POLREP 72 and Special Bulletin A - FINAL POLREP

NanoChemonics Site
4 Magnox Drive
Pulaski, Pulaski County, Virginia 24301

Lat: N 37.04718
Long: W 80.79146

ATTN: RRC
VADEM- Tolbert
VADEQ- Lohman
EPA- Heston

DATE: September 28, 2016

I. SUMMARY FACTS

Site Name - Nanochemonics (VAD 153226832)(SSID: A3QR)
Site Size – estimated 38 acres
Location – 4 Magnox Drive, Pulaski, Virginia
Funding approval date – Action Memorandum 9-30-2010; However, PRPs and Respondents to EPA Orders conducted most of the Response Action
Project period – September 2010 through August 2016
Project description – removal of hazardous substances resultant from abandonment of manufacturing operations.
Hazardous materials present – various iron oxides, PCBs, various laboratory chemicals
Contaminated Medium – building surfaces/demolition debris, soil (PCBs), surface water (potential)
Quantities removed – an unknown amount was treated through the waste water system with cleaned waters discharged to Peak Creek. An unknown amount was disposed along with demolition debris. Approximately 4,349 tons of wastes were disposed. See Section VI of POLREP text.
OSC name – Michael Towle
Primary cleanup contractor – ERRS: Kemron. The PRP used various contractors inclusive of A&D Environmental, GARCO, DH Griffen, D&D, Hilco, ARG, MAA, and McAdams.
Disposal location – EQ's Wayne Disposal, New River Resource Authority, others
Project Ceiling – Extramural: $1,959,400; Work completed predominantly by PRP under Order
Project Cost – ERRS: $117,376; START: $358,978; Work completed predominantly by PRP under Order. The total Site direct costs inclusive of EPA oversight is estimated at $748,000.
Exposure Avoided / $1M – 375 persons.

II. SUMMARY OF INCIDENT

A. The NanoChemonics Site (Site) involves the location of the manufacturing facility of the former NanoChemonics Holdings, LLC. The facility manufactured a number of iron oxide products. A Removal Action was completed at the Site in 2016 which largely involved the dismantlement or removal of the majority of the facility and its contents as well as the consolidation and on-site burial of lagoon sludges resulting from historical operations.

B. The Site is situated on approximately 38 acres of land in a mixed use area of the Town of Pulaski, Pulaski County, Virginia. The Site included the former manufacturing facility (which included numerous buildings), several laboratories, a water treatment facility (which included four lagoons), a waste sludge drying area, and many tanks, processing vessels, equipment items, and pipelines which were used in or were related to NanoChemonics' manufacturing processes. The Site drained through a network of interior and exterior trenches and drains ("drainage system") to an on-Site treatment system and then through a series of four lagoons. The lagoons discharged to Peak Creek, which courses through and alongside the Site and then flows through the Town of Pulaski and in to Claytor Lake, a recreational area.

C. The response action or Work at the Site was completed largely by one or more potentially responsible parties (PRPs) under 2 separate EPA enforcement vehicles (orders). Additionally, NanoChemonics performed some actions prior to the issuance of any EPA orders. A small portion of the Work was also conducted by an EPA contractor (EPA ERRS contractor Kemron) when the PRPs were not fully responsive to the response needs of the Site.

D. The response action largely entailed the demolition of the premises as a means to remove the majority of the hazardous substances from the Site. Potentially contaminated washwaters and stormwater generated during the response action were mainly treated and discharged through the facility's wastewater treatment system which included settlement in designated tanks or 4 lagoons before discharge to Peak Creek. The demolition debris, which included a large amount of surfaces contaminated by hazardous substances, was hauled away for disposal into a nearby landfill. The lagoon sludge was excavated, dried, placed, and covered in the facility's drying bed. Prior to demolition, numerous drums and containers of product, by-product, off-specification product, waste, and laboratory chemicals were removed. Finally, an area of PCBs-contaminated soil was removed, PCBs-contaminated concrete slabs were decontaminated, and PCBs-contaminated caulks which could not be completely removed were sealed in place. Other than wastes disposed, it is not believed that Site contamination is measurable in off-premises locations or Peak Creek downstream from the Site.

E. A summary of cleanup activities conducted at the site is presented in Section III of this POLREP and presented in further detail in the earlier POLREPs. A summary of the wastes disposed is contained in Section VI of this POLREP. Supporting documentation is contained in the Site's file maintained at EPA's offices in Philadelphia, PA.

F. Initially, NanoChemonics Holdings, LLC was conducting response actions at the Site after cessation of manufacturing activities. Then NanoChemonics Holdings and then STNP, LLC (the

current owner of the NanoChemonics property), conducted a response action and cleanup of the Site under 2 separate EPA orders. NanoChemonics Holdings, LLC initiated response actions under a Unilateral Administrative Order issued in September 2010. STNP, LLC purchased the property in January 2011 and then continued the response actions pursuant to an Administrative Settlement and Order signed on April 8, 2011. STNP, LLC completed the field-based Work requirements of the Removal Response Action in July 2016. A Final Report required by the Order was submitted in September 2016. EPA notified STNP of the satisfaction of the Work requirements in October 2016.

III. RESPONSE ACTION NARRATIVE

The narrative of the Removal Response Action is divided below into sections by year.

III A – Initial Actions and 2010

A. Upon request of the Virginia Department of Emergency Management (VADEM), the EPA On-Scene Coordinator (OSC) responded to the NanoChemonics Holdings facility on August 30, 2010. The OSC met with Local and State authorities and on September 1, 2010 toured the Site with the State and a facility representative. Manufacturing operations had been discontinued and a facility representative, an employee, was actively accumulating, segregating, and organizing laboratory chemicals which remained in various facility buildings. The OSC participated in an initial characterization of remaining chemicals. The OSC observed an unknown amount of residual chemical substances, including a number of hazardous substances (as defined in 40 CFR Part 302) in tanks, process vessels, containers (totes, drums, bags, bottles, etc.), lagoons, trenches, drains, equipment, and piping systems as well as likely existing in residual materials coating certain surfaces or located upon the floor that posed a threat of direct exposure to on-Site persons and/or release from the Site to the environment. The initial observations are contained in POLREP 1 dated September 2, 2010.

