APPENDIX E

Environmental Remediation History

APPENDIX E

SUMMARY OF REMEDIAL ACTIVITIES

Site History Report – October 2004

Ingersoll Rand Company Site

Phillipsburg, New Jersey

Environmental investigations at the site were commenced in response to the identification of LNAPL on the groundwater surface beneath the plant area in the 1970s during the installation of a potable well. Based on historical accounts, IR began investigation into the source of oil after connection of the well to the facility water system caused employees to complain of oil in the showers. In 1975 IR conducted a dye test from an "oil dump" area identified at the landfill. After pumping approximately 500,000 gallons from the well over a 16 hour period no dye was recovered. Several other pumping events were conducted to remove oil from the well. Discharge was either to Spray Pond or to ground surface south of the AST-farm. In August 1975, EPA visited the site and required that IR prepare a plan for removal of oil from the well and permit applications for the landfill and for surface water discharges. Investigations in late 1975 identified oil at WW-3 (installed 1903). Through the remaining years of the 1970s, water usage was scaled back and problems with oil impacts were noted at all production wells. To mitigate these problems, initial pumping at wells would be diverted through the Spray Pond's oil skimmers until "acceptable" levels were achieved. At that time, water could be diverted to the plant water system.

By the early 1980s, due to agency directives and permit stipulations, IR installed five monitoring wells (MW-1 through MW-5) in the vicinity of oil impact. An additional nine wells (recovery wells RW-1 through RW-7, MW-2A, and TH-36) were installed through the remaining portion of the decade. During this time, IR installed dual pump recovery systems at the recovery wells, designed to depress water levels and skim oil from the water surface. Water was discharged through an oil water separator to the Spray Pond and oil was recovered in small ASTs located at or near each well head.

Between 1986 and 1994, a total of 36 AOCs were identified. Later in 1994, with the submittal of a *Supplemental Draft Remedial Investigation Work Plan* (Tellus, 1994b), two additional AOCs were identified. Investigation of the 36 AOCs has been ongoing since 1994 and earlier.

Three additional soil AOCs were identified through various investigations through 2000 and groundwater impacts were separated into three AOCs (LNAPL plume, dissolved phase impacts, and west side of fuel oil plume). During a review of Building #16 in 2003, a pit and sump were identified and classified as another AOC for a total of 45 areas of concern at the site.

Since the dissolution of the IDP partnership and the sale of the pump business to Flow Serve, as well as the limited use of the site, IR has been evaluating redevelopment options. In 2003 IR decided to accelerate soil investigative activities in anticipation of future redevelopment activities. In October 2003, IR and ENSR presented a conceptual remedial investigation work plan to NJDEP in which soil

investigative activities would be conducted simultaneously at all remaining site AOCs with the goal of large-scale delineation of impacts without detailed sampling scopes created for each AOCs. Final delineation would define the boundaries of a Deed Notice which would be prepared for submission in a later Remedial Action Work Plan. NJDEP verbally approved of IR's concept and ENSR began an accelerated soil investigation in October 2003. A Soil Remedial Investigation Report was submitted to NJDEP in July 2004.

The following subsections detail activities at each AOC that has been identified at the site since investigation and remedial actions began.

E.1 AOC 1 (Transformer [Removed] East End Bldg. 12)

This AOC was identified in the 1994 *Draft RIWP* and is located at the east end of the power house (Bldg. #12) is the former location of six polychlorinated biphenyl (PCB) containing transformers. The transformers were installed in the 1920's and removed in the 1960's, when changes to the facility power grid system made them unnecessary. In August and September 1997, ENSR collected investigative samples from around the concrete pad, which formerly held the transformers. Soil analytical data was reported in the October 23, 1997 *Field Sampling Summary Report* submitted to Ingersoll-Dresser Pump Co. (IDP) and later transmitted to NJDEP. Based on the reported soil analytical results, concentrations of total petroleum hydrocarbons (TPHC) and PCBs were identified in excess of applicable soil cleanup criteria.

Soil samples collected between 1998 and 2004 have delineated the PCB and TPHC impacts at this AOC to the NJDEP most stringent soil cleanup criteria (MSSCC; the lowest of the residential direct contact, non-residential direct contact, and impact to groundwater soil cleanup criteria). As reported in the 2004 Soil Remedial Investigation Report, ENSR recommends no further investigative activities and that this AOC be included in a deed notice.

E.2 AOC 2 (Spray Pond Sludge Disposal Area)

Based on the 1994 *Draft RIWP*, approximately 2,000 cubic yards of sludge and sediment were removed from the bottom of the Spray Pond (a man-made, concrete-lined body of water that was used to provide recycled non-contact cooling water and act as a stormwater detention pond) in the mid 1970s. The sludge and sediment were staged in a bermed area approximately 80 feet long by 120 feet wide by 5 feet deep located east of the current inverse ponds. The dredged material was allowed to dry and was covered with clean fill.

Based on previous soil analytical results, which indicated the presence of TPHC at concentrations of over 100,000 mg/kg, the remedial option for this AOC was determined to be excavation with offsite disposal. Additional impacts reported in the soil at this AOC include methyl ethyl ketone (MEK) at 0.012 milligrams per liter (mg/l), nitrobenzene at 0.012 mg/l, barium at 5.8 mg/l, and lead at 0.55 mg/l

using Toxic Characteristic Leachate Procedure (TCLP) analysis; as well as PCB (Aroclor 1254) at 12.0 mg/kg, and reactive sulfide at 111 mg/kg using standard analytical procedures.

ENSR's July 11, 2003 *Waste Classification Sampling Plan & Soil Reuse Sampling Proposal* suggests excavation and offsite disposal using waste classification protocols as per the selected disposal facility with the collection of delineation soil samples to better estimate total impacted soil volume. These additional soil samples were collected during the accelerated soil investigation in 2003 and 2004 and were presented in a separate submission. Remedial expectations for this AOC are excavation and offsite disposal.

E.3 AOC 3 (Chip Pads)

Six separate Chip Pads were identified in the 1994 *Draft RIWP* as concrete or gravel pads that were historically used for the temporary storage of metal chips generated from machining operations. Two (AOC 3A and 3B) were located in the former Cameron area in the southwest of the site; two were located north of the New Landfill (AOC 3C and 3D); and two were located northeast of former building #17 (AOC 3E and 3F). These metal chips may have had residual cutting oils and/or coolant, which could have drained to the ground surface.

Initial investigations at the former chip pads indicated impacts from various compounds. Soil samples collected at Chip Pads 3A, 3B, 3C, 3D, and 3F had reported concentrations of PAH, metals, and/or PCBs in excess of the NJDEP MSSCC. The former Chip Pad 3E, located at the same location as the current building 17B, was not sampled previously. Results of continued investigation and remediation at Chip Pads 3A and 3B were presented in ENSR's May 2000 *Site Investigation/Remedial Investigation Report of AOC-3A, 3B and 17*; ENSR's May 2001 *Site Investigation/Remedial Investigation Report of AOC-3A, 3B, 26, 29, 31, and 37*; and ENSR's January 2002 *Remedial Investigation Report for Southside AOCs*.

