Remedial Action Report

Record of Preparation, Review, and Approval

Southern Maryland Wood Treating Site

Operable Unit One

On-Site Thermal Desorption of Contaminated Soils

This report has been prepared in accordance with EPA OSWER Directive 9320.2-09A and will be used as the basis for the development of the site Final Close-Out Report.

RA Report Prepared By:	U.S. Army Corps of Engineers:	Signature Name/Title Date
RA Report Reviewed By:		Signature Name/Title Date
Approved By:	EPA Region 3 Approving Official:	Signature Name/Title Date

Remedial Action Report

Southern Maryland Wood Treating Site
Hollywood, MD

Southern Maryland Wood Treatment Plant Remediation Project – Aerial photo date February 2000

Contracts administered by the U.S. Army Corps of Engineers:

Remedial Design: Contract No. DACA – 31-95-D-0083, Delivery Orders 13 - ICFKaiser, Inc.
Remedial Action: Contract No. DACA – 31-95-D-0083, Delivery Orders 15 and 16 - ICFKaiser, Inc., International Technologies, Inc.

Interagency Agreement DW96943895-01-0 dated 17 Jan 97

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I. Introduction

The Southern Maryland Wood Treating Site is approximately 25 acres in size and is located on a 96-acre parcel of land on Rt. 235 approximately one mile north of Hollywood, Maryland. The site is bounded by residential, agricultural and wooded tracts of land. Stormwater flows and groundwater seepage flows into an east and west tributary which combine to form Old Tom's Run, the discharge of which eventually reaches Breton Bay and the Potomac River.

The facility was owned and operated by the Southern Maryland Wood Treating Company from 1965 to 1978 as a pressure treatment wood preservation business. Creosote and Pentachlorophenol (PCP) were used as wood preservatives by the facility. Six unlined lagoons were used for disposal of liquid wastes from the process. As a result of such disposal practices, onsite soils and ground water beneath the lagoons became contaminated. Non-aqueous phase liquids (NAPLs), both light (LNAPLs) and dense (DNAPLs) were found in the subsurface beneath the lagoons and above the underlying clay layer. Additionally, due to ground water discharge to the pond from the lagoon area, surface water and sediments in the onsite pond and sediments in Old Tom's Run (east and west tributaries) became contaminated. Storage of treated wood onsite resulted in surface soil contamination in the upper site and northeast tank areas.

In the early 1970's, the operators of the facility, L.A. Clark and Sons, Inc., submitted an application to the local health department for the construction of a new onsite well. Upon inspection of the Site, health officials found evidence of possible contamination and rejected the application. The State of Maryland then entered into negotiations with L.A. Clark, asking them to clean up the site. However, in 1978, the company filed for bankruptcy and closed the facility.

Pursuant to a petition for contempt filed by the State, L.A. Clark began an initial cleanup of the site in 1982. Liquids from the lagoons were sprayed into the woods behind the Site. The sludges from the lagoons were excavated, mixed with wood chips, composted sewage sludge and top soil and spread in a previously uncontaminated area on the southeastern section of the property in an attempt to bioremediate the contaminants. This attempt at land treatment of the sludges was unsuccessful and resulted in the contamination of several additional acres of the property (later designated as Pit 1).

On March 14, 1985, EPA initiated its first response action at the Site which was prompted by the discovery of contaminated material seeping into the freshwater pond. During this activity, approximately 1,400 cubic yards of contaminated sediments were excavated from the pond. This sediment was stabilized with cement kiln dust and encapsulated on-site in an impermeable synthetic liner to the east of the former lagoon area within the area designated as Pit 4. The stabilized material was staged on-site to await final cleanup activities.

The Site was promulgated on the National Priorities List on June 1, 1986. In 1988, EPA concluded a remedial Investigation (RI) and Feasibility Study (FS) at the Site. Based on the findings of these studies, EPA issued a Record of Decision (1988 ROD) on June 29, 1988. The 1988 ROD called for the construction of a subsurface barrier wall around the former lagoon area, which was found to contain a plume of contaminated ground water; excavation and onsite

incineration of contaminated soil from the lagoon area, the land treatment area, and other areas of the Site; onsite incineration of liquids and solids contained in tanks and retorts; demolition of buildings; and pumping and treatment of contaminated ground water.

In order to expedite the start of cleanup work at the Site, the remedial action was divided into phases. The first phase was the installation of a sheet pile barrier wall around the former lagoon and process area, designated as Pit 4 or the containment area. Construction of the sheet pile wall was completed in November of 1990. The second phase included the remaining components of the selected remedy. In May of 1992, design of the incineration and ground water treatment components had reached the 95% stage. At that time, it was apparent that a substantial cost reduction could not be achieved, resulting in Maryland's inability to fund its required 10% share of site remediation costs. At the same time, local citizens and local government entities expressed opposition to an on-site incinerator. The design work was suspended and EPA proposed to conduct a Focused Feasibility Study to reevaluate the remedy for the Site.

On June 29, 1993, a second removal action was initiated to address certain immediate threats to the Site while the FSS was being conducted. This action included the demolition of several buildings that were in danger of collapse; the removal and off-site disposal of liquid and solid waste in numerous tanks and retorts, and over 350 drums of investigation derived wastes; the recovering of the pile of previously excavated and stabilized sediment; the construction of an underflow dam to reduce the amount of floating and sinking material migrating from the onsite pond into the west tributary stream; the construction of a trench upgradiant of the pond to collect contaminated ground water and DNAPL; and the construction of a water treatment facility to treat water from the pond and/or the trench prior to discharge to the west tributary. The water treatment plant became fully operational in 1995.