B. NanoChemonics Holdings was conducting actions intending to improve Site conditions by organizing and bulking laboratory chemicals at the Site. NanoChemonics also engaged the services of American Environmental and completed the packing and disposal of the majority of the higher-hazard laboratory chemicals remaining at the Site. An estimated 6490 pounds of chemical wastes (waste flammable liquids, acids, bases, oxidizers, mercury, and inorganic compounds) were disposed by Environmental Enterprises Inc. in Cincinnati, OH under manifest. VADEM and State Police also completed a detonation of a small amount of some of the laboratory chemicals.

C. The OSC discussed Site needs with NanoChemonics representatives and others on September 2, 2010. NanoChemonics agreed to continue actions to further address the immediate threats posed by the Site. On September 9, 2010, Nanochemonics provided an "Environmental Action Plan" to summarize what they intended to do. The Plan was

finalized on September 17, 2010. The Plan proposed actions to follow a "lagoon closure plan" which had been submitted by NanoChemonics to the State in July 2010, follow relating BMPs, continue to remove chemicals, flush process systems, conduct an asbestos survey, dispose off-specification product, and decontaminate tanks among other things.

D. At the request of the Virginia Department of Environmental Quality (VADEQ) on September 24, 2010, EPA took the lead on the oversight of environmental cleanup actions at the Site. The OSC sought funding and approval of an Action Memorandum for a removal response action (Removal Action) at the NanoChemonics Site. The Action Memorandum was signed by EPA Region III on September 30, 2010. The authorized Removal Project Ceiling was $1,959,400.

E. On September 30, 2010, EPA Region III issued a Unilateral Administrative Order (UAO) to NanoChemonics Holdings, LLC, requiring the Company to conduct response actions to address the threats at the Site and to submit a Response Action Plan (RAP) defining how the required Work would be completed. Among other things, the UAO required NanoChemonics to secure the Site, decontaminate the facility, treat and manage waste flows into the lagoons and Peak Creek, and dispose hazardous substances from the Site.

F. Peak Creek courses through the Site and separates it into 3 areas. The first area of the Site (off the main road) contained the MO building and is referred to as the "Dry side". A bridge across Peak Creek then allowed entry into "Wet side" or "Creek side" of the Site which contained the vast majority of the manufacturing facility. Another bridge across Peak Creek then allowed entry into the area of the lagoon system containing 4 lagoons and a drying bed (it is the understanding of the OSC that dried sludges may also be buried on other portions of the area of the lagoon system).

G. NanoChemonics submitted the initial RAP on November 12, 2010 largely following the actions previously proposed in the September 2010 Environmental Action Plan. After multiple revisions submitted in response to EPA comments, a Final RAP was submitted December 22, 2010. EPA approved the RAP on January 4, 2011. NanoChemonics personnel maintained some security of the Site while gaining approval of the RAP. However, local authorities also provided security actions.

H. The OSC mobilized the EPA Emergency and Rapid Response Services ERRS cleanup contractor (Kemron) and the EPA Superfund Technical Assessment and Response Team START contractor (Techlaw) to the Site in November 2010 to assist NanoChemonics in better securing the buildings (e.g., boarding or locking) at the Site and in stopping a low-volume discharge from the lagoons into Peak Creek which involved improving the outflow structure. The OSC also mobilized the START contractor in December 2010 to

conduct an inventory and characterization effort within the NanoChemonics buildings of remaining containers and residuals.

III B – Response Actions - 2011

A. On January 26, 2011, an entity called STNP LLC notified EPA it intended to acquire the title to the NanoChemonics property. STNP also proposed its desire to complete response actions at the Site under a different enforcement vehicle - an Administrative Settlement and Order on Consent (AOC). STNP's contractor provided a draft Work Plan to the EPA itemizing its intended actions to address the threats posed by the Site.

B. STNP acquired the property on January 28, 2011. The AOC was eventually negotiated and signed on April 4, 2011. A Response Action Plan was provided by EPA. This Plan was revised and adjusted numerous times throughout the response action as EPA notified STNP of issues with compliance with the Order and actions which could result in a release of hazardous substances from the Site.

C. STNP contractors mobilized to the site and began conducting cleanup operations the week of April 4, 2011. Initial cleanup operations involved, among other things: cleaning/decontaminating buildings, equipment and tanks; asbestos removal; removal of waste materials/hazardous substances from buildings; cleaning out trenches, and the management of the waters generated during the cleaning process. STNP Contractor A&D Environmental conducted most of the cleaning and decontamination operations as directed by D&D. Eventually, the bulk of the manufacturing facility would be demolished (mostly by DH Griffin), the salvageable metals removed, and the contaminated surfaces and debris disposed off-Site.

D. Throughout the cleanup process, A&D Environmental removed wastes (e.g., drums, containers, or residuals) from the buildings and accumulated these wastes in the MO building on the Site. The MO building was chosen since it sat alone across Peak Creek from the remainder of the facility, was the location where most of the facility's remaining product and off-specification products were located, and had relatively hood access for vehicles. The wastes included tank residues, floor sweepings, and other wastes found in containers throughout the Site. Ultimately over 300 containers (totes and drums) of consolidated wastes totaling over 500 tons were generated. These wastes were profiled to contain acidic liquids or solids, caustic liquids or solids, non-PCB oils and items, universal wastes, metal oxides, oily water, and debris.