Based on the above information, NJDEP granted NFA determinations for AOC 3A and 3B in their May 11, 2002 and June 13, 2001 letters, respectively.

In 2002, soil samples were collected at chip pads 3C, 3D, and 3F. Additional samples were collected at each of these locations during the 2003-2004 accelerated soil investigation. NJDEP had granted a conditional NFA for 3E in their October 18, 1994 letter due to the inaccessibility of the former chip pad. However, since impacts have been identified at all of the five investigated locations, characterization was warranted at 3E to assess the presence and extent of any possible impacts at this location. Soil samples were collected at this location during the 2003-2004 accelerated soil investigation.

Based on the results of these investigations, which were reported in the 2004 Soil Remedial Investigation Report, metals impacts will require some additional delineation at AOC-3C/3D and AOC-3F. Proposed activities, as detailed in Section 5.0 of the Site History Report, will be coupled with

investigative activities proposed for new AOCs 46-60. Remedial expectations for these AOCs are their inclusion in a Deed Notice.

E.4 AOC 4 (Three Round Concrete Tanks – North of Building 17A)

As documented in the 1994 *Draft RIWP*, AOC 4 consisted of three underground concrete tanks approximately 4.5-feet in diameter and 4 feet deep. The use of the tanks was not discernable but may have been septic tanks or collection tanks for discharge from the nearby chip pad AOC 3F. In 1996 the concrete tanks were removed and soil samples were collected from the vicinity. Soil analytical results, reported in the October 1996 *UST Closure Report*, indicated that no compounds exceeded applicable criteria.

NJDEP responded in a January 23, 1997 letter indicating that No Further Action was necessary for this AOC.

E.5 AOC 5 (Contaminated Soil Piles East of Bldg 17)

Based on historical accounts, potentially impacted soils excavated during underground storage tank closure activities in the late 1980s were stockpiled at this AOC. No soil investigation has been conducted in this area to date. However, as discussed in the 1994 *Draft RWIP*, based on the source of this material, investigation is warranted. Based on anticipated impacts in this material, ENSR submitted a *Waste Classification Sampling Plan & Soil Reuse Sampling Proposal* in July 2003 proposing reuse sampling at reduced sampling frequency. NJDEP verbally concurred with this proposal during the October 2003 meeting and presentation (*History, Status, and Proposed Work for Areas of Concern at the former Ingersoll Rand facility in Phillipsburg, New Jersey)*. Soil analytical results for this area will be submitted in a separate Soil Reuse Plan. Based on the analytical results, expected remedial action for this AOC is reuse at either the old or new landfill prior to capping.

E.6 AOC 6 (Cameron Coolant Disposal Area)

During initial investigations in the late 1980s and early 1990s, Tellus Environmental Consultants received information during an interview with plant employees that cutting oils were dumped southeast of the former Cameron Pump operations. As reported in the 1994 *Draft RIWP*, field reconnaissance and review of aerial photographs could not identify the location of this potential AOC. Based on this account, NJDEP responded in an October 18, 1994 letter indicating that No Further Action is appropriate unless the location of a coolant disposal area was identified.

Based on ENSRs recent review of historic documentation in support of this Site History Report, a coolant disposal area was not identified southeast of the former Cameron Pump area. However, documentation was uncovered that indicated liquid wastes may have been disposed in the Old Landfill

through portions of facility history. Since the Old Landfill is an identified AOC and has been investigated, No Further Action related to AOC 6 remains appropriate.

E.7 AOC 7 (Three Fuel-Oil USTs at the Northeast Corner of Building #13)

Tellus Environmental identified these USTs in the 1994 *Draft RIWP* based on their review of a 1922 site plan. These USTs were abandoned in place in 1996 as reported in the October 1996 *UST Closure Report*. Soil sampling conducted during closure operations and reported in the 1996 report indicated that no compounds exceeded applicable criteria. NJDEP responded in a January 23, 1997 letter indicating that No Further Action is appropriate for AOC 7.

E.8 AOC 8 (One 500-Gallon Gasoline UST at the Northwest Corner of Building #263)

Tellus Environmental identified this UST in the 1994 *Draft RIWP* based on their review of historic documents. The tank was reportedly used in the testing of small pumps and was located at the western property boundary in the Cameron area. In 1996, the UST was excavated and disposed offsite with soil samples collected at the excavation site. As reported in the 1996 *UST Closure Report*, no compounds exceeded applicable criteria. NJDEP responded in a January 23, 1997 letter indicating that No Further Action is appropriate for AOC 8.

E.9 AOC 9 (One 10,000-Gallon Fuel Oil UST on the East Side of Building #12)

Tellus Environmental identified this UST in the 1994 *Draft RIWP* based on their review of historic documents. The tank was reportedly already filled with concrete and its use was not determined. In 1996, sampling was conducted in the vicinity of the former UST. As reported in the 1996 *UST Closure Report*, no compounds exceeded applicable criteria. NJDEP responded in a January 23, 1997 letter indicating that No Further Action is appropriate for AOC 9.

E.10 AOC 10 (Building #14 – Former Heat Treat)

The 1994 *Draft RIWP* identified this AOC due to the former use of demolished Building #14 for heat treating operation, which would have used quenching oils containing cyanide. Investigations, reported in the 2000 *Remedial Investigation Report (AOC-10, 11 & 12)*, indicated impacts of tetrachloroethylene (PCE), arsenic, beryllium, lead, and thallium were identified at concentrations exceeding applicable soil cleanup criteria; no cyanide was detected in excess of applicable criteria. Based on the fact that these impacts were largely delineated and that the area was covered by the concrete slab of the former building or asphalt, ENSR proposed no further investigative activities and that the area be incorporated into a deed notice. NJDEP agreed with this approach in their August 2, 2000 letter granting a conditional No Further Action based on the institution of a Deed Notice for the area.

E.11 AOC 11 (Former 10,000-Gallon Methanol UST South of Building #14)

This AOC was identified in the 1994 *Draft RIWP*. The UST was reported to have been cleaned and filled with sand. However, upon inspection, the tank appeared empty. In 1996, this UST was abandoned in-place and soil samples were collected to document soil quality in the vicinity of the tank. Soil analytical results reported in the 1996 *UST Closure Report* indicated no impacts, but samples could not be collected below 3.5 feet. In 1999 additional soil borings were completed to deeper depths and soil samples were collected to verify soil quality near the UST invert. Soil analytical results reported in the 2000 *Remedial Investigation Report (AOC-10, 11 & 12)* indicated no VOCs or methanol present in excess of applicable criteria. As such, No Further Action was recommended.

NJDEP responded in their August 2, 2000 letter in agreement of the recommendation.