An FSS was conducted from May 1992 until February 1995, at which time the Final FSS report was issued. Based on the FSS, EPA issued a Record of Decision (1995 ROD) on September 8, 1995, which revised the remedy selected in the 1988 ROD.

II. Operable Unit Background

The major components of the remedy selected in the 1995 ROD included the following:

- Dewatering of the containment area in preparation for the excavation of subsurface soil and DNAPLs below the water table followed by on-site treatment of water generated in the dewatering process and discharge of the treated water to the west tributary;
- Excavation of soil from within and outside of the sheet pile wall and dredging of sediments from the pond and segments of Old Tom's Run that contain contaminants in excess of the cleanup levels;

- Dewatering of saturated soils/sediments onsite in preparation for treatment by thermal desorption, followed by on site treatment of water generated in the dewatering process and discharge of treated water to the west tributary;
- Staging of excavated soils/sediments on-site in preparation for dewatering, following dewatering preparation for treatment by thermal desorption, and following thermal desorption preparation for backfilling. Also, on-site staging of NAPLs collected during excavation and dewatering, water treatment residues, recondensed contaminants from the thermal desorption process, and any grossly contaminated soil/sediments that is not amenable to treatment by thermal desorption prior to off-site shipment for treatment and disposal;
- On-site treatment of excavated soils and sediments by a thermal desorption process;
- Appropriate on or off-site treatment and disposal of desorbed, recondensed contaminants from the thermal desorption process, NAPLs collected during excavation and dewatering, water treatment residues, and any grossly contaminated soil/sediment that is not amenable to treatment by thermal desorption;
- Sampling of treated soils and sediments to ensure delisting levels have been achieved;
- Backfilling with treated soil/sediments in excavated areas;
- Pumping and treating of surface water from the on-site pond until the sources of contamination to the surface water (i.e., soil, sediment, ground water) are remediated. Treatment of surface water in the on-site water treatment system followed by discharge to Old Tom's Run;
- Building demolition and cutting off of the sheet pile wall following remediation, as determined necessary. Off-site disposal of building rubble and sheet piling; and
- Maintenance of perimeter fencing until access restrictions are no longer necessary.

The remedial action objectives as stated in the 1988 ROD and revised by the 1995 ROD were to eliminate contaminants at the Site which served as a source of ground water and surface water contamination and to reduce or eliminate the risks associated with exposure to contaminated surface water, soil and sediments. In order to address these unacceptable risks and to protect human health and the environment, the following detailed remedial action objectives and associated cleanup levels have been established:

(1) to prevent ingestion/direct contact with surface soils that contain in excess of 0.1 ppm benzo(a) pyrene (B(a)P) equivalence;
(2) to protect ground water as a current or potential drinking water supply, by containing or treating subsurface soil that contains in excess of 1.0 ppm B(a)P equivalence;
(3) to prevent future ground water contamination through the recovery and/or management of NAPLs; and
(4) to protect surface water quality and to restore sediments in the pond and tributaries to acceptable levels for the protection of aquatic life. Sediment cleanup levels have been established at 3.2 ppm low molecular weight PAHs, at 9.6 ppm high molecular weight PAHs, and 0.4 ppm PCP. All sediment cleanup levels are on a dry weight basis.

Upon achievement of the cleanup levels as detailed above the Site will be available for residential use.

ROD Amendments

On March 5, 1999, EPA issued a non-significant change to the ROD establishing cleanup levels for PCP in surface and subsurface soils. The subsurface cleanup level was established at 1.7 mg/kg and the surface cleanup level was established at 5 mg/kg. The 1995 ROD established soil cleanup levels for CPAHs because these contaminants were found to be most prevalent on the site, both in concentration and extent of contamination, and because they presented the greatest risk to human health and the environment. PCP was also known to be present in site soils but at a much lower frequency and always in areas where the CPAH concentrations were high. Therefore, EPA did not initially establish a separate cleanup level for PCP, believing that the soil contaminated with PCP would be excavated and treated with the soils excavated based on the CPAH cleanup levels. During the course of cleanup activities, EPA and USACE determined that a separate cleanup criteria for PCP was appropriate to determine excavation and treatment requirements in the rare instances where PCP was present in higher concentrations than CPAH contamination.

Remedial Design Summary

Requirements for the thermal desorption system for use at the SMWTP site were a treatment temperature of 900 degrees Fahrenheit at a retention time of approximately 10 minutes in order to desorb contaminants from the soils and sediments. The desorbed contaminants were to be condensed or otherwise collected for further treatment or disposal. Air emissions from the thermal desorber were to comply with the substantive requirements of Maryland regulations governing air pollutants and air quality for VOCs, visible emissions, particulates and nuisances and with federal air emission standards for process vents.

The ground water treatment system at the SMWTP site consisted of two systems, the original water treatment plant, designated as WTP-1, placed in operation in 1995 for the treatment of surface waters from Pit 4, and the new ground water treatment system, designated as WTP-2, constructed for the treatment of thermal desorption condensate water. Components of the WTP-2 treatment system consisted of settling tanks, oil/water separation, chemical addition and mixing, inclined plate clarification, sand filtration, sludge dewatering, Ultraviolet Oxidation technology, pH adjustment and activated carbon treatment.