E. Combined demolition and cleanup operations began on the "Creek side" of the Site where most of the manufacturing facility was located and most of the tanks, equipment, and wastes were located. The buildings were cleaned by A&D Environmental in order to prepare them for demolition by DH Griffin. Dust suppression was also supplied by Griffin, A&D or D&D. The demolition began in May 2011. The demolished buildings included: Cobalt Adsorption (CA); Magnetite (MG); Small Particles (SP); Pilot Plant (PP); Yellow Oxide (YO) (including New Technology Reactor (NTR) section); Boiler House; Applications Laboratory and warehouse; storage/maintenance shop building; water treatment building, and, ultimately (2012) the MO

building. Bulk copperas material (iron sulfate) was removed from the Copperas storage shed; however, the Copperas storage building was not demolished.

F. A trench drainage system ran through and alongside the buildings. This system had once allowed for process fluids to move from the process areas into the lagoon system. During the Removal Action, this system was purposed to allow for potentially contaminated washwaters to be properly managed. The system was periodically cleaned out over the course of the cleanup activities.

G. Wash water generated during decontamination of the buildings, equipment, and tanks or during dust suppression activities migrated into the trench system and then towards a sump located at the foot bridge over Peak Creek before it could flow to the lagoon system. The flow through the trenches could be (and was) blocked (plugged) at the sump. The accumulated liquids were transferred from the sump to designated facility tanks for treatment. The treatment mainly involved adjustment of pH, flocculation, and settlement. The discharge from the treatment tanks was also filtered.

H. Treated wash waters were transferred to the lagoon system after meeting discharge limits established in the Order or they were used as a source for dust suppression during demolition/salvage activities.

I. Throughout the Removal Action, 100's of thousands of gallons of washwaters were directed into the Site's drainage network and/or collected in tanks and treated (i.e., "managed" as required in the Order). The "managed" waters also included waters generated by precipitation events.

J. Demolition and salvage activities occurred from May 2011 to October 2011, when salvage operations were completed on the Creek side of the site. Piles of non-salvageable debris (e.g., wood, building siding, bricks, concrete blocks, etc.) which contained hazardous substance residues remained. These debris piles became the subject of concern since STNP initially failed to offer or conduct management and disposal of these materials.

K. The OSC met with STNP contractors in July and August 2011 to identify problem areas to be addressed by STNP to come into compliance with the Order. As then required, STNP contractors covered the demolition debris piles, which contained hazardous substance-containing residuals, with plastic sheeting. After the piles were covered, EPA allowed the plug in the sump to be removed and thus allow storm water to flow directly into the lagoon system.

L. Beginning in July 2011, EPA began to notify STNP that certain actions were not consistent with the Work requirements of the Order. Additional actions would be required to reduce the threat of release of hazardous substances from the Site. STNP contractors were required to conduct additional cleanup activities, including pressure washing concrete pads and cleaning out trenches, from September 6 to 16, 2011.

M. To facilitate actions and in order to minimize the potential for release from the Site, the OSC mobilized the EPA ERRS contractor (Kemron) to the site on September 7, 2011 to evaluate debris piles for disposal in the event that STNP was unable or unwilling to dispose of the debris. While on the Site, the ERRS collected disposal profile samples from waste/debris piles staged on

the concrete pads of the former buildings, and the copperas tank farm. Analytical results indicated the presence of PCBs at a concentration (66 mg/kg) above regulatory limits (50 mg/kg), in debris piles staged on the former CA pad, requiring disposal as a regulated TSCA PCB waste. At this time, water flows directly to the lagoons were stopped unless the piles remained covered or were removed.

N. The OSC requested ERRS to conduct cleaning activities that were not being adequately addressed by STNP contractors. On October 19, 2011, STNP contractors began mobilizing additional equipment (pumps and frac tanks) to the site. ERRS continued cleanup operations until they demobilized on November 23, 2011 when the OSC believed that STNP was again complying with Order requirements and the Site was stabilized.

O. Disposal of the demolition debris began in October 2011. EPA evaluated the piles and separated out that debris that was potentially contaminated by PCBs (originating from the Cobalt building (CAB)). The debris consisted primarily of the bricks, blocks, and wooden structure comprising the buildings which was contaminated by residues of the former manufacturing operations. The non-PCB debris was transported by Hilco for disposal at the New River Resource Authority landfill. Ultimately, 3180 tons of this waste stream was disposed in 2011.

P. The buildings were demolished only after asbestos abatement and removal of universal wastes (e.g., light ballasts) was performed by STNP contractors.

Q. Several small piles of debris were not removed until 2012. Additionally, the MO building (which contained all the wastes in containers) was not yet demolished since it contained all the staged wastes.

R. In 2011, the OSC required analysis of washwater for PCBs due to the discovery of PCBs in some of the demolition residuals. The analytical results waters stored in tanks was determined to contain PCB congeners at concentrations exceeding Virginia water quality standards. It was also determined that some of the storm water flowing into the lagoon system may have been contaminated with PCB congeners – discharged was not allowed. Based on the analytical results, STNP was required to treat storm water and wash water stored in tanks on the Creek side prior to discharging the waters into the lagoon system.

S. In November 2011, STNP was issued a Notice of Condemnation from local authorities relating to the existence of partially demolished buildings. Pulaski authorities determined these structures posed certain hazards to the community. The EPA Order did not require STNP to demolish any structure – only remove the hazardous substances posing a threat. EPA determined these structures to not be part of the threats posed by hazardous substances. STNP appealed the condemnation in December 2011.

III C - Response Actions – 2012

A. The OSC was informed that the STNP appeal of the condemnation was not successful (however, the status of the buildings remains unchanged to this day).

B. Site cleanup continued in 2012, including additional cleanup required on the Creek side of the Site and cleanup of surfaces and removal of wastes staged within the MO building prior to its demolition.

C. GARCO began to profile the containerized wastes staged in the MO building in February 2012. These wastes which included off-specification products, process residuals, and the remaining containerized wastes at the Site totaled over 500 tons. These wastes were disposed in April 2012.