E.12 AOC 12 (Quench Oil Tanks)

As detailed in the 1994 *Draft RIWP* and the February 2000 *Remedial Investigation Report for AOCs 10, 11, and 12*, two 10,000 gallon steel USTs, which previously contained quench oil used in heat treating operations, were removed - one in 1988 and one in 1996. Results of the UST closure and subsurface evaluation were detailed in the 1996 *UST Closure and Site Investigation Report* and the February 2000 *Remedial Investigation Report for AOCs 10, 11, and 12*. Soil analytical results reported in these documents indicated that TPHC, PAHs, arsenic, and beryllium had been reported at concentrations in excess of applicable soil cleanup criteria. Of greatest concern, TPHC concentrations exceeding 100,000 mg/kg were reported to the assumed bedrock depth. Considering the location of recovery well RW-9, which periodically accumulates LNAPL at the surface of the groundwater, AOC 12 is considered the most likely source area. Based on field observations and the soil analytical results from this AOC, additional sampling was considered necessary to characterize the extent of impact in this area. Additional soil sampling was conducted in 2003 and 2004 during the accelerated soil investigation. Based on soil analytical results, which were presented in the 2004 Soil Remedial Investigation Report, impacts have been delineated and remedial options should be assessed.

E.13 AOC 13 (One 500-Gallon Gasoline UST south of Building #14)

As detailed in the 1994 *Draft RIWP*, this AOC was identified based on a 1926 Site Plan. In 1996, as described in the *UST Closure and Site Investigation Report*, excavation in the location indicated did not identify the presence of a tank, fill material, or evidence of disturbance. As such, it was assumed that either the tank had been previously removed or was not located at the location indicated on the 1926 map. As such, No Further Action was proposed. NJDEP concurred with this proposal in their January 23, 1997 letter.

E.14 AOC 14 (One 500-Gallon Benzene UST North of Building #14)

According to the 1994 *Draft RIWP*, this AOC was identified based on a 1960 Site Plan. In 1996 an excavation was completed at the location of this former UST and uncovered a cement block containment pit that was filled with concrete and crushed gravel. Based on discussion with a facility employee, it is likely that the tank was formerly located in the containment pit. To confirm soil quality in the vicinity of the former UST, two soil samples were collected outside of the containment structure. Analytical results reported in the 1996 *UST Closure and Site Investigation Report* indicated that no compounds were detected in excess of applicable soil cleanup criteria. As such, No Further Action was recommended. NJDEP concurred with this proposal in their January 23, 1997 letter.

E.15 AOC 15 (Two 1,000-Gallon USTs North of Building #8)

According to the 1994 *Draft RIWP*, a 1,000 gallon diesel UST and 1,000 gallon lube oil UST were identified based on a 1960 Site Plan. The tanks were situated adjacent to the footer of Buildings #7 and #8 and could not be removed without undermining the structural integrity of the building. As documented, these USTs were closed in-place according to applicable regulations and six soil samples were collected to document soil quality in the vicinity of the USTs. Soil analytical results, reported in the 1996 *UST Closure and Site Investigation Report*, indicated that no compounds were detected in excess of applicable soil cleanup criteria. As such, No Further Action was recommended. NJDEP concurred with this proposal in their January 23, 1997 letter.

E.16 AOC 16 (Former Drill Manufacturing Building #17)

As reported in the 1994 *Draft RIWP*, Building #17 was used for the manufacture of rock drills. Based on additional document review, other operations at Building #17 included welding, casting, shot blasting, and sand blasting. The building was first identified on historic site plans dated 1913 and was leveled in the mid-1980s. Subsequently, a large portion of the remaining foundation was covered with asphalt and is currently used as a parking lot.

Former Building #17 was identified as an AOC in the *1994 Draft RIWP* because it formerly contained trenches and/or pits, which could have potentially contributed to site environmental impact. As such, a site investigation of this area was determined to be warranted.

In 2003 and 2004, during the accelerated soil investigation, soil borings were collected based on the 1994 *Draft RIWP*. Soil analytical results, which were reported in the 2004 Soil Remedial Investigation Report, indicated that arsenic, beryllium, and thallium concentrations were identified in excess of applicable soil cleanup criteria. These impacts have been delineated and are anticipated to be addressed with a Deed Notice.

E.17 AOC 17 (Former Iron Foundry – Buildings #4 and #30)

As reported in the 1994 *Draft RIWP*, the former Iron Foundry buildings (#4 and #30) were located on the west side of the site east-southeast of the Stormwater Retention Pond and was used for iron and brass foundry operations, core making, casting cleaning, sand blasting, coal storage, and office administration from the beginning of facility operations in the early 1900's through the 1980s. In 1988, the former iron foundry structures were demolished. Remaining foundations were covered with clean fill and seeded.

The former iron foundry has been identified as an AOC in the *1994 Draft RIWP* based on the activities conducted at the former foundry as well as it formerly having contained trenches and/or pits which could have potentially contributed to site environmental impact.

In September 1999, a site investigation was conducted at this AOC. As proposed in the 1994 *Draft RIWP*, the 500-foot by 200-foot area of the former buildings was sampled on a 75-foot grid pattern. Results of the investigation, reported in the May 2000 *Site Investigation/Remedial Investigation Report*, indicated the presence of PAH compounds, TPHC, beryllium, and thallium at concentrations in excess of applicable soil criteria. Based on these results, additional delineation was warranted and was conducted during the 2003-2004 accelerated soil investigation. Soil analytical results, which were reported in the 2004 Soil Remedial Investigation Report, indicated that delineation was completed to the property boundaries and that the impacts in this area are anticipated to be addressed with a Deed Notice.

E.18 AOC 18 (Monitoring Wells MW-5, MW-25, and MW-26 Area)

As reported in the 1994 *Draft RIWP*, TPHC has been detected in groundwater at MW-5 and LNAPL had been intermittently identified since 1992. Since this time, LNAPL has consistently been reported at MW-5. Additional wells were proposed in the 1994 Draft RIWP and accepted by NJDEP in their October 18, 1994 letter. Investigation was conducted in 1998 and 1999 and reported in the 2000 *Remedial Investigation Report – AOC 18*. Based on the results of the investigation and NJDEP's response, LNAPL at this location, both separate and dissolved phase, would be addressed in a site-wide groundwater investigation and installation of a LNAPL recovery system at MW-5. A more complete review of groundwater remedial activities is included at the end of this Appendix

E.19 AOC 19 (Air Trappage Tank)

The "Air Trappage Tank" was described in the 1994 *Draft RIWP* as a 1,500-gallon, aboveground, welded steel tank that received approximately 50 gallons per day of air trap discharge (lubricating oil/condensate mix) from the air compressors in Building #12. The AST was situated on a 10x16-foot containment pad and was surrounded by coated cement block walls. As reported, a NJDEP inspection in 1986 noted oil staining adjacent to the containment structure for this tank. A sampling plan was

submitted in 1987 and initial sampling was conducted in 1988. Initial investigative activities indicated concentrations of TPHC, VOCs, BNs, and metals in excess of the soil cleanup criteria.