III. Construction Activities

Site Preparation

In October of 1997 ICFKaiser began site preparation activities at the SMWTP site in preparation for the upcoming remedial action. Initial preparatory activities included siting and preparing the locations for the new water treatment plant (WTP-2) and for the thermal treatment pad. Clearing and grubbing of other handling and process areas, road building and utilities installation and

hook-up. Several buildings that were part of the former wood treatment plant operations were also demolished during this phase.

Water Treatment Plant No. 2

After clearing and grading of the new water plant location, OHM Remediation, Inc., a subcontractor to ICFKaiser, Inc. began building WTP-2. WTP-2 was designed to provide treatment of the condensate from the thermal desorption system, dewatering of excavations (ground water) and water from the stormwater pond located in the containment area, as necessary. The contractors installed a concrete pad and a sheet metal and girder building to house WTP-2 components. WTP-2 consisted of an equalization tank, an oil/water separator, a bag filtration system, precipitation (pH adjustment and polymer addition), an inclined plate separator, sand filtration, UV/oxidation, liquid phase carbon adsorption, aeration and all associated transfer pumps and controls. A filter press was used to de-water the sludge prior to its disposal in an approved disposal facility. Construction of WTP-2 continued through March of 1998. A successful Proof of Performance Test for the new water plant was completed in April 1998. Difficulties in achieving the discharge criteria for WTP-2 process water were encountered throughout the thermal desorption treatment activity. However, this condition was alleviated by utilizing WTP-2 water as process make-up water in the CTDU systems and for soil rehydration. The thermal desorption process, including condensate treatment and recycling, was a water-losing operation. Clean "make-up" water was continually added to the process to compensate for water consumption.

Water Treatment Plant Area

Thermal Desorption Pad

Site preparation of the thermal treatment pad area commenced in January 1998 and consisted of grubbing of bushes and small trees and grading out of the area to establish level ground. This

area was wet and swampy and called for the removal of clayey surface soils and the addition of gravel in several areas to maintain a dry trafficable surface. A concrete pad was constructed to provide a solid surface for construction and operation of the thermal desorption units. Two pole barns for soil protection from the elements were also constructed adjacent to the TDU pad. A truck scale was installed for weighing dump trucks filled with excavated soils for treatment. A 100-foot by 100-foot, 100,000-gallon modular tank was installed for process water storage to the immediate south of the TDU pad.

In February 1998, the two (2) continuous and two (2) batch vacuum Thermal Desorption Units were mobilized to the project site. Installation activities (mounting, piping, wiring, etc.) for these units and their respective Vapor Recovery Systems (VRS) began immediately.

Proof of Performance Testing

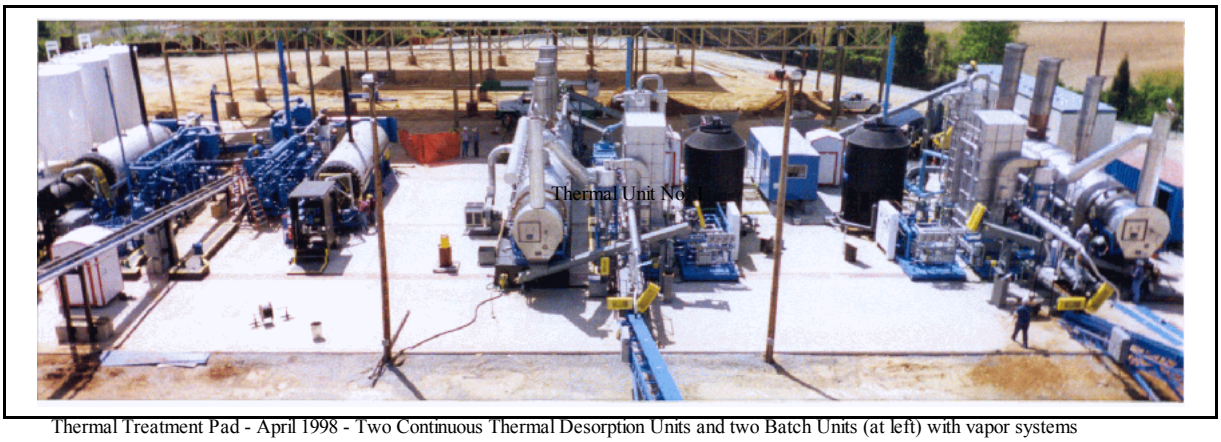
After some initial start-up shortcomings mainly involving soil conveyance systems, the thermal units were considered prepared for Proof of Performance (POP) testing in June 1998. POP preliminary test results were acceptable. The EPA granted authorization for operation of the two (2) Continuous Thermal Desorption Units up to a throughput rate of 12 tons per hour for each unit. Operations of the two (2) Batch Vacuum Thermal Desorption Units commenced also with the goal of sustaining the design average throughput rate of 1 ton per hour for each unit.

In April 1999 a second POP test was conducted to determine if elevated throughput rates of 15 tons per hour would yield acceptable performance results for air and soil discharges from a CTDU. Stack sampling provided acceptable results for compliance with air discharge limitations at the elevated throughput rate. However, system optimization and maintenance requirements indicated that CDTU operations were best sustained in the range of 10 to 12 tons per hour for each CTDU.