D. The PCB-containing demolition debris which resulted from the demolition of the Cobalt Area Building and staged on the CAB pad was loaded and transported off site on April 19, 2012. Thirty five (35) tons of PCBs-contaminated materials were disposed at EQ's Wayne Disposal facility in Michigan. The pad was then cleaned and the resulting waters and residual materials placed into 3 drums and 3 totes.

E. After asbestos abatement was completed, the demolition and salvage of the MO building was conducted. 500 tons of additional demolition debris potentially contaminated by process residuals was transported to New River Resource Authority landfill in April 2012.

F. Remaining debris at the Site consisted of uncontaminated block and brick which was set aside and intended for use in lagoon closure activities (note that such activity was not ultimately conducted).

G. STNP contractors conducted treatment and discharge of accumulated storm waters and wash waters within storage tanks to the on-Site lagoon system. STNP notified EPA that low levels of PCB congeners had been detected in the lagoon system, with the highest levels in Lagoon 4. In June 2012, STNP contractors discharged water stored in Lagoons 1 and 2 into Peak Creek after meeting requirements of the Order and obtaining EPA approval. EPA disapproved discharge of Lagoon 4 due to contaminant levels exceeding the discharge limits established in the Order and also due to the PCB congener levels. Storm water, including runoff from the PCB-containing debris pile on the CAB pad, had drained into the lagoon system in 2011 during a storm event when the pumps could not pump fast enough to prevent overflow of the sump and the plug had been removed to allow discharge to the lagoon system.

H. EPA also required STNP contractors to collect soil samples on the Creek side of the Site in June 2012 to test for the presence of metals and PCBs. Sampling grids were also established for conducting post-clean-up sampling of the Cobalt Adsorption Building pad where PCB-contaminated demolition debris (> 50 mg/kg PCB) had been staged. The sampling was conducted to verify the effectiveness of the pad cleaning.

I. Analytical results received in July 2012 for EPA split samples collected during the STNP soil sampling indicated that a limited area of soil around the CAB pad would require excavation and disposal. The pad was deemed to be satisfactorily cleaned.

J. In August 2012, the STNP contractor notified EPA that all the remaining cleanup items had been completed. The EPA OSC inspected the Site in September and identified items that had not been satisfactorily completed, in addition to new items involving removal/disposal of certain debris piles and the drums of waste generated during the PCB cleanup activities. START also collected additional soil/sediment samples for PCB analysis from the Site's trench drainage system and around the CAB pad. Analytical results indicated additional excavation would be required adjacent to the CAB pad.

K. In October 2012, STNP changed its response contractors. The new contractors (Mid Atlantic Associates (MAA) and Ammons Resource Group (ARG) initiated activity by accepting existing Site wastes and agreements in place for the rental of storm water tanks and beginning cleaning activities relating to surfaces throughout the Site. In October 2012, MAA and ARG also took control of cleaning efforts in the area of the CAB pad. The 3 drums of solids and 3 totes of fluids that were generated during Cobalt Area cleaning activities were assumed by MAA and ARG.

L. The OSC met with the new contractors on October 25-26, 2012 to discuss the remaining cleanup action items. Between October and December, 2012, the STNP contractors conducted additional cleaning of trenches and residuals remaining onsite, pressure washed trenches and pads, pumped storm water from the rental frac tanks into facility Tank 327.

M. In November 2012 MAA and ARG began treatment of remaining stormwater in the tanks at the Site. The procedure relied upon a minimum 30 day settling period. MAA and ARG managed these waters throughout the remainder of 2012.

N. MAA and ARG conducted a thorough cleaning action at the Site. The residuals were placed into roll-off containers and transported to NRRA. 5 roll-off containers (est. 50 tons) were transported from the Site to New River Resources Authority between November 12 and 16, 2012.

O. In November 2012, ARG cleaned the deep sump on the CAB pad (PCBs concentration of 3.75 mg/kg) and placed these deep sump residues into the drying bed. It is believed that prior contractors believed the bottom of the sump had already been reached, but ARG and MAA determined that original CAB residues likely not contaminated by demolition remained at the base.

P. ARG also excavated low-level PCB-contaminated soil from the fence line east of the YO building near the railroad spur. The soil contained aroclor 1268 not found in any other sample. Although this may have originated from a different source, a 6" deep cut (about 2' wide by 30' long) was removed. Confirmation samples showed levels up 4 mg/kg at the property line (fence). This non-hazardous soil was disposed along with other facility residuals at NRRA in December 2012.

Q. In December 2012, ARG also excavated a few inches of soil (mostly gravel) from an 800 square foot area near the CAB pad with low level PCBs. This activity completed the removal or decontamination of the PCBs-contamination associated with the CAB area. These materials were disposed along with facility residuals in December 2012. The total amount of contaminated soils and facility residuals disposed at NRRA in December 2012 was 16 tons.

III D – Response Actions – 2013

A. Off-site transportation and disposal of the wastes resulting from the cleanup of CAB pad and other waste (drums of acid and caustic, light ballasts, etc.) was conducted January 10, 2013. The wastes included 3 drums of PCB solids and 3 totes of PCB liquids resulting from CAB pad cleaning, several drums of acids and a drum of caustic relating to certain water treatment, and 1 drum of oil and 1 drum of light ballasts. The wastes were removed by Garco. The PCB wastes were disposed at Wayne disposal (solids) and Veolia (liquids). The other liquids were disposed at Pollution Control Industries.

B. From February 6 to 12, 2013, STNP contractors treated and discharged the remaining waters being held in tanks at the facility and managed under the Order. The waters were discharged into the lagoon system (#2) and to Peak Creek through outfall 001. Ultimately, the following tanks were treated and discharged: #327 (64,737 gallons), #9 (10,356 gallons), #10 (5,496 gallons) and #404 (34,350 gallons).

C. STNP contractors began treating the water stored in Lagoon #3 with caustic and flocculent in late January 2013 in preparation for final treatment (via bag filter and GAC) and discharge. Final treatment and discharge of water from Lagoon #3 to Peak Creek began on March 11, 2013 and continued until April 19, 2013. The treatment/discharge was discontinued when the water level in Lagoon #3 became low and turbidity became an issue. It was also found that a water source (likely an underground spring) constantly

delivered water into Lagoon #3. Approximately 500,701 gallons of water were treated and discharged.

