UNITED STATES

ENVIRONMENTAL PROTECTION AGENCY

REGION III

STATEMENT OF BASIS

for

Northrop Grumman Systems Corporation
(Former Sperry Marine) and Parcel G
Charlottesville, VA

EPA ID: VAD 003 123 833

Prepared by
Office of Remediation
Land and Chemicals Division

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Section 1: Introduction

The United States Environmental Protection Agency (EPA) prepared this Statement of Basis (SB) to solicit public comment on its proposed remedy for a portion of the Sperry Marine Facility (Facility) currently owned and operated by the Northrop Grumman Systems Corporation (NGSC) property. Specifically, this SB addresses the Manufacturing Parcel (NGSC) and an adjacent property, Parcel G (the Properties) at the Facility. The Facility is located at 1070 Seminole Trail (US-29), Charlottesville, VA in Albemarle County (Figure 1).

This SB highlights key data that EPA relied on for proposing its remedy for the Properties. In this SB, EPA is proposing Monitored Natural Attenuation (MNA), Long-Term Groundwater Monitoring (LTM) and Vapor Intrusion Controls Systems (VCS). In addition, the proposed remedy for the Properties includes land and groundwater use restrictions to be implemented by institutional controls until EPA's Corrective Action Objectives are achieved.

The Properties are subject to EPA's Corrective Action Program under the Solid Waste Disposal Act, as amended, commonly referred to as the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. Sections 6901 et seq., (Corrective Action Program). The Corrective Action Program goal is to ensure that certain facilities subject to RCRA have investigated and cleaned up releases of hazardous waste and/or hazardous constituents that occurred at or from their property. The Commonwealth of Virginia is authorized to implement the Corrective Action Program under Section 3006 of RCRA, and as part of a workshare agreement with EPA, EPA is the lead Agency in overseeing the investigation phase of Corrective Action at the Facility, including the Properties.

EPA is providing 45 days for public comment on this SB. Based on comments received during this period, EPA may modify its proposed remedy. EPA will announce its selection of a final remedy for the Properties in a Final Decision and Response to Comments (FDRTC) document after any public comments have been received and considered by EPA.

EPA's Fact Sheet on the Facility is located at: https://www.epa.gov/hwcorrectiveaction/hazardous-waste-cleanup-northrop-grumman-systems-corp-charlottesville-va. Information on the Corrective Action program is located at: https://www.epa.gov/hwcorrectiveactionsites.

The Administrative Record (AR) for the Facility contains all documents, including data and quality assurance evaluations that EPA relied on in proposing the final remedy for the Properties. Attachment A is the AR Index for the documents related to the Properties. Public Participation information is provided in Section 8 of this SB for those interested in reviewing the AR.

Section 2: Facility Background

In 1955, the Sperry Corporation (Sperry) developed the 81.6-acre wooded Facility property for the manufacturing of periscopes, navigational and related equipment. Equipment was tested on-site.

Historic processes included machining, degreasing, soldering and painting. After its development, much of the Facility remained wooded. In 1986, Sperry and the Burroughs Corporation merged, creating Unisys Corporation (Unisys). Unisys sold the 19-acre Manufacturing Parcel within a year after the merger.

In 1986, the 81.6-acre Facility property was subdivided into three parcels or lots. Parcel boundaries were revised in 1999. Two undeveloped parcels, Lot 1 and Lot 2, respectively, were sold to developers and Lot 3, a 19-acre parcel referred to as the Manufacturing Parcel, was retained by Sperry for manufacturing operations. Thereafter, the Manufacturing Parcel was acquired by many different owners until Northrop Grumman Systems Corporation (NGSC) acquired it in 2003. NGSC currently uses the 19-acre Manufacturing Parcel for designing and testing navigation systems used in large ships. Figure 2 depicts the three parcels/lots which comprised the original 81.6-acre Facility property.

In 2015, a Costco retail store and parking lot were built on Lot 1 (Costco Parcel). EPA issued a Final Decision and Response to Comments document for the Costco Parcel on July 9, 2014 which addressed remaining contamination originating with historic Facility releases on that Parcel.

Lot 2, also known as Parcel G, is located adjacent the Manufacturing and Costco Parcels, as shown on Figure 2 (approximate boundaries). Parcel G is currently owned by OCT Stonefield Property Owner (OCT). OCT has developed Parcel G, which includes retail buildings and a parking lot.

Within the Facility were two perennial (intermittent) streams called North and South streams (Figure 2). North stream was in a ravine on the northeast side of the Manufacturing Parcel. North stream was later diverted into an underground pipe in the ravine, which was filled, leveled and paved for development of the Costco Parcel and Parcel G. South stream was located on the southeast side of the Manufacturing Parcel and was also diverted into an underground pipe. The two piped streams drain into a culvert under Seminole Trail and flow into Meadow Creek, south of the Facility.

Chemicals used on the Manufacturing Parcel included Freon, tetrachloroethene (PCE), trichloroethene (TCE) and 1,1,1-trichloroethane (TCA). PCE and TCE, used for degreasing, were later replaced with TCA. A paint booth was used in manufacturing and paint residues were collected and stored in drums on the north side of the Manufacturing Building on the Manufacturing Parcel. Several underground storage tanks were located on the south side of the Manufacturing Building and were removed.