Thermal Desorption

Sustained 24-hour, 7-day per week operations of the four (4) thermal desorption units began after the satisfactory completion of POP testing in June 1998. Initial operation of the continuous units was plagued by shortcomings in the area of soil conveyance and excessive solids loading in the condensate flow. In July of 1998, the metal screw feed conveyers were replaced with belt conveyors which were more effective in raising feed soils to the TDU feed hopper. In August of 1998 belt conveyors were also installed on the discharge side of the CTDUs to increase operating time for the units. Excessive clogging and wear and tear on the single, horizontal feed screw into the CTDU drums prompted USACE representatives to direct ICFKaiser personnel to procure twin screw feed units to replace the single screw units. In December 1998, twin screw feed units were installed on each of the two (2) CTDUs and yielded elevated soil throughput rates.

Operation of the two (2) Batch Vacuum Thermal Desorption Units (BTDUs) proved problematic. Activities were constantly plagued by soil conveyance difficulties (clogging of feed screw conveyors and discharge screw conveyors) and internal cracking of the unit drums requiring confined space entries for welding repairs. USACE representatives directed a shutdown of the BTDUs in January 1999 due to unsatisfactory performance. Soil blending activities were refined and expanded in order to make wetter, more contaminated site soils amenable to treatment in the CTDUs.



Thermal Treatment Pad - April 1998 - Two Continuous Thermal Desorption Units and two Batch Units (at left) with vapor systems

Soil treatment activities progressed through the summer of 1999, a very dry season, at an average combined treatment rate of 18 tons per hour for the CTDUs. Throughput rates slowed in the fall of 1999 due to a period of refurbishment activities which was also plagued by re-start problems. Refurbishment activities included the repair of internal insulation on CTDU #1, and verified that the drums on each of the CTDUs were not experiencing unusual wear. Throughput rates were reduced throughout the winter and spring of 2000 down to a combined average throughput rate of approximately 13 tons per hour, attributed to higher moisture from increased precipitation and also due to an increase in clay content in the soils excavated from lower elevations in Pit 4. The summer of 2000 experienced higher than average precipitation and this, combined with still more Pit 4 soils higher in clay content, reduced sustainable throughput rates down to a combined average rate of 11 tons per hour for the two CTDUs. Soil treatment operations ceased on October 6, 2000 at a total soil treatment tonnage amount of 270,584.

Pit 4 Excavation – June 2000

Pit 4 Dewatering

Pit 4 dewatering activities began in February 1999. A series of six deep wells in the upper parts of Pit 4 combined with a 41-point wellpoint system along the 130 foot contour elevation line. Extracted water was pumped through an oil/water separator and a settling tank and was then pumped to either WTP-1 or WTP-2 for processing. Dewatering activities continued through the summer of 1999. On September 16, 1999, Hurricane Floyd dumped 17 inches of rain onto the Site, flooding Pit 4 with approximately 2 million gallons of rainwater and significantly undermining all de-watering progress made up to that point. Removal of the hurricane water from Pit 4 was accomplished gradually over the next few months using a new mobile water treatment system, designated WTP-3, which consisted of bag filtration, carbon adsorption, resin treatment for cyanide removal, and pH adjustment.

Stream Remediation and Restoration

Beginning in February 2000, excavation activities in the small tributary stream that receives stormwater runoff from Pit 4 commenced. Sampling activities detected pockets of PAH contaminated within the stream sediment in a number of locations in the upper and lower reaches of the tributary stream. Excavation activities were undertaken with the minimal impact necessary for adequate removal of affected sediments. In total, approximately 600 tons of contaminated sediment was removed from the stream area. Restoration activities followed the removal action and were completed in September 2000.

Demobilization Activities

After thermal treatment operations ceased in October 2000, demobilization activities commenced with the decontaminating and dismantling of the CTDU units and VRS system components. WTP #3 was reconfigured for decontamination water treatment and moved adjacent to the thermal treatment pad to permit the shutdown and breakdown of WTP #2. Deconning and dismantling began first with CTDU #1, then for CTDU #2. USACE secured bids for the purchase of the TDUs and the units were shipped off-site by the respective new owners after cleaning and breakdown operations were completed.

Backfill of staged treated soils from Pit 1 into Pit 4 continued until Pit 4 achieved the proper grading. Final site grades were roughly based on initial site contours with minor adjustments for the slightly increased amount of fill material (due to swell factor) and for aesthetic purposes. Seeding took place after final grading. Two (2) inches of LeafGro organic leaf mulch material was tilled into the upper six (6) inches of soil as an amendment. The prescribed EPA seed mix was placed via a hydroseed machine upon the pit surface along with straw and a paper pulp tacking media. Nylon netting was placed as needed in areas of concern to help prevent erosion. Pit 4 was completed in this manner followed by Pit 1, Pit 5 and then the remaining disturbed areas of the site. Pits 2 and 3, previously seeded in May 1999 with only marginal plant growth yield, were mowed, reseeded, and a one (1) inch layer of LeafGro was added as a soil amendment.

Pit 4 Final Grading and LeafGro Placement

WTP #2 was shutdown, cleaned and dismantled during this phase of the project. The metal building and concrete pad were removed. Also, in the TDU pad area, the pole barn was removed and the concrete pad was broken up and shipped off-site by a subcontractor for recycling. Site perimeter fencing was repaired as necessary. A gravel roadway traversing the site and allowing access to the monitoring wells was surfaced with leftover clean site gravel and allowed to remain.

The arrival of winter weather conditions in December 2000 prevented the completion of final seeding activities of approximately 2 acres of disturbed Site areas. These areas were seeded in March 2001 when weather conditions permitted this activity. During a Site visit in May 2001, grass growth was satisfactory and there were no significant areas of erosion damage. The EPA-sponsored a public media event on July 10, 2001 at the Site which marked the completion of remedial activities. After this event, Site utilities were de-energized and the on-Site production well tank and piping was drained and secured.