Additional soil sampling was conducted during the 2003-2004 accelerated soil investigation. Soil analytical results, which were reported in a separate Soil Remedial Investigation Report, indicated delineation was completed to nearby AOCs and it is anticipated that this AOC to be addressed with a Deed Notice.

E.20 AOC 20 (5,000 Gallon Waste Oil AST in Building #12)

According to the 1994 Draft RIWP, this AST is located in the basement of the Powerhouse and was regulated under the facility's Hazardous Waste Storage Permit. The tank, which was previously located in a vault, had been moved to a containment area in the basement and had continued to be used under the facility's RCRA permit and had been inspected weekly as per RCRA and DPCC regulation. As such, it was determined that the AST was not ISRA applicable. NJDEP concurred with this assessment in their October 18, 1994 letter but raised concerns about this tank during a site meeting in late 2003. Based on this meeting, the AST was re-evaluated.

As documented in ENSR's December 5, 2003 letter to NJDEP, the AST had been taken out of service at some time after the 1994 *Draft RIWP* and had been removed from the facility. No staining or other evidence of past leaks or discharge was observed in the former containment structure. As such, No Further Action was again proposed for this AOC. At this time, NJDEP has not commented on this submission.

E.21 AOC 21 (Waste Coolant Tank South of Building #9)

As documented in the 1994 *Draft RIWP*, this AST was in use and was permitted under the facility's RCRA permit and was located in a secondary containment structure. The AST was inspected weekly per RCRA and DPCC regulations and no evidence of discharge was observed nor was any discharge documented. Based on these facts, No Further Action was recommended. NJDEP concurred with this assessment in their October 18, 1994 letter but raised concerns about this tank during a site meeting in late 2003. Based on this meeting, the AST was re-evaluated.

As documented in ENSR's December 5, 2003 letter to NJDEP, the AST had been taken out of service at some time after the 1994 *Draft RIWP* and had been removed from the facility. No staining or other evidence of past leaks or discharge was observed in the former containment structure. As such, No Further Action was again proposed for this AOC. At this time, NJDEP has not commented on this submission.

E.22 AOC 22 (600-Gallon Brill Skimmer)

As documented in the 1994 *Draft RIWP*, this AST was in use at the time of the report and was used as an oil skimmer and collection vessel for oil removed from the Spray Pond pre-treatment area. The AST was permitted under the facility's former RCRA Part B permit, was inspected weekly per RCRA and DPCC requirements, and was located in a secondary containment structure with an impermeable liner. No evidence of discharge was observed nor was any discharge documented. Based on these facts, No Further Action was recommended. NJDEP concurred with this assessment in their October 18, 1994 letter but raised concerns about this tank during a site meeting in late 2003. Based on this meeting, the AST was re-evaluated.

As documented in ENSR's December 5, 2003 letter to NJDEP, the AST had been taken out of service at some time after the 1994 *Draft RIWP* and remains at the facility. No staining or other evidence of leaks or discharge were observed in the in the vicinity of the AST. As such, No Further Action was again proposed for this AOC. At this time, NJDEP has not commented on this submission.

E.23 AOC 23 (Former Incinerator Location)

As reported in the 1994 *Draft RIWP*, a review of historic site plans conducted by Tellus identified that three incinerator sites had been present at the facility. One of these incinerators designated AOC-23, which operated from 1967 to 1974, was located at the south end of the Spray Pond.

This incinerator site is suspected to have been used for the burning of wood and other trash materials. As that the nature of the materials incinerated is not well known and that no sampling was ever conducted at the time of the incinerators' demolitions to verify that they had not impacted the surrounding soils, these three areas were included in the 1994 Draft *RIWP*. Incineration was discontinued at the site after 1974, mostly due to problems meeting air emissions limits. All incinerator structures had since been demolished.

Based on the results of a site investigation conducted at this AOC, which was reported in the September 2002 AOC*-23, 33, & 34 (Former Incinerators) SI Report*, concentrations of PAHs and metals were reported in excess of applicable soil cleanup criteria. Soil characterization from soil borings collected in this AOC were reported to have consisted either partly or entirely of the gray to black sandy fill material that is present in this area of the site to depths greater than eight feet. Based on the soil characterization, it appears that these incinerators are located on top of the northern most sections of the Old Landfill. Additionally, soil analytical results from this AOC indicate similar impacts to those identified in the Old Landfill. As such, ENSR has proposed that this incinerator AOC be incorporated into the Old Landfill.

E.24 AOC 24 (One 2000-Gallon Process Tank)

As documented in the 1994 *Draft RIWP*, this AST was used to store waste coolant, oil, and water for batch process through the Ultrafilter (AOC-28). This AST was permitted under the facility's former RCRA Part B permit, was inspected weekly per RCRA and DPCC requirements, and was located in a secondary containment structure. No evidence of discharge was observed nor was any discharge documented. Based on these facts, No Further Action was recommended. NJDEP concurred with this assessment in their October 18, 1994 letter but raised concerns about this tank during a site meeting in late 2003. Based on this meeting, the AST was re-evaluated.

As documented in ENSR's December 5, 2003 letter to NJDEP, the AST had been taken out of service at some time after the 1994 *Draft RIWP* and remains at the facility. No staining or other evidence of leaks or discharge were observed in the in the vicinity of the AST. As such, No Further Action was again proposed for this AOC. At this time, NJDEP has not commented on this submission.

E.25 AOC 25 (Two 10,000-Gallon USTs Southwest of Building #17)

As reported in the 1994 *Draft RIWP*, these tanks were identified as an AOC, but had already been removed in 1985 and excavated in 1987 in accordance with an NJDEP-approved closure plan. Approximately 650 yd^3 of soil from the former tank excavation was transported offsite for disposal. Based on the completion of remedial activities prior to the report, No Further Action was recommended. NJDEP concurred with this assessment in their October 18, 1994 letter.

E.26 AOC 26 (One 2,000-Gallon UST)

As reported in the 1994 *Draft RIWP*, these tanks were identified as an AOC, but had already been removed in 1986 according to a NJDEP-approved closure plan. During excavation, no evidence of leaks or discharge was observed and the tank was inspected by NJDEP personnel. Since the tank was properly closed pursuant to the regulations in effect at the time of closure, No Further Action was recommended. NJDEP concurred with this assessment in their October 18, 1994.

Confirmation soil samples were collected from the former location of this UST in 2001. Soil analytical results, reported in the 2001 *AOC-3A, 3B, 26, 29, 31, and 37 Site/Remedial Investigation Report*, indicated that no compounds were present at concentrations greater than applicable soil cleanup criteria. NJDEP again indicated that No Further Action was acceptable for this AOC in their letter dated May 14, 2002.

E.27 AOC 27 (Hazardous Material/Waste Storage Shed East of Building #12)

As reported in the 1994 *Draft RIWP*, the hazardous waste storage shed had been in use at the time of the report and was regulated under the facility's RCRA permit. The shed is designed for the storage of

hazardous materials and is constructed in a dyked area on a concrete slab with a collection sump. Inspections of this area were completed weekly as per RCRA and DPCC requirements. No discharges were documented. Based on these facts, No Further Action was recommended. NJDEP concurred with this assessment in their October 18, 1994 letter but raised concerns about this area during a site meeting in late 2003. Based on this meeting, the area was re-evaluated.

