, 2001.
9. Quarterly Remediation Progress Report for the Third Quarter 2001. Prepared by IT Corporation. Dated November 20, 2001.

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

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

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

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

Rationale:

Question not applicable. See response to Question #5.

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

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

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

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

____ If no - enter "NO" status code in #8.

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

Rationale:

Groundwater monitoring programs have been established for each of the groundwater impact areas at the Cessna site. Monitoring in the RCRA Area is being performed pursuant to the requirements of NJPDES permit number NJ0099074 (Ref. 1). Continued monitoring of groundwater in the ECRA Area, on the Engle Property, and in the Northern Runway Area is required by the Final HSWA Permit issued to the facility by USEPA on September 30, 1997 (Ref. 2).

Twenty-four wells are routinely sampled in the RCRA Area to (1) monitor performance of the groundwater recovery and treatment system, and (2) confirm current boundaries of the impact area within overburden groundwater. Nineteen wells in the ECRA Area, Engle Property, and Northern Runway Area are also routinely sampled to monitor contamination trends and ensure that COCs are not rising to levels that would threaten water quality in Stony Brook or require resumption of ECRA Area treatment operations. The ongoing monitoring program also includes collection of surface water samples from three locations within Stony Brook; data from these samples are used to document that impacted overburden groundwater at the Cessna site is not negatively impacting the brook. All sampling locations are shown on Figure 1 from the Quarterly Groundwater Remedial Progress Report for the Third Quarter of 2001 (Ref. 4). Quarterly groundwater level measurements are also collected across the Cessna site to allow for development of current groundwater contour and flow maps. The long-term groundwater monitoring program for Cessna is expected to continue until all COCs have stabilized below NJ GWQC. The groundwater monitoring program may be modified as necessary, however, in response to changing environmental conditions and/or establishment of groundwater CEAs.

Current parameters of the long-term monitoring programs are noted in Table 7 below. As indicated, sampling is conducted quarterly, semi-annually, and/or annually depending on the well being sampled and analytical parameters being investigated. Quarterly monitoring events are conducted in January, April, July, and October of each year. Semi-annual samples are collected in April and October, and annual samples are collected in October. Groundwater monitoring reports are submitted to NJDEP four times each year, roughly three to four months after the associated samples are collected.

Table 7 – Status of Cessna Monitoring Wells and Surface Water Sampling Locations

Wells	Sampling Frequency	Analytical Parameters
RCRA Area		
MW-1R, MW-7, MW-8, MW-9, MW-28S, MW-28M, MW-33, MW-34S, MW-34D, MW-35S, MW-35D, MW-36S, MW-36D, MW-37S, MW-37D, P-1, and surface water sampling location SW-1	Quarterly	VOCs +10 (EPA Method 624)
MW-10, MW-17DD, and MW-28D	Semi-Annual	
MW-6R, MW-17S, MW-17D, MW-31, and SMW-3	Annual	
All RCRA Area wells and surface water locations listed above	Annual	Total Cadmium, Total Lead, Fluoride
ECRA Area		
MW-19SR, MW-21, MW-23D, MW-23D, P-7, and surface water sampling locations Upstream and Downstream	Quarterly	VOCs +10 Total Cadmium Total Lead
MW-19DR, MW-20, MW-21D, P-6, and P-8	Semi-Annual	
MW-26S and PW (Potable Well)	Annual	
Engle Property		
TMW-B and TMW-E	Quarterly	VOCs +10
TMW-D, TMW-F, and TMW-G	Semi-Annual	
Northern Runway Area		
MW-5 and MW-14	Quarterly	VOCs +10

Source: Third Quarter 2001 Quarterly Remediation Progress Report, Appendix C, Table C, Status Listings. Dated November 20, 2001.

The NJPDES permit also calls for monitoring of the RCRA Area groundwater treatment system. Influent and effluent samples are collected from the system on a bi-weekly basis. Influent samples are analyzed for VOCs, and effluent samples are analyzed for VOCs, priority pollutant metals, fluoride, chloride, cyanide, and total dissolved solids (Ref. 3). Midfluent samples are also collected as needed to evaluate the possibility of contaminant breakthrough. Field monitoring reports forms are provided to NJDEP twice each month, and the results are summarized in the quarterly groundwater monitoring reports.

References:

1. Letter from Stephen Maybury, NJDEP, to Robert Brayley, Textron Inc., re: Cessna Aircraft ARC Avionics Division NJPDES Permit No. NJ0099074. Dated January 2, 1997.
2. Final HSWA Permit issued by USEPA on September 30, 1997, for the Former Cessna Aircraft Facility, Aircraft Radio and Control Division, EPA I.D. No. NJD002155448.
3. Letter from Bryan Moore, NJDEP, to Robert Brayley, Textron Inc., re: Final Report – Alternate Plume Containment Work Plan. Dated July 12, 2000.
4. Quarterly Remediation Progress Report for the Third Quarter 2001. Prepared by IT Corporation. Dated November 20, 2001.

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

   _X_ YE - Yes, "Migration of Contaminated Groundwater Under Control" has been verified. Based on a review of the information contained in this EI determination, it has been determined that the "Migration of Contaminated Groundwater" is "Under Control" at the Former Cessna Aircraft site, EPA ID #NJD002155448, located on Rockaway Valley Road in Boonton Township, 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:_____
Michele Benchouk
Engineering Consultant
Booz Allen Hamilton

Reviewed by: _____ Date:_____
Pat Shanley
Geologist
Booz Allen Hamilton

Also reviewed by: _____ Date:_____
Alan Straus, RPM
RCRA Programs Branch
USEPA Region 2

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

Approved by: Original signed by: Date: 8/1/2002
Raymond Basso, Chief
RCRA Programs Branch
USEPA Region 2

Locations where references may be found:

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

Contact telephone and e-mail numbers: Alan Straus, USEPA RPM
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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

Former Cessna Aircraft Facility, Aircraft Radio and Control Division

	GW	AIR (Indoors)	SURF SOIL	SURF WATER	SED	SUB SURF SOIL	AIR (Outdoors)	CORRECTIVE ACTION MEASURE	KEY CONTAMINANTS
Groundwater	Yes	NA	NA	NA	NA	NA	NA	▸ Implementation of groundwater recovery and treatment operations in the ECRA Area to reduce VOC mass in groundwater (discontinued) ▸ Implementation of groundwater recovery and treatment operations in the RCRA Area to capture impacted groundwater and reduce VOC mass in groundwater ▸ Excavation of wastes and contaminated soil in various suspected source areas to eliminate further contaminant migration to groundwater ▸ Establishment of a CEA for fluoride at the RCRA Area injection wells due to elevated concentrations in treatment system effluent ▸ Ongoing groundwater and surface water monitoring program in place ▸ CEAs planned for VOCs and inorganics in both the ECRA and RCRA Areas until contaminant concentrations fall beneath applicable NJ GWQC	▸ Chloroform ▸ 1,1-DCA ▸ 1,1-DCA ▸ 1,2-DCA ▸ Methylene Chloride ▸ PCE ▸ Toluene ▸ 1,1,1-TCA ▸ TCE ▸ Vinyl Chloride ▸ Cadmium ▸ Fluoride ▸ Lead