D. Initial treatment of water in Lagoon #4 with caustic and flocculent was begun March 29, 2013.

E. STNP contractors collected storm water samples from the Creek side sump, copperas sump area, and the MO sump in January 2013. EPA required sampling of the storm flows to demonstrate that sufficient cleanup had occurred to show that the Site was not a source of hazardous substance release to Peak Creek. Analytical results for all the standard parameters in the Order were below the required levels, except for iron in the MO sump at 2.1 mg/L, slightly exceeding the 1 mg/L limit. PCB congener concentrations in the Creek side sump (17.2 ng/L) and copperas area (18.4 ng/L) were substantially lower than previous results from STNP and EPA sampling. However, PCB congener concentrations in the MO sump were 529 ng/L suggesting a remaining source of PCBs in the MO area.

F. Due to the elevated PCBs levels found in the MO sump, STNP contractors filled drainage trenches on the MO pad with concrete and sealed drains on the MO pad that drained to the MO sump were the samples were collected. This action was done in an attempt to seal the PCB source should it exist somewhere in underground piping. On February 13, 2013, STNP contractors collected a composite sample of storm water that accumulated in low areas on top of the MO pad. Analytical results for iron were below the 1 mg/L limit but the PCB congener concentration was 656 ng/L. The analytical results suggested a source of PCBs associated with the MO building pad itself.

G. In March 2013, STNP submitted a plan to collect samples of mastic, concrete and residuals (e.g., fine dusts or debris) remaining on the MO pad to be analyzed for PCB/aroclors in order to attempt to find the source of the elevated PCBs levels in storm water originating from the MO pad. EPA approved the plan and STNP contractors collected samples of mastic and residuals from defined areas of the MO pad on March 19th. Concrete samples were not collected. Analytical results showed high concentrations of aroclors in some of the mastic and residuals. The highest concentration detected in mastic was 12,000 mg/kg and the highest concentration in residuals (i.e., small particle debris located upon the pad) was 530 mg/kg. Excluding the highest concentration, the remaining residual samples ranged from 0.62 to 29 mg/kg. Responders believed that the mastic and caulk were deteriorating in the weather after the building covering the pad was removed via demolition. In May 2013, STNP proposed to remove the PCB-containing mastic and clean up remaining residuals on the pad.

H. STNP contractors mobilized to the site and conducted cleanup activities to remove PCB-containing mastic/caulk (mastic) and residuals from the former MO pad between May 15 and 17, 2013. Mastic suspected to contain high concentrations of PCBs based on the March 2013 sampling event was removed from two areas designated Q8 and Q6 during sampling. Expansion joints from which mastic was removed were then sealed using self-leveling sealant. Expansion joints and mastic in other areas where STNP did not suspect high PCB content were also sealed with sealer without removing the mastic. Approximately 60-linear feet of PCB-containing mastic in area Q8 and 10 linear feet in area Q6 could not readily be removed and were sealed using grout. Residuals were vacuumed up using a HEPA vacuum unit and/or shop vac. Mastic and vacuumed residuals were placed into 55-gallon drums. On August 27, 2013 6 drums of PCB-containing wastes (mastic and debris) from the MO pad were transported off-Site by GARCO and disposed at Veolia.

I. The stormwater from the Creek side of the site continued to drain into the lagoon system. Lagoon #3 was used to capture these waters which were now analyzed to be uncontaminated by hazardous substances from the Site. STNP contractors mobilized to the site on June 11, 2013 to resume treating and discharging lagoon water to Peak Creek. Water treatment/discharge continued until the morning of June 25, 2013, when it was discontinued due to low water level. Another 264,856 gallons of water had been treated and discharged. In July 2013, STNP contractors resumed the treatment and discharge of lagoon water in preparation for beginning the lagoon "closure" process. Treatment/discharge continued off and on through August 13, 2013 amounting to another 94,467 gallons.

J. A response action schedule submitted by STNP called for mobilization of heavy equipment and commencement of lagoon sludge cleanout the week of June 17, 2013. However, a 10-ton bridge weight limit prevented delivery of the excavator to the lagoon side of the site via the existing roadway. This bridge would also disallow delivery of fill material across the bridge or removal of sludge from the lagoon area for off-Site disposal. The lagoon cleanout process was put on hold until STNP contractors could make alternate plans to mobilize heavy equipment to the lagoon area. STNP also claimed that it would need the lagoon system footprint to improve the chances for sale of property in the future.

K. The plan for closure of the lagoon system was adjusted to allow for removal of all sludge from the lagoons and consolidation into the drying bed without subsequent filling of the lagoons (which no longer would contain hazardous substances).

L. STNP contractors mobilized to the Site on September 25, 2013 to commence lagoon closure activities relating to the removal of the sludge. Heavy equipment was mobilized

to the Site and the 'long-reach' excavator was moved across Peak Creek to the lagoon area along the concrete apron at the base of the facility's bridge across Peak Creek. The contractors began pumping water from Lagoons #1 and #2 into Lagoon #4.

M. EPA and STNP contractors split samples of lagoon (Lagoons 1, 2, and 3) and drying bed sludges the week of September 30, 2013. Sludge samples were collected from Lagoon #4 on October 29th. Analytical results demonstrated that the sludges were acceptable to be deposited in the drying bed.

N. Transfer of sludges from the lagoons to the drying bed began the week of October 7, 2013. STNP contractors used a mud pump and a long-reach excavator (and dump truck) to remove the sludges from the four lagoons and transfer them to the drying bed. Additionally, sludges were cleaned out of the concrete sump and conveyances to and between the lagoons. The sludge was removed from conveyances using a mini-excavator and remaining residuals were cleaned out using a pressure washer and vacuum truck. The remaining water and sediment in the Creek side waste water tanks were removed using the vacuum truck and placed into the drying bed in November 2013. By December 20, 2013, sludge removal/cleanout had been completed for Lagoons #1 and #2 and only a small amount of sludge remained in Lagoon 3.