As documented in ENSR's December 5, 2003 letter to NJDEP, the Hazardous Waste Storage Shed remains in use by Flow Serve as a temporary storage area. The facility no longer has a RCRA Part B permit as it does not store waste longer than 90-days. Weekly inspections continue as per DPCC regulations and no discharges from this area have been documented. As such, No Further Action was again proposed for this AOC. At this time, NJDEP has not commented on this submission.

E.28 AOC 28 (Ultrafilter in Building #12)

As documented in the 1994 *Draft RIWP*, the ultrafilter was used to separate waste coolant and oil from water received from the process tank (AOC-24). Waste coolant and oil were contained and water was discharged to the sanitary sewer. This AST was permitted under the facility's RCRA permit, was inspected weekly per RCRA and DPCC requirements, and was located in a secondary containment structure. No evidence of discharge was observed nor was any discharge documented. Based on these facts, No Further Action was recommended. NJDEP concurred with this assessment in their October 18, 1994 letter but raised concerns about this tank during a site meeting in late 2003. Based on this meeting, the AST was re-evaluated.

As documented in ENSR's December 5, 2003 letter to NJDEP, the AST had been taken out of service at some time after the 1994 *Draft RIWP* and remains at the facility. No staining or other evidence of leaks or discharge were observed in the in the vicinity of the AST. As such, No Further Action was again proposed for this AOC. At this time, NJDEP has not commented on this submission.

E.29 AOC 29 (Old Landfill)

As previously indicated the landfill was cited by EPA officials in 1975 for being an un-permitted landfill and required its closure. Additionally, it was believed at the time that an "oil dump" area in the Old Landfill was responsible for the LNAPL identified at a newly installed water well. Since this time, various investigations have taken place at the Old Landfill.

As reported in the 1994 *Draft RIWP*, a hydrogeology investigation of the landfill was conducted in the early 1980s and reported in Capsule's 1983 *Report on the Hydrogeologic Investigation of the Phillipsburg Landfill*, which indicated that test pits showed no evidence of free liquid or unusual odors, soil samples had reported metals impacts, and that the landfill did not pose a threat to surface water or groundwater in the vicinity. Although not indicated, a closure plan appears to have been completed in 1981. Through the late 1980s and early 1990s monitoring wells were installed in the vicinity of the Old

Landfill to assess groundwater quality and delineate the LNAPL plume (AOC 42). Groundwater data is discussed in context of AOCs 42, 43, and 44. Based on the above, no further action was recommended for the landfill.

NJDEP responded in their October 18, 2004 letter indicated that since the Landfill would not be governed under current (1994) solid waste regulations; further review would be required to address impacted soils at the Landfill.

Additional investigative activities were conducted in 2001 and were reported in ENSR's 2001 *AOC-3A, 3B, 26, 29, 31, and 37 Site/Remedial Investigation Report*. The report indicated that fill appeared to be predominantly foundry sand with construction debris and other intermixed wastes. Soil analytical results reported sporadic impacts of TPHC, PAHs, PCBs, and metals. Based on this additional information, additional delineation was recommended. NJDEP responded in their June 13, 2001 letter indicating their agreement that the eastern and southern boundaries shall be further defined and that if further groundwater sampling indicates that the landfill has contributed to groundwater impact, a cap or cap augmentation would be required.

To provide documentation of the delineation of impacts at the Old Landfill, surface soil samples were collected at 300-foot intervals from the southern and eastern perimeter of the landfill. No samples were collected to the west due to the presence of the New Landfill and no samples were collected to the north as the Old Landfill was to be spilt at Loop Road into a northern and southern section, the southern portion would be included in a proposed land transfer. Based on the soil analytical results presented in the 2002 *Southside AOC Remedial Investigation Report Addendum*, no impacts were reported and delineation of the southern portion of the Old Landfill was complete. Once again, No Further Action was recommended with the stipulation that a Deed Notice is placed at the AOC and its future use is restricted to non-residential. NJDEP responded in a March 6, 2002 letter indicating that the landfill should be capped or closed pursuant to Solid Waste Regulations and that a groundwater investigation should be performed to verify that no impacts identified in the Landfill have migrated to groundwater.

IR responded to these comments in an April 9, 2002 letter indicating that closure approval was not required because the Landfill was closed prior to adoption of the Department's closure requirements. NJDEP has not yet responded to this submission.

Based on NJDEP's March 6, 2002 letter, a review of groundwater analytical data was conducted for monitoring locations in the vicinity of the Old Landfill. This data, presented in the April 26, 2002 letter from ENSR to NJDEP Re: *NFA Request for Old Landfill (AOC-29)* indicated that although chlorinated volatile organic compounds were identified south of the Old Landfill and sporadically to its north along with the LNAPL plume, groundwater flow potential did not support the presence of source material in the Old Landfill. As such No Further Action was recommended for the Old Landfill. NJDEP responded in a September 10, 2002 letter concurring with this recommendation.

Additional sampling was conducted at the Old Landfill by the Town of Phillipsburg to assess the distribution of impacts at the landfill with emphasis on the top 10-feet as this zone would be disturbed by planned construction activities. Analytical results reported in TRC's 2003 Site Investigation Report indicated similar material characterization and impacts as previous investigations.

Although the southern portions of the Old Landfill have received NJDEP concurrence that no further investigative action is required based on the 2002 NFA Request for the Old Landfill, historical information suggests that the Old Landfill extended north of the Loop Road to the Spray Pond. As described in the 1994 *Draft RIWP*, the north edge of the landfill is impossible to differentiate from areas which were historically filled at the southern facility structures and east of the Spray Pond, where filling was conducted to complete a road (Loop Road) around the facility.

Additionally, to the north of the currently known landfill extents appear other AOCs including the spray pond, former underground fuel oil lines, and the oil water separator building (AOC-41), which have had a variety of reported impacts. As such, IR will not rely on analytical data to delineate the northern extent of the former landfill, but will review historical information and soil boring logs to assess thickness of fill extending from the old landfill. At fill thicknesses of less than 8 ft, it is unlikely that disposal of material other than foundry sand was conducted. Therefore, IR will define the old landfill as those locations contiguous to the known location of the Old Landfill where fill thickness exceeds 8 ft. Upon NJDEP approval of the interpreted extent of the Old Landfill, IR expects to place a soil cap and deed notice the entire area of the Old Landfill.

E.30 AOC 30 (Sediment in Spray Pond)

The Spray Pond, as described in the 1994 *Draft RIWP* is a 2.5 million gallon concrete lined rectangular surface impoundment that is used to receive non-contact cooling water from the Power House (Building #12) and stormwater from the eastern portion of the facility. In the mid-1970s, the sediment at the bottom of the pond was removed and placed east of the inverse ponds (see AOC-2). Analytical results from samples collected from this material indicated TPHC, PAH, PCB, and metals in excess of the applicable soil cleanup criteria. Because this previously removed sediment had reported impacts, the sediment presently in the Spray Pond was included as an AOC.