Aerial photo of restored Site – May 2001

IV. Chronology of Events

Date	Event
June 1988	EPA issues ROD calling for the construction of a subsurface barrier wall around the former lagoon area, excavation and incineration of affected site soils, and ground-water treatment.
November 1990	Completion of sheet pile containment wall around Pit 4.
May 1992	EPA begins Focused Feasibility Study (FSS) to reevaluate the remedy for the site.
September 1995	EPA issues ROD for thermal desorption of site soils and restoration of the site to residential treatment standards.
June 1997	USACE awards Contract DACA31-95-D-0083, task Orders 15 and 16 to ICFKaiser Engineers, Inc. to perform site remediation and restoration.
October 1997	Site Preparation activities begin.
February 1998	Mobilization of Thermal Desorption Units to the site.
June 1998	Successful Proof of Performance (POP) testing of the Thermal Desorption Units. Throughput of 12 tons per hour authorized per CTDU.
December 1998	Design upgrade to the Two (2) Continuous Thermal Desorption Units – twin feed screws to improve throughput performance.
January 1999	USACE directs shut-down of the two (2) Batch Vacuum Thermal Desorption Units due to lack of performance. Dewatering activities in Pit 4 commence.
April 1999	The IT Group purchases ICFKaiser, Inc and assumes responsibilities as the prime remediation contractor. Successful second Proof of Performance test verifying compliance with operating parameters at 15 tons per hour throughput per CTDU.
August 1999	145,000 tons of site soils treated. IT Group chooses not to extend contract for ETG Environmental, Inc. and assumes full responsibility for thermal desorption operations.
September 1999	Hurricane Floyd dumps 17 inches of rain on the site in 24 hours. Pit 4 floods with over 2 million gallons of rainwater.
November 1999	Stack testing confirms operation of the WESP unit in a de-energized mode while maintaining compliance with air emissions requirements. The WESP unit suffered from problematic operation and extensive maintenance requirements.
December 1999	A clarifier, mix tank and filter press are incorporated into TDU pad operations for solids removal from condensate.
October 2000	Completion of thermal treatment activities at 270,584 tons. Demobilization activities begin. Post Construction Monitoring Well Sampling performed.
December 2000	Demobilization activities completed. Second Round of Post Construction

	Monitoring Well Sampling is performed.
January 17, 2001	Pre-final inspection of the remediated Project Site by EPA, MDE and USACE.
March 2001	Final seeding of remaining areas is completed. Third Round of Post Construction Monitoring Well Sampling is performed.
June 2001	Fourth Round of Post Construction Monitoring Well Sampling is performed.
July 10, 2001	EPA-sponsored public media event to mark the completion of remedial activities is held at the Site.

V. Performance Standards and Construction Quality Control

The 1995 ROD established the soil clean-up levels of 100 ppb Benzo (a) Pyrene (B(a)P) equivalent for surface soils (within two feet of the surface) and 1000 ppb B(a)P equivalent for subsurface soils (below two feet from the surface). Of the 270,600 tons of soils processed through the desorption units, approximately 180,000 tons (67%) of treated soils achieved surface clean standards. Approximately 90,000 tons (33%) was cleaned to subsurface standards. Throughout the course of the treatment activities two soil storage bins failed to meet subsurface cleanup criteria and required the re-treatment of approximately 1,546 tons of soil.

Processed soils were staged in temporary holding bins after processing. Each bin held approximately 700 tons of processed soil. Each bin was sampled in accordance with the *Sampling and Analysis Plan for Remedial Activities (SAP), June 1998*, and *the Quality Assurance Project Plan (QAPP), May 1998*, to verify that clean-up levels were achieved. Sampling consisted of a composite sample from 10 different locations on the heaped soil within a given storage bin. Samples were sent off-site to a USACE-accredited lab and analyzed for PAHs by EPA Analytical Method 3540C/8310 and for Carbazole by EPA Method 3540C/8270C. One bin out of every ten (10) bins was also analyzed for TCLP PAHs by Methods 1311/3520C/8310, TCLP SVOCs/PCP by Methods 1311/3520C/8270C, TCLP Metals by Methods 1311/3005A/6010B/747OA and for Total Cyanide and Sulfide. Sample splits taken in accordance with the *SAP* and were analyzed by a Quality Control laboratory at a rate of approximately 10% and compared favorably in support of data quality and accuracy. USACE personnel maintained an ongoing tracking system for the verification of treated soil storage bins throughout the project and ensured achievement of the appropriate cleanup levels for all backfilled soil in accordance with the *SAP* and *QAPP*. All sampling activities performed on site were conducted in accordance with guidelines established in the *SAP* and the *QAPP* documents in order to sufficiently and consistently meet the established Data Quality Objectives (DQOs) established for the remedial action.

In accordance with the *SAP* and *QAPP*, all excavation sidewalls and floors were sampled for attainment of the appropriate cleanup level (either subsurface clean or surface clean). If verification sample results indicated an exceedence of the cleanup criteria, excavation activities continued as needed to achieve the cleanup goals. USACE personnel maintained an ongoing

tracking system for the verification of excavation pits throughout the project and ensured achievement of the appropriate cleanup levels in all excavated source pits.