O. STNP contractors collected storm water samples from the main sump and copperas area on the Creek side of the Site and MO pad during the week of November 26, 2013. Analytical results for the storm water sample collected from the MO pad indicated a total PCB congener concentration at 476 ng/L. This result was lower than results for the previous storm water sampling event in February 2013, which had a concentration of 656 ng/L. PCB concentrations in the creek side main sump were 12.2 ng/L (the result was 17.2 ng/L in the previous sampling event in January 2013). The copperas area sample had 30 ng/L PCBs (the result was 18.4 ng/L in the previous sampling event). On the whole, the data suggest that PCBs release from the Creek side of the former facility was negligible while the potential for PCBs release from the MO building was still present.

III E – Response Actions – 2014

A. Lagoon closure/cleanout operations resumed on January 9, 2014. The remaining sludges in Lagoons #3 and #4 were excavated with the long-reach excavator and transferred into the drying bed. The remaining conveyances between lagoons and in the lagoon system area were also cleaned out during this time period. Lagoon cleanout was deemed complete by STNP on February 4, 2013, pending final inspection by EPA.

B. The EPA OSC met with STNP contractor onsite on March 13, 2014 to inspect the Site and to verify the status of the lagoon closure. Based on the inspection, the OSC determined that the lagoon system cleanout had been satisfactorily completed. Sludge

removed from the four lagoons had been placed in the drying bed to dry. Final closure of the drying bed was scheduled to begin later in the year after the sludge had sufficiently dried.

C. During the March Site visit, the OSC also inspected the Creek side and MO sides of the Site and discussed remaining items to be completed under the EPA Order with STNP contractors. Items remaining to be completed on the creek side included cleanout of a ferrous sulfate tank, verification that pipes in the pipe rack (at tank farm) had been cleaned out, removal of a debris pile; and removal of the silt fence. The remaining action items for the MO side were to address the PCB-containing caulk identified in the MO pad and removal of the inert debris piles. Additional storm water sampling on the MO pad was also required. Subsequently, STNP submitted proposed new procedures for closing the drying bed and for removal of PCB-contaminated mastic/caulk from the MO pad. EPA reviewed and agreed on the revised procedures.

D. STNP contractors mobilized to the Site the week of August 4, 2014 and commenced cleanup operations to address the remaining action items on the Creek side of the Site and the MO pad. The OSC met with STNP contractors at the Site on August 4, 2014 when test pits in the drying bed were dug to evaluate the drying progress of sludge and clay. STNP determined that the sludge and clay had dried sufficiently to allow for the final "closure" activities to begin.

E. STNP contractors also collected additional samples of caulk from across the MO pad to verify which areas had PCB-containing caulk that would need to be removed. Seven caulk samples were collected from the MO pad and sent to an STNP-procured laboratory be analyzed for PCBs (aroclors). Five of the seven samples had PCB concentrations that exceeded the 50 mg/kg regulatory level to be classified as PCB waste, with concentrations ranging from 680 to 12,000 mg/kg. These results were used to identify additional areas of the MO pad that would require removal of PCB-containing caulk.

F. During the week of August 11-15, 2014, STNP contractors completed the demolition of the steel tanks and fiberglass tanks and dismantled the pipe rack above the tanks. Inert debris piles located adjacent to the MO pad and one located on the creek side of the site were transported offsite for disposal in a local landfill. The steel tanks and pipes were cut up and transported off site to be recycled. Fiberglass tank debris, insulation, and other debris were also transported offsite to NRRA. The fiberglass copperas tank was demolished the week of August 18, 2014. The tank remnants/debris and the ferrous sulfate residual contents were loaded into trucks and transported off site to NRRA for landfill disposal.

G. On August 18, 2013, STNP contractors collected five samples of caulk from the concrete building pads on the Creek side of the Site. Analytical results indicated only low concentrations of PCBs in the samples, with the concentrations ranging from 1.4 to 4.0 mg/kg. These concentrations were well below the regulatory levels and it was determined that the caulk on the Creek side pads would not require removal.

H. STNP re-mobilized to the Site on August 25, 2014 to begin removing additional PCB-containing caulk from the MO pad and finish cleanup activities on the Creek side of the Site. The contractors also vacuumed up residuals/dust on the MO pad with a HEPA vacuum and then pressure washed the pad. PCB-containing caulk and residuals removed from the MO pad were stored in a lined roll off box onsite until disposal arrangements for the PCB waste could be arranged. The wastes were removed from the Site in November 2014 and disposed at Wayne Disposal. A self-leveling sealer was used to seal the seams in the concrete pad where caulk had been removed.

I. STNP contractors mobilized to the Site on October 29, 2014 to commence closure of the drying bed. A significant amount of wet clay/sludge (C/S) mixture was encountered in portions of the drying bed. The conditions were not suitable for final covering of the sludge. STNP mobilized an excavator to the Site to organize the wet C/S and place into wind rows to facilitate the drying process. A bulldozer was used to mix shale from the drying bed berm with the C/S and place it in lifts in the drying bed. A dump truck was mobilized to the Site and used to haul shale material from the facility hill side and place it into the drying bed to be mixed with the C/S. STNP determined that much of the C/S was too wet to enable placement to meet the requirements of the Order, even with the addition of the shale. The STNP contractors made a determination that the C/S needed to be allowed to dry in the wind rows before the drying bed closure could be completed. The contractors demobilized along with all the equipment on November 6, 2014.

III F – Response Actions – 2015

A. STNP contractors re-mobilized to the Site on July 20, 2015 to continue drying bed closure activities. An excavator was used to turn the C/S that had been placed in wind rows in the drying bed. It was determined that much of the C/S was still too wet to enable placement to meet compaction requirements. The C/S was turned and worked with the excavator to break up large chunks of C/S to facilitate drying. The contractors demobilized, along with the equipment, on July 24, 2015.