In 1996, eight sediment samples were collected from the Spray Pond. Analytical results reported in a letter to NJDEP dated April 25, 1996 indicated that TPHC, PAHs, PCBs, and metals were present in the sediment at concentrations greater than the applicable soil cleanup criteria. The letter indicates that the Pond has an impermeable concrete liner and that impacts in the sediment would not have the capability to impact soil or groundwater. Additionally, discharge from the Pond is monitored under the facility's DSW permit. Based on the above, No Further Action was requested and the sediment would be removed as part of facility maintenance activities.

NJDEP responded in a July 6, 1999 letter indicating that MW-27 should be analyzed for TCL/TAL analysis to confirm that the sediment is not impacting groundwater.

In response, IR sent a letter NJDEP dated December 20, 1999, which stated that spray pond sludge was not impacting soil or groundwater based on sampling results. In the same letter, IR again requested No Further Action with sediment to be addressed as a facility maintenance issue. To date NJDEP has not responded to this request.

E.31 AOC 31 (Inverse Ponds)

As described in the 1994 *Draft RIWP*, the Inverse Ponds consist of two irregularly shaped surface impoundments, located southeast of the Spray Pond that receive water from the Spray Pond via an underground pipe and discharge water to the Ephemeral Stream via an outfall monitored under the facility's discharge to surface water permit. The Ephemeral Stream (AOC-37) channels the discharge to the Lopatcong Creek. The Inverse Ponds also receive (and discharge) surface water runoff from the eastern part of the facility, including the bulk storage tank farm, and serve as oil containment structures for the tank farm under the facility spill prevention, control, and countermeasure (SPCC) plan. Calculations of water volumes entering and exiting the inverse pond system indicates that the gunnite linings of one or both of the ponds leaks. An aqueous and sediment sample collected from the northern pond indicated TPHC impact. The potential for these ponds to have leaked petroleum to the groundwater below them has warranted their inclusion in the 1994 *Draft RIWP*.

As presented in the May 2001 *AOC 3A, 3B, 26, 29, 31 and 37 Site Remedial Investigation Report*, samples collected from the sediment contained in these ponds in 2000 reported concentrations of TPHC, PAHs, and metals in excess of the soil cleanup criteria. As presented in the August 2002 *AOC-31 Site/Remedial Investigation Report, additional* samples collected in 2002 indicate the presence of TPHC, PAHs, arsenic, and beryllium in soil beneath the ponds' gunnite linings. Presently, it is IR's intent to close the ponds and modify the stormwater and drainage system accordingly. Upon closure, the required investigation and remediation of impacts, as necessary, will be completed.

E.32 AOC 32 (Two Unlined Lagoons)

As reported in the 1994 *Draft RIWP*, two unlined ponds were located on the western border of the facility, west of the Foundry area. Analysis of water in the ponds indicated no compounds in excess of applicable surface water criteria. In 1991, the two ponds were replaced by a larger stormwater detention basin with a small retention basin near the southwest corner. In constructing the new stormwater basin, the bases of the original ponds were excavated. No documentation or construction diagrams were available for review. Based on the above, No Further Action was recommended. NJDEP concurred with this recommendation in their March 28, 1995 letter.

Recent soil sampling conducted in the vicinity of the stormwater basin indicated the presence of gray and black sand, presumably foundry sand. Soil analytical results, reported in the 2004 Soil Remedial Investigation Report, indicated sporadic impacts of PAHs in excess of applicable soil cleanup criteria. As documented in this Site History Report, no ponds were present in this area of the facility before the 1930s. This low-lying area appears to have been filled with foundry sand during early facility operations. See Appendix L for additional information regarding filling activities conducted at the site. Based on the identified PAH impacts during investigative activities related to AOC-17, ENSR has recommended that these impacts are addressed in AOC-17 (Former Iron Foundry) and the AOC-32 (Two Unlined Ponds) is not reopened.

E.33 AOC 33 (Former Incinerator Location)

As reported in the 1994 *Draft RIWP*, a review of historic site plans conducted by Tellus identified that three incinerator sites had been present at the facility. This incinerator, identified on a 1960 site plan, was located north of Building #17 in the northern portion of the property and is identified as AOC-33.

This incinerator was suspected to have been used for the burning of wood and other trash materials. As that the nature of the materials incinerated is not well known and that no sampling was ever conducted at the time of the incinerators' demolitions to verify that they had not impacted the surrounding soils, this area was included in the 1994 Draft *RIWP*. Incineration was discontinued at the site after 1974, mostly due to problems meeting air emissions limits. All incinerator structures had since been demolished.

Based on the results of site investigations conducted at these AOCs reported in the September 2002 AOC*-23, 33, & 34 (Former Incinerators) SI Report*, concentrations of PAHs and metals were reported in excess of applicable soil cleanup criteria. Analytical results at AOC 33, located north of Building 17A, indicated TPHC and arsenic in excess of the applicable soil cleanup criteria warranting additional investigation.

Additional sampling was conducted during the 2003-2004 accelerated soil investigation. Soil analytical results, which were reported in the Soil Remedial Investigation Report, indicated delineation was completed and it is anticipated that this AOC will be addressed with a Deed Notice.

E. 34 AOC 34 (Former Incinerator Location)

As reported in the 1994 *Draft RIWP*, a review of historic site plans conducted by Tellus identified that three incinerator sites had been present at the facility. This incinerator site (AOC-34), identified from a 1960 site plan, was located immediately adjacent to Building #22, southwest of the Spray Pond.

This incinerator was suspected to have been used for the burning of wood and other trash materials. As that the nature of the materials incinerated is not well known and that no sampling was ever

conducted at the time of the incinerators' demolitions to verify that they had not impacted the surrounding soils, these three areas were included in the 1994 Draft *RIWP*. Incineration was discontinued at the site after 1974, mostly due to problems meeting air emissions limits. All incinerator structures had since been demolished.

Based on the results of site investigations conducted at these AOCs reported in the September 2002 *AOC-23, 33, & 34 (Former Incinerators) SI Report*, concentrations of PAHs and metals were reported in excess of applicable soil cleanup criteria. The samples were reported to have consisted either partly or entirely of the gray to black sandy fill material that is present in this area of the site to depths greater than eight feet. Based on the soil characterization, it appears that this incinerator is located on top of the northern most sections of the Old Landfill. Additionally, soil analytical results report similar impacts similar to those identified in the Old Landfill. As such, ENSR proposes that this incinerator AOC is incorporated into the Old Landfill.