For additional information regarding specific remedial action details, sample and analysis performance standards and cleanup goal achievement, refer to the *Technical Report for Remedial Action, Southern Maryland Wood Treating Site, Hollywood, Maryland, Final - August 2001*. This report has been generated by the IT Group, the remedial action contractor, and is considered a companion report to this Remedial Action Report generated by the USACE.

Hazardous Waste Quantities Summary Table

Waste Item	Treatment/Disposal Action	Quantity	Remarks
Contaminated Soils	Thermal Desorption	270,584 tons	On-site activity
Water Treatment Waste Filter Cake	Off-site disposal	1,389 tons	TSDF - Canada
Water Treatment GAC Carbon	Off-site disposal	154 tons	TSDF - Canada
Water Treatment Sludges	Off-site disposal	747 tons	TSDF - Canada
Water Treatment Liquids	Off-site incineration	7,300 gallons	LWD, Inc.- Calvert City, KY; EI DuPont, Deepwater, NJ
Lab Waste Liquids	Off-site recycling treatment and disposal	170 gallons	CyclChem - Lewisberry, PA
Contaminated Debris	Off-site disposal	625 tons	TSDF - Canada
Contaminated Hard Pan/clay/stone	Off-site disposal	2,091 tons	TSDF – Canada (not amenable to thermal desorption)

Water Treatment Plant Estimated Quantities

Water Plant	Total Estimated Quantity Treated (gallons)	Remarks
WTP-1	7,120,000	Pit 4 pond water (est. since Jan 1998)
WTP-2	46,900,000	Thermal Desorption water and other site sources
WTP-3	1,190,000	Pit 4 stormwater

VI. Final Inspection and Certifications

The Baltimore District, US Army Corps of Engineers, maintained a ten (10) person work force throughout the project to provide a 24-hour per day, 7-day per week site presence and conduct ongoing Quality Assurance and Health and Safety inspections.

Inspections

A pre-final inspection of the remediated project site took place on Wednesday, January 17, 2001. The following individuals were present for this inspection:

Rob Sanchez	EPA
Dave Healy	MDE
Ed Hughes	USACE
Gordon Chin	IT Group

In addition to administrative items addressed during the site inspection, the following additional punch list items were noted as action items:

1. place brass padlocks on the metal access cap of the site production well to help safeguard against vandalism
2. repair damaged silt fencing near the LeafGro storage piles in the vicinity of the former decontamination pad area
3. place straw and perform hand repairs of erosion damage areas in Pits 1 and 4
4. place straw and seed in the unseeded area where the former IT Group Quality Control trailer was located
5. perform seeding operations in the remaining unseeded acres once weather conditions permit
6. perform final removal of site utilities once they are no longer needed.

Health and Safety

All site activities were conducted in accordance with the *Site Specific Health and Safety Plan (HASP)* and EM385-1, Safety and Health Requirements manual. The project operated on a 24-hour per day, 7-day per week schedule for over two and a half years and accumulated over 510,000 man-hours without a lost-time accident.

VII. Operation and Maintenance Activities

Final grading and seeding of backfilled and disturbed areas occurred in stages during the latter part of the project. Excavated and disturbed areas were graded to approximately original contours with minor variations to afford the best drainage and erosion control characteristics. After final grading and verification by survey, the EPA prescribed seed mixture was applied by hydroseeding along with a layer of 2 inches of LeafGro composted leaf mulch material disked into the top 6 inches of soil, straw and a paper pulp affixing media. Erosion protection netting, biodegradable matting and/or rock riprap was installed in areas were erosion was a concern.

Post-Closure monitoring activities consist of monitoring well sampling, stream remediation area monitoring and upland seeding and erosion monitoring. Well sampling and monitoring activities shall occur during the following months; (quarterly) Mar 01, June 01, Sept 01, Dec 01, Mar 02, June 02, (semi-annual) Sept 02, Mar 03, Sept 03, Mar 04, and Sept 04. A benthic study in the west tributary shall occur in Sept 03. A low-flow well sampling technique as presented in EPA Bulletin No. QAD023, dated June 1999, shall be used to collect well water samples. Specific information regarding Post-Closure Monitoring Activities is presented in the *Post Closure Monitoring Plan, November 2000*.

VIII. Summary of Project Costs

The following costs are estimated because there are several significant pending or potential modifications to the remedial action contract.

The total project costs including both remedial design and remedial action are summarized as follows:

	Estimate at Completion	Actual, Pending or Potential Modifications	Estimate at Completion including the below pending and potential modifications
Total Contract Value	$54,974,619		$57,681,051
Modification – Site Monitoring and Groundwater Sampling (RMC, Inc.)		$276,432 (O&M)	
Pending Modification – IT Group G & A Adjustment Claim		$500,000 (RA)	
Potential Modification – IT Group Fee Claim		$830,000 (RA)	
Potential Modification – ETG Indirect Fee Claim		$1,100,000 (RA)	
Total Pending and potential modifications		$2,706,432	
Total USACE Costs	$4,247,854		

Sub-total Project Costs			$61,928,905
Revenue from sale of Government property			-$460,000
Total Project Cost			$61,468,905

The remedial design component of the costs are as follows:

Remedial Design	
ICF Kaiser (IT predecessor) included in total contract value above	$615,190
Baltimore District	$406,854
Total	$1,022,044

The remedial action component of the costs are as follows:

	Estimate at Completion
RA Contract Costs (estimated)	$54,359,429
Total Pending or potential RA modifications (estimated)	$2,706,432
Sub-total	$57,065,861
Total USACE RA Costs (estimated)	$3,841,000
Sub-total	$60,906,861
Revenue from sale of Government property	-$460,000
Total RA Cost (estimated)	$60,446,861

The post-remedial action operations and maintenance costs are as follows:

	Estimate at Completion

11 quarters of groundwater sampling	$246,445
Upland and Stream area monitoring and Benthic Study	$29,987
Total	$276,432

The initial contract, DACA31-95-D-0083, Delivery Order 16, was awarded in 17 June 1997 and was initially funded to $9,000,000. The following modifications were issued as shown below to increase funding on the contract as necessary to maintain contractor activities.