B. The contractors re-mobilized to the Site on September 15-16, 2015 to turn over and work the clay/sludge (C/S) to facilitate further drying. The STNP prime contractor stated that field conditions indicated that the C/S was dry enough to move into final closure of the drying bed. Final closure activities were tentatively scheduled for October 2015.

C. EPA START and STNP contractors mobilized to the Site on September 29, 2015 to conduct storm water sampling. Split storm water samples were collected during a rain event from the former MO building pad and the copperas area on the 'creek side' of the Site. The samples were sent to the respective EPA and contractor laboratories to be analyzed for PCB congeners. Analytical results obtained by STNP for PCB congeners indicated a concentration of 213 ng/L for the MO pad composite sample and 1.54 ng/L for the Copperas area sample. These results were significantly lower than those for the previous storm water sampling event (November 25, 2013) in which PCB congener concentrations of 476 ng/L were detected for the MO pad sample and 30 ng/L for the copperas area sample. Analytical results for the EPA split samples were similar (240 ng/L on the MO pad and 1.4 ng/L for copperas). The results generally indicated that cleaning processes were complete on the Creek side and that conditions on the MO pad were greatly improved. The OSC believed that the extent of cleaning (caulk removal) on the MO pad had progressed as far as it could.

D. STNP contractors mobilized to the Site on October 13, 2015 to begin the final closure activities for the drying bed. The contractors spread, graded, and compacted the C/S material within the drying bed. Cover soil was spread over the C/S layer and compacted. Final grading and compaction of the drying bed cover, seeding, and application of straw over the area were completed and STNP contractors demobilized from the Site on October 20, 2015.

E. EPA, VADEQ, and STNP contractors made a site visit to inspect the drying bed closure and conduct a Site walkthrough on November 5, 2015. Low areas were identified on the drying bed cover where water had accumulated following a recent rain event. These areas would only require a small amount of additional soil to fill in. Other action items were identified during the Site walkthrough, including removal of remaining contractor piping, a mixing tank, drums, and removal of the silt fence. VADEQ also expressed the desire to have the lagoons filled in. Other remaining Site issues involved a final evaluation of the PCB congener results for storm water and a determination if further action was warranted to address the issue.

III G – Response Actions – 2016

A. On February 5, 2016, STNP contractors mobilized to the site to collect water samples from Lagoons #3 and #4 as required to determine if lagoon cleaning activities successfully addressed hazardous substances that could discharge to Peak Creek. START was onsite to observe the sampling. STNP and START also inspected the drying bed and observed two small areas with standing water following an overnight rain event.

B. An STNP contractor also mobilized to the Site to remove the silt fence on the Creek side of the Site and pick up and remove remaining piping, a mixing tank, empty drums and totes, and other equipment.

C. STNP analytical results for the lagoon water samples indicated that all parameters were less than the limits set in the Order except for a slight exceedance for iron in the sample collected from Lagoon #4. The Lagoon #4 sample had iron detected at 1.7 mg/L, exceeding listed limit of 1 mg/L. The iron concentration in Lagoon 3 was well below the limit. Note that water in lagoon system was not discharging to Peak Creek.

D. On July 15, 2016 a sample of water from the lagoon waters was collected. The analytical result indicated that the limits established in the Order were met.

E. During the week of August 15, 2016, STNP contractors completed activities related to the addressing the low spots in the cover placed over the sludge in the drying bed. This action completed the field activities relating to the Removal Action.

F. The OSC inspected the Site on August 25, 2016 and found that all field actions required by the Order had been completed.

IV. RESOURCES COMMITTED

The Project was completed mostly by a Potentially Responsible Party. The EPA issued an Action Memorandum selecting a response action on September 10, 2010 with ceiling amounts indicated in the table below. However, the majority of the EPA costs relate to EPA personnel and START contractor costs incurred in oversight of the Project. The table below includes EPA costs to date obtained from the EPA financial system which includes persons not directly relating on-scene oversight.

	CEILING (Action Memo)	COST TO DATE
ERRS - Kemron	$1,699,300	$117,376
START - Techlaw	$260,100	$358,978
Laboratory/Analytical		$63,077
EPA Direct		$208,247
TOTAL	$1959,400	$747,678

V. ROSTER OF AGENCIES

Organization	Role	Main Contacts
EPA	Oversight of PRP, Coordination with DEQ and Pulaski and Direction of EPA contractors	Michael Towle
VADEQ	Coordination between EPA and State and Local Authorities	Elizabeth Lohman
VADEM	Provided initial response and stabilization	Jack Tolbert
Pulaski	Coordination between Responders and Town / County officials as well as security and advice	Todd Garwood William Pedigo Gary Roche
Pulaski (County)	Coordination between Responders and Town / County officials	Peter Huber
EPA START – Techlaw	Provided onsite oversight and advice to EPA	Gene Nance
EPA ERRS – Kemron	Provided cleanup activity for EPA	Kevin Shaver
NanoChemonics	Provided early actions	Carmine Dinitto Chris Andrews
STNP LLC	Provided contractors for response actions	Chris Andrews
DH Griffin	Demolition of main plant	
Cycle Systems	Demolition of MO building	
Duncklee & Dunham (D&D)	Provided supervision and environmental management for PRP STNP	Andy Rodak
A&D Environmental	Cleanout of main plant	
GARCO	Waste management and disposal	
Mid Atlantic Associates	Environmental management	Jeff Tyburski (McAdams)
Ammons Resource Group	Cleanout of Site, PCB removal, Lagoon Closure	Fred Ammons