E.35 AOC 35 (One 1,000-Gallon Diesel UST East of Building #12)

As reported in the 1994 *Draft RIWP*, this UST was removed in the mid 1970s. However, the tank had a history of leakage. As such, sampling was conducted in the vicinity of the former tank. Analytical results from field and laboratory analytical methods, reported in the 1995 *Report of Soil Investigation AOC 38 & 35*, indicated that no compounds exceeded applicable soil cleanup criteria. No Further Action was recommended. NJDEP concurred with this recommendation in their April 11, 2000 letter.

E.36 AOC 36 (Soil Pile)

As reported in the 1994 *Draft RIWP*, potentially impacted soil that was excavated during site modifications and upgrades during the early 1990's was segregated and placed in stockpiles east of the tank farm and south of Building #111. These piles were later moved to an area south of the spray pond sludge disposal area (AOC 2). Given the unknown condition of the soil stockpiled, this soil pile was included as an AOC in the 1994 Draft *RIWP*. Based on the anticipation that this material may be impacted, ENSR submitted a *Waste Classification Sampling Plan & Soil Reuse Sampling Proposal* in July 2003 proposing a reduced-frequency soil reuse sampling plan. NJDEP verbally concurred with this proposal during the October 2003 meeting and presentation (*History, Status, and Proposed Work for Areas of Concern at the former Ingersoll Rand facility in Phillipsburg, New Jersey*).

Soil sampling activities were conducted at this AOC during the 2003-2004 accelerated soil investigation. Soil analytical results for this area will be submitted in a separate Soil Reuse Plan. Based on the analytical results, expected remedial action for this AOC is reuse at either the old or new landfill prior to capping. Due to the impact identified in the current soil pile location, post excavation soil sampling was conducted at the former soil pile location to confirm the removal of the impacted soil. Soil analytical results from post-excavation sampling, presented in the 2004 Soil Remedial Investigation Report,

indicated that impacts related to the soil pile had not impacted surface soil at the former storage location.

E.37 AOC 37 (Ephemeral Stream)

The Ephemeral Stream was identified as an AOC in the 1994 *Supplement to the Draft RIWP*, which presented a sampling workplan. This intermittent stream is a part of the facility's stormwater management system and represents the final DSW outfall from the Inverse Ponds which channels facility discharge water to the Lopatcong Creek. Sampling conducted in 2001 and reported in the 2001 *AOC 3A, 3B, 26, 29, 31 and 37 Site Remedial Investigation Report*, indicated that arsenic was present at a remote downstream location at concentrations in excess of applicable soil cleanup criteria.

Later in 2001 one confirmatory soil sample and two delineation soil samples were collected in the vicinity of the area of reported arsenic impact; one 25-feet upstream and one 55-feet downstream. Analytical results, presented in the 2002 Southside AOC Remedial Investigation Report Addendum, indicate that the arsenic concentration at the original sample location was anomalous and that no further action was warranted. NJDEP concurred with this recommendation in their May 14, 2002 letter.

E.38 AOC 38 (Buried No. 2 and No. 6 Fuel Oil Pipelines (Abandoned))

As reported in the July 1995 *Status of the Remedial Investigation./Remedial Action on the Buried and Abandoned No.2 and No.6 Fuel Oil Lines*, a leaking discharge line from recovery well RW-4 was discovered in 1994. The discharge contained small amounts of recovered LNAPL. NJDEP was notified and remedial actions to address this discharge were commenced. During excavation additional No.6 fuel oil impact was identified from a nearby No.6 fuel oil pipeline extending from the bulk AST-farm. Post excavation soil samples from the RW-4 discharge line excavation indicated no additional TPHC impact. However, additional investigation was conducted at the former No.2 and No.6 fuel oil pipelines extending from the bulk AST farm. As documented in the 1995 report, impacted soil was removed from the No.6 oil pipeline excavations. However, impacted soil appears to have been returned to excavations west of RW-4. Soil samples conducted along the in-place No.2 fuel oil pipeline reported TPHC at concentrations below applicable criteria.

Additional field and laboratory analysis, reported in the 1995 *Report of Soil Investigation AOC 38 & 35*, indicated no TPHC or VOCs in excess of applicable soil cleanup criteria. Based on this analysis, No Further Action was recommended. NJDEP concurred with this assessment in their April 11, 2000 letter.

E.39 AOC 39 (Former Scrap Pad)

In the summer of 1997 during the installation of a trench for a gas pipeline immediately south of Building #24, an area of petroleum-like staining and odor was discovered. Samples collected by IDP and

reported to NJDEP in their October 27, 1997 letter, indicated impacts in excess applicable soil cleanup criteria for TPHC and select PAH compounds. In review of historic facility plans, it was determined that the source area may have been a former scrap pad location.

Based on the results of investigations at other scrap pads, additional investigation and delineation was warranted. Additional soil sampling was conducted in the vicinity of the former scrap pad during the 2003-2004 accelerated soil investigation. Soil analytical results, which were presented in the 2004 Soil Remedial Investigation Report, indicate that the AOC has largely been delineated to nearby structures and/or AOCs. It is anticipated that this AOC will be addressed with a Deed Notice.

E.40 AOC 40 (Concrete Structure South of Former Building #17)

This AOC was identified by IDP during the facility's investigation of an apparent sinkhole that developed near Building #16. The structure, identified in IDP's October 1999 letter to NJDEP, was approximately 3.25 x 4.75 x 4.6-feet. A sample of the sediment contained within the structure indicated the presence of TPHC, PCBs, and metals in excess of applicable criteria. The sediment was removed and disposed by IDP in 2000 and two additional soil borings were conducted outside the structure. Soil samples collected from these borings did not report any compounds in excess of soil cleanup criteria. A report discussing these activities and analytical results was not submitted to NJDEP. This material will be summarized and submitted to NJDEP is a forthcoming submission.

E.41 AOC 41 (Spill at Separator Building)

The Oil Water Separator Building (AOC 41) is located on the eastern portion of the site and north of the Spray Pond (Building #104) and houses three oil-water separation tanks. These tanks were formerly used to store fuel oil and were converted to oil water separator tanks in the mid to late 1980s. The oil-water separator is utilized as a precautionary measure should the groundwater depression pumps at the recovery wells intake LNAPL. As documented in an IDP memo dated February 2, 2000, during the winter of 1999-2000, the oil-water separation tanks housed in Building 104 experienced an overflow when water inside the tanks froze and expanded, resulting in the release of petroleum to the secondary containment liner over the soil at the base of the building. Post-cleanup sampling indicated evidence of a previous petroleum release at this location, presumably from overfill or spillage at the tanks during their former operation as fuel oil storage tanks. As such, additional investigation was determined appropriate for this area. Additional soil sampling was conducted in the vicinity of the separator building during the 2003-2004 accelerated soil investigation. Soil analytical results, which were presented in the Soil Remedial Investigation Report, indicate that the AOC has been delineated. It is anticipated that this AOC will be addressed with a Deed Notice.

E.42 AOC 42 (Groundwater – West Side of Fuel Oil Plume)

As documented in NJDEP's letter dated October 12, 2000, continued remedial investigation data can be conducted as a site-wide investigation. As such groundwater activities will be discussed at the end of this Appendix instead of an AOC-by-AOC basis.