Modification Number	Date	Incremental Amount Added	Total Contract Funded Amount
001601	13 Feb 98	$12,000,000	$21,000,000
001603	23 Dec 98	$8,000,000	$29,000,000
001604	1 June 99	$3,000,000	$32,000,000
001605	14 Sept 99	$6,677,633	$38,677,633
001606	28 Jan 00	$8,515,214	$47,192,847
001607	5 July 00	$6,499,772	$53,692,619
001608	22 Nov 00	$1,200,000	$54,892,619
001609	18 May 01	$82,000	$54,974,619

The 1995 ROD estimate for the remedial action was $31,000,000 for the treatment of 145,000 tons of contaminated material. The ROD cost per ton was $214/ton. The 1997 through 2000 estimate at completion (including pending and potential modifications) is $60,450,429 for the treatment of 273,400 tons of contaminated material (includes thermal desorption soils and debris and rock disposed of off-site). The estimate at completion cost per ton is $221/ton which is within 4 percent of the ROD estimate (not considering inflationary adjustments).

IX. Observations and Lessons Learned

Growth of Soil Quantity Requiring Treatment

The project commenced with an expected tonnage of 145,000 tons. The final total for the project was 274,000 tons requiring treatment or disposal. Throughout the course of the project, soil tonnage growth was due to a number of reasons; pit expansion (in many areas wider and deeper than initial screening indicated), soil moisture content (wet weather periods increased density due to moisture), ample and adequate excavating (required for full removal of contaminants, efficient and complete verification) and soil density variations (compacted soils vs. unconsolidated material, sandy material vs. clayey material). It is fair to assess that for soil remediation projects in general, the final total quantity of soil requiring treatment is never actually known until excavating is complete and verified by analytical sampling.

Under-design of Major Systems

Vapor Recovery System - Solids accumulation in sumps was greater than expected. Significantly increased amount of fine particulates in TDU condensate resulted in increased maintenance demands. Fine particulate (clay) carryover and buildup in ducting and the Thermal Oxidizers created safety concerns (ignitions, combustion hazards) and led to more maintenance cleaning and down-time, and required periodic change-out of the FTO bed material.

Water Treatment Plant - Increased particulate loading required additional settling tanks, an additional filter press and clarification steps. This created maintenance requirements (sludge removal) and affected operation of the UVOxidation system. The design did not anticipate high COD, cyanide and ammonia (created in the thermal process). Discharge criteria were not achieved and there was over reliance on GAC for contaminant removal.

Soil Conveyance Problems at Start-Up

Inclined screws failed to move untreated soil. These had to be replaced with belt conveyors on the feed and discharge ends of the CTDUs. Only extremely dry (hot, treated soil immediately emitted from the CTDU) could be moved effectively by an inclined screw. Conveyor motors were upgraded to larger sizes to handle the load requirements. The single horizontal feed screw into the CTDU units required replacement with a higher capacity twin screw unit in order to sustain desired soil throughput rates.

Cost Reimbursement Contract Management

Maintaining a balance of quality performance and cost control with the contractor was a constant challenge. A contractor generally views fixed price contracts vs. cost reimbursement contracts differently. Under cost reimbursement, the contractor generally perceives little to no risk as far as financial liability. Fee incentivization must be performed wisely to keep the contractor properly motivated to save government money as well as provide a quality product. Performance measures must be realistic and clearly defined. It is possible that with incentive fee rates in the 5 to 7% range, contractors may be more motivated to reap overhead return, in the range of 15 to 50%, on expanded project costs. This runs counter to the goal of incentive fee arrangements. This issue should be studied thoroughly before fee incentive arrangements are formulated.

Since the government is only invoiced for items after the contractor has paid the vendor bill, there is an inherent cost-tracking lag. This makes proactive cost management and communication vitally necessary for accurate and effective cost tracking and projecting.

The initial subcontractor mobilized two (2) Batch vacuum thermal desorption units to the project. These systems performed significantly below expectations. USACE directed shutdown and removal of the units from the project against contractor wishes but in the best interest of the government.

X. Operable Unit Contact Information

This project was a federal lead, with the U. S. Army Corps of Engineers providing design and construction management in accordance with an Interagency Agreement (IAG).