VI. SUMMARY OF WASTE TREATMENT AND/OR DISPOSAL

September 2010	6490 pounds	Laboratory chemicals	American Environmental
September 2010	Minor	Laboratory chemical detonation	VADEM, VA State Police
Oct – Dec 2011	3180 tons	Non Haz Demolition debris (Creek side)	New River Res. Auth. (NRRA)
April 2012	35 tons	PCB-contaminated debris (CAB)	EQ Wayne Disposal
April 2012	559 tons	Waste containers and off-specification product (MO)	GARCO and First Piedmont
April 2012	500 tons	Non Haz demolition debris (MO building)	NRRA
November 2012	50 tons	5 R/O Non Haz demolition debris (final cleanup)	NRRA
December 2012	16 tons	1 R/O NH PCBs soil, residuals, debris	NRRA
January 2013	5954 pounds	Drums/totes (CAB cleaning and excess water treatment chemicals)	Veolia – PCB liquids Wayne – PCB solids PCI - other
August 2013	1100 pounds	Drums/PCB waste (MO)	Veolia
November 2014	3610 pounds	PCB waste (MO)	Wayne
Various	100s of thousands of gallons	Washwaters treated and discharged through the lagoon system	Off-Site via Peak Creek

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VII. FUTURE CONSIDERATIONS

A. At the conclusion of the Removal response action, the majority of the former NanoChemonics manufacturing facility had been demolished and disposed from the Site. A few small buildings such as a storage shed in the Copperas area, a small building where product samples were stored in the Copperas area, a cinder block pump house, and parts of a former administrative/laboratory building remained. One empty fiberglass tank also remains. The property is subject to an Order of Condemnation from Pulaski (the OSC believes that such requirement is outside the requirements of the Order). The Site is surrounded by fencing.

B. The concrete slabs of all demolished buildings also remain. There are tank cradles, pump pedestals and remnants of the trench system also within the footprint of the Site. PCB-containing concrete caulk/mastic which could not be completely removed from the MO building slab and which is located in the joints of the former concrete floor is covered with sealant and grout.

C. Sludge potentially containing hazardous substances has been removed from the 4 lagoons, dried, consolidated, and placed into the drying bed. Small quantities of some of the materials generated during the Removal Action are also mixed within the drying bed materials (e.g., lime, ferrous sulfate residuals, and small amounts of material containing low levels of PCBs (e.g., a few mg/kg)). This drying bed was then covered and sloped to minimize the potential for water to pool on the cover and infiltrate into the dried sludge. The drying bed is located in the lagoon area of the Site where other sludges are believed to be buried.

D. Samples collected to represent the quality of stormwater flows have been collected and used to determine that the quality of the waters discharging from the Site do not contain hazardous substances from the former manufacturing facility (and its wastes) at levels of concern in the Order. PCBs were extensively sampled in the storm discharges and Peak Creek. Low levels of PCBs (e.g., measured in pg/L) were found upstream in Peak Creek and within the storm discharges at the Site. The OSC does not believe that the amounts of PCBs in the storm discharges pose an additional threat to warrant additional Removal Action or additional Work under the Order. Some of these PCBs may result from sources other than the NanoChemonics Site (e.g., railroad siding). PCBs levels downstream of the Site appear to result from other sources. Peak Creek sampling (i.e., TMDL sampling) conducted by others indicates elevated levels of PCBs downstream of the Site likely not resulting from NanoChemonics.

E. It is probable that minor amounts of residual materials may exist at the Site adhered to or existing as stains upon concrete pads or components of the trench system (e.g., sumps, concrete walls, and pipe that formerly carried process flows into the lagoons (and which crosses Peak Creek)) as well as in the soils underlying the former lagoons. However, sampling of the flow in the lagoons indicates only the possible presence of increased levels of iron.

F. The lagoon footprints remain unfilled. The owner of the Site claims an interest in selling the property and using the lagoon system as part of the attributes of the property (although VADEQ indicates that such lagoon system may no longer qualify for such purpose). The State had requested that such footprints be filled and the original plans required such actions (along with

allowing the sludges to remain within). Due to physical restrictions on the bridge, a material balance which would have required creating a borrow area to generate fill, and an approved alternate action, the sludges were removed from the lagoons and consolidated into the drying bed. The OSC does not believe that such additional actions can be required under the Order.

G. The Site is now characterized by extensive layout of concrete slabs and a trench system that carries stormwater towards the lagoon system. Stormwater also falls on the Site and runs off the property in other locations. EPA has sampled the surface soils in identified stormwater flow pathways and has found low levels of PCBs inclusive of an area near the railroad spur not believed to be related to the Site. The PCBs levels are not believed to result in an unacceptable release of hazardous substances which warrants continuation of removal actions. The Removal Action did not evaluate possible wastes or threats that nay exist subsurface at the Site. The Site has a fence, but signs of trespass are obvious. Remaining dilapidated and partial buildings, which may contain some asbestos-containing materials, may be a nuisance attraction. There is no security presence on the Site. The OSC believes that the remaining structures do not contain hazardous substances subject to the Removal Action. The subsurface at the Site is also largely uncharacterized as it was not part of the scope of the Removal Action.

H. Outcome Measure:

The calculation of a population that is potentially exposed to contaminated soil is as follows:

Human Exposure = Resident Population On-Site + Restricted Access Multiplier x [Resident Population Off-Site + Recreational Public Population]

The population within a one mile radius of the Site is approximately 1000 persons. This was determined by considering the population density of Pulaski (1139 persons/square mile) which is east of the Site and which makes up about ½ of the subject area, the increased density within structures within downtown Pulaski, and the lower population density of the rural area to the west of the Site. There are no persons living on the Site or known to live in the area of Site contamination. As removal activities were conducted on private property, a restricted-access multiplier of 0.5 is used. No removal activities were conducted within areas of public use.

Human Exposure = 0 + 0.5[1000]

Using the above calculation, the population that is potential exposed is 500 people. The total extramural cost of the removal activities is approximately $748,000. Therefore, approximately 375 human exposures are avoided per $1 million extramural resources expended due to this removal action.

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Michael Towle
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EPA Region III
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