E.43 AOC 43 (Groundwater – LNAPL Plume)

As documented in NJDEP's letter dated October 12, 2000, continued remedial investigation data can be conducted as a site-wide investigation. As such groundwater activities will be discussed at the end of this Appendix instead of an AOC-by-AOC basis.

E.44 AOC 44 (Groundwater – Dissolved Phase)

As documented in NJDEP's letter dated October 12, 2000, continued remedial investigation data can be conducted as a site-wide investigation. As such groundwater activities will be discussed at the end of this Appendix instead of an AOC-by-AOC basis.

E.45 AOC 45 (Building #16 Sump and "Well")

In response to the lease of Building #16 by IR to a structural steel fabrication company (Blue Ridge Steel), ENSR conducted a regulatory applicability review to determine potential impact of Blue Ridge Steels operations on any of IR's current permits or on the environmental condition of the property. During a site walk and inspection of Building #16, ENSR observed the presence of an 18-inch diameter unlined sump with concrete cover and a drain or well-like structure that consisted of a 4-inch diameter pipe extending into the ground. Based on the presence of these structures, the historic industrial activities performed in this building, and the expected activities by Blue Ridge Steel, an investigation was warranted.

Soil sampling activities were conducted at this AOC during the 2003-2004 accelerated soil investigation and were reported in the 2004 *Soil Remedial Investigation Report*. Based on soil analytical results, which indicated impacts of PCE and metals, a monitoring well was installed near this location to verify groundwater quality and soil impacts were delineated by nearby sample locations. Groundwater analytical results, which will be presented in an annual Groundwater Monitoring Report in late-2004, did not indicate impact in excess of applicable groundwater quality criteria. Soil impacts are intended to be addressed by a deed notice and the groundwater monitoring well will be assessed for usefulness in the site-wide groundwater investigation activities.

E.46 Groundwater Investigations

Since the installation of monitoring and recovery wells at the site to address the LNAPL which was identified on the groundwater surface in the 1970s, groundwater cleanup activities were placed under the oversight of a NJPDES Discharge to Groundwater (DGW) permit (Permit No. NJ0078484). Under this permit IR installed approximately 45 monitoring and recovery wells between July 1982 and November 1992. Reports detailing a portion of these activities were submitted between 1992 and 1994 and included the 1992 *Installation of Additional Monitoring Wells as Required by DGW Permit NJ0078484*, the 1992 *Progress Report – Installation of Monitoring Wells*, and the 1993 *Progress Report – Installation of Monitoring Wells 24, 25, and 26*. These reports presented continuing activities to investigate and remediate the LNAPL plume.

After submission of the 1994 *Draft RIWP*, NJDEP indicated that groundwater investigations would no longer be conducted under the DGW permit due to a change in regulations, and continued investigation would be conducted under the facility's ACO. Further, as presented in NJDEP's October 18, 1994 letter, a more complete groundwater investigation would be required.

In response, a 1995 *Groundwater Reports – Update to Supplement to the Draft Remedial Investigation Workplan* was submitted to NJDEP and provided additional information regarding LNAPL remediation, groundwater monitoring activities, and the likelihood that the Landfill was not contributing to groundwater impacts.

NJDEP responded to the above submissions in a March 28, 1995 letter indicating more information and a complete groundwater investigation are still required.

In September 1997 a *Free Product Remedial Investigation Report* was submitted to NJDEP and detailed activities conducted to characterize groundwater flow and LNAPL conditions through the use of pumping tests. Results of this study indicated that a groundwater divide was present through the central portion of the site and LNAPL would not likely have the ability to migrate westward; product may have the ability to migrate southeast although hydraulic conductivity is very low except where solution cavities exist. Recommendations included continued product recovery with water table depression to maintain hydrodynamic control of the western portion of the LNAPL plume.

NJDEP responded to the 1997 report in a February 11, 1998 letter indicating that a more comprehensive hydrogeologic study should be completed.

During 1998 and 1999 supplemental activities were conducted to evaluate the LNAPL identified at MW-5 which was identified as AOC-18. Findings, reported in the 2000 *Remedial Investigation Report – AOC 18*, indicated that LNAPL from the main plume area (AOC 43) may be migrating to the MW-5 area and that no appreciable dissolved phase impact has occurred from the LNAPL plume. Recommendations made in this report included the continuation of LNAPL recovery and the evaluation

of MW-5 for the installation of a LNAPL recovery system. A pneumatic recovery system was installed in late 2002 as a pilot test for recovery operations at that location. This recovery system went online in early 2004.

NJDEP response, dated October 12, 2000 indicated that continued remedial investigation data shall be submitted in electronic format and can be conducted in site-wide or AOC-by-AOC submittals.

In 2002, in response to NJDEP's March 6, 2002 letter indicating that a groundwater investigation of the Old Landfill would be required, a review of groundwater data was initiated. This review was conducted simultaneously with the preparation of a comprehensive *Remedial Investigation Work Plan for Groundwater*, which was submitted in 2002 along with an *NFA request for the Old Landfill* documenting the data review of wells in the vicinity of that AOC.

NJDEP accepted the *Remedial Investigation Work Plan for Groundwater* in their July 9, 2002 letter and indicated that continued investigative activities pursuant to the approved Groundwater Investigation Work Plan would be required to determine if the Landfill was a continuing source of impact to the groundwater.

Pursuant to the accepted *Remedial Investigation Work Plan for Groundwater* activities to evaluate site-wide groundwater were conducted through 2002. Activities included the preparation of a groundwater analytical database, preparation of a geologic database, comprehensive groundwater sampling, down-hole geophysical investigations, product thickness gauging, LNAPL fingerprinting, and a well search. Results of this investigation were presented in 2002 a *Groundwater Remedial Investigation Report*. As documented, recommendations included verification of well search results, installation of additional wells, collection of additional LNAPL samples for fingerprinting, continued product recovery, collection of groundwater samples using Passive Diffusion Bags to assess vertical concentration trends, removal of BN compounds from future sampling, and further evaluation of metals impacts at select wells. IR began implementing recommendations through 2003 and submitted its first *Annual Groundwater Monitoring Report and Supplemental Remedial Investigation Report* detailing the results of the activities conducted from mid-2002 through mid-2003.

NJDEP's responded to the 2002 *Remedial Investigation Work Plan for Groundwater* in their letter dated October 28, 2003. NJDEP recommendations included a review of the potable water wells, continued verification of well search results, conducting an alternative review of site geology, conduct additional horizontal and vertical delineation of dissolved phase groundwater impacts, and evaluate metals impact in groundwater in relation to metal impacted soil identified at the site.

IR responded to the NJDEP's October 28, 2003 letter in a 2004 *Response to NJDEP Letter Dated 10-28-03* providing additional information as requested. IR has since continued to implement groundwater monitoring and investigation activities in support of the development of a Remedial Action Work Plan for groundwater.