Primary Contact for Construction Management:
U.S. Army Engineer District, Baltimore
Bruce R. Ware IV, P.E., Resident Engineer
Environmental Remediation Resident Office
Building E-1356-1T
Bush and Scully Roads
Aberdeen Proving Ground, MD 21010-0056
Phone Number: 410-671-6003

Primary Contact for Project Management:
U.S. Army Engineer District, Baltimore
Edward Hughes, P.E., Project Engineer
Environmental Remediation Resident Office
Building E-1356-1T
Bush and Scully Roads
APG, MD 21010-0056
Phone Number: 410-671-6003

Completion Contractor:
International Technologies Group, Inc.
Attn: Kirk Ticknor, P.E.
7130 Columbia Gateway Drive
Columbia, MD 21046
Phone: (443) 532-0474

MDE Remedial Project Manager:
David Healy
Maryland Department of the Environment
2500 Broening Highway
Baltimore, MD 21224
Phone: (410) 631-3496

EPA Project Manager:
Robert J. Sanchez
U.S. EPA Region III

1650 Arch Street
Philadelphia, PA 19107
Phone Number: (215) 814-3451

Appendix A – Cost and Performance Summary

Equipment Capital Costs

Water Treatment Plant No. 2	$2,400,000
Continuous Thermal Desorption Units	$2,818,722
Batch Vacuum Thermal Desorption Units	$1,378,436
Thermal Desorption Pad Equipment/Structures	$1,596,458
Total Equipment Capital Costs	**$8,193,616**

Remediation Operating Costs (based on IT Group cost reporting as of June 2001)

Thermal Desorption Unit Mobilization and Prep	$ 914,464
Process Startup/shakedown	$ 2,530,378
Thermal Processing (ETG and IT Group)	$19,785,757
Soils Handling Labor, Equipment and Structures	$ 4,827,503
Sampling (lab, labor, equipment)	$ 3,388,797
O & M Support Area	$ 766,467
Water Treatment Plant O & M	$ 1,252,660
Water Treatment Plant Labor	$ 1,614,697
Total Remediation System Operating Costs	**$35,080723**

Thermal Desorption System Operating Parameters

Item No.	Parameter	Instrument	Acceptable Range/Maximum	Calibration
1	Soil Feed Rate	Variable Speed Screw Feeder	15 Tons per Hour	Weigh feed buckets over time period for average
2	Thermal Desorber Face Pressure	Pressure Transmitter	<0.25 to 2 inches w.c.	Factory Calibrated
3	Thermal Desorber Shell Temperature	Thermocouple	1000-1500 deg F	Factory Calibrated
4	Soil Exit Temperature	Thermocouple	875 to 1050 deg F, not < 850 deg F for 20 min. or not > 100 deg F for 60 min. while treating soil	Factory Calibrated
5	Cyclone Temperature	Thermocouple	750 to 1150 deg F	Factory Calibrated
6	Scrubber Outlet O2 Level	O2 Level Analyzer	1 to 10%	Daily Automated Calibration check
7	Scrubber Recycle Water Temperature	Thermocouple	50 to 135 deg F for 24-hr average, 150 deg F max	Factory Calibrated
8	Cooling Tower Inlet Water Temperature	Thermocouple	50 to 140 deg F	Factory Calibrated
9	WESP Gas Exit Temperature	Thermocouple	80 to 99 deg F	Factory Calibrated
10	FTO Bed Temperature	Thermocouple	1500 to 1800 deg F	Factory Calibrated
11	CPM TCH Level	Thermocouple	800 ppm	Automated Calibration check

Soil Characteristics and Site Conditions

Soil characteristics varied between excavation locations and were also elevation dependant. The majority of treated soils were sandy silts from the upper elevations within 10 to 12 feet of the ground surface. At lower elevations below 10 to 12 feet, clay content generally increased. Increased clay content generally created conveyance and feed system delays which resulted in lower average thermal desorption treatment rates. At lower elevations in Pit 4 a lean brown silty clay layer was generally present (approximately 6 to 12 inches thick). Under the lean clay layer a hard pan mineral rock or ironstone was present (also generally 6 to 12 inches thick). This rock consisted of consolidated intermixed sands and gravel. The hard pan rock layer generally required treatment due to its porosity and content of DNAPLs. Underneath the hard pan rock layer a thick blue clay layer was present. This blue clay layer functioned as a barrier layer and prevented further downward migration of DNAPLs. Excavation requirements entailed the scraping of one to two inches of thick blue clay to ensure complete and adequate removal of DNAPLs and contaminated hard pan and lean clay. The elevated clay levels in soils requiring treatment during the later months of the project created reduced throughput rates due to conveyance difficulties and increased maintenance activities created from elevated particulate fines carry-over into the TDU vapor recovery systems. Increased soil moisture content levels from lower elevation soil in Pit 4 also resulted in decreased throughput rates from conveyance and handling difficulties as well as increased heat capacity requirements.

Site Conditions

Hollywood, Maryland is located approximately 60 miles southeast from Washington DC. The climate is seasonal with hot summers and cold winters. Summer high temperatures can reach the upper 90s and winter low temperatures can be into the single digit temperatures (degrees Fahrenheit). Average rainfall is approximately 44 inches. During the remedial action the project experienced drought conditions during the late spring and summer of 1999. The drought conditions aided in dewatering of Pit 4 and afforded rapid TDU throughput rates for sandier soils undergoing treatment during the summer of 1999. Average weekly throughput rates were as high as 21 tons per hour in June 1999. The drought period was brought to a rapid end with the onslaught of Hurricane Floyd on September 16, 1999 which dumped over 17 inches of rain on the Site within a 24-hour period. With the arrival of wetter weather during the fall of 1999, TDU refurbishment requirements, and the treatment of soils of higher clay content during the spring and summer of 2000, average TDU throughput rates dipped to below 10 tons per hour during the later stages of the project.

For a project Site map, treatment system layout diagram and additional project information refer to the *Technical Report for Remedial Action, Southern Maryland Wood Treatment Site, Hollywood, Maryland, August 2001* produced by the IT Group.