Section 3: Summary of Environmental Investigations

3.1 Corrective Action Regulatory History

In August 1980, EPA received a Hazardous Waste Activity Notification for the Facility as required by RCRA §3010. A 1988 inspection by Virginia Department of Waste Management (VDWM) identified the Facility as a large quantity generator of waste solvents, corrosives and paint sludge. From 1987 to 1990, Sperry voluntarily conducted environmental investigations in preparation for subdividing and selling portions of the 81.6-acre Facility property. The investigations included sampling of soil, soil

vapor, surface water (SW), sediment and groundwater (GW). Contamination was identified in some areas. The Facility property was subdivided into three lots, Lots 1, 2 and 3, respectively.

In 1996, Sperry entered into a Voluntary Agreement with VDEQ to remediate the three Lots (Figure 2). Lots 1 and 2 were wooded parcels under contract to developers. Lot 3 included the Manufacturing Parcel and 13 wooded acres later added to Lot 1. Sperry submitted Site Characterization Reports to VDEQ for Lots 1 and 2 in 1996 and Lot 3 in 1997. In 1998, a Supplemental Data Report for the three Lots was submitted. Risk assessments concluded that the three Lots did not present unacceptable risks to human health or the environment if land and groundwater (GW) use restrictions were implemented. In 2000, Sperry recorded the Declaration of Restrictive Covenants restricting the Properties to non-residential use and prohibiting GW as a drinking water source. Lot 1 had restricted GW use but unrestricted land use. In 2000, VDEQ issued a Certificate of Satisfactory Completion of Remediation (CSCR) for Lots 2 and 3, which included a copy of the use restrictions recorded on the deeds in July and March 2000, respectively. In 2002, VDEQ issued a CSCR for Lot 1 (included the 13-acres originally part of Lot 3), allowing unrestricted land use and prohibited GW use for drinking water purposes.

As part of Sperry's Voluntary Remediation Agreement with VDEQ, SW and sediment samples were collected from the North and South streams and 20 monitoring wells (MWs) were sampled. From 2000 to 2004, four years of GW data were collected from seven MWs on the three Lots. In the final GW Report to VDEQ in 2005, Sperry concluded that GW contamination, consisting of chlorinated volatile organic compounds (cVOCs), showed stable or decreasing trends. In 2007, the Facility requested that VDEQ release the Facility from VDEQ's Voluntary Remediation Program (VRP) to continue investigation and clean up under an EPA Facility Lead Agreement (FLA). VDEQ agreed and issued a CSCR for the remaining Lot 3 in 2008.

In January 2008, the Facility entered into a FLA with EPA to identify data gaps and investigate any remaining areas identified for Corrective Action.

3.2 Environmental Investigations Summary:

3.3.1 Corrective Action RCRA Facility Assessment and RCRA Facility Investigation

In a 1996, VDEQ identified 10 solid waste management units (SWMUs), one hazardous waste management unit (HWMU) and one area of concern (AOC) at the Facility. Ten years later, during a 2006 Facility visit, EPA re-evaluated the SWMUs and AOC. Thirteen SWMUs were identified, with 8 located inside the Manufacturing Building and five SWMUs and two AOCs located outside. SWMUs inside the Manufacturing Building were not investigated because the units were on concrete floors with no visible floor drains and no evidence of releases. The previously identified HWMU was renamed SWMU-1. The Facility was designated as a small quantity hazardous generator at that time.

As part of the FLA with EPA, the Unisys sent EPA a *RCRA Facility Investigation Work Plan* with a *Description of Current Conditions* (April 2008) (RFI WP). The RFI WP included the data collected under VDEQ's Voluntary Remediation Program. The RFI WP built upon the previous investigations and identified areas where further investigation was needed. The RFI WP covered the

Manufacturing Parcel, Parcel G and the Costco Parcel. Six areas were identified for further investigation, as listed below:

(1) SWMU-1: Former Paint Pit on Manufacturing Parcel;
(2) SWMU-9A: Former Used Drum Storage Area on Manufacturing Parcel;
(3) SWMU-9B: Former Hazardous Waste Storage Area on Manufacturing Parcel;
(4) AOC-2: Former Weed Control Area, partially on Parcel G;
(5) Facility-wide GW on Manufacturing Parcel and Parcel G; and
(6) North Stream Sampling on Parcel G.

Units one through four, above, were identified as potential contaminant source areas. SWMU-9A and AOC-2 were considered the main source areas.

Investigation of the six areas was completed and the *RCRA Facility Investigation* (RFI) Report was submitted to EPA in September 2010. EPA approved the RFI Report in March 2013. The findings are discussed in Section 3.4.

3.3 Summary of Remedial Activities:

Prior to the FLA, Unisys completed remedial activities at two locations: (1) SWMU-1 (Former Paint Pit); and (2) AOC-1 (Former Diesel Fuel Spill). Under the FLA, Unisys conducted a soil removal at AOC-2 (Former Weed Control Area) (Figure 2). The remedial or Interim Measures (IMs) for clean-up at these three locations are detailed below.

SWMU-1: The Former Paint Pit, also known as the Former Neutralization Pit, was located outside the Manufacturing Building's northern corner. The Former Paint Pit was unlined and was used to neutralize and dispose of waste liquids from 1955 until the 1970s. Waste types and quantities are unknown. Sperry excavated 70 to 80 cubic yards of contaminated soil from the Pit in 1989 and stockpiled it on-site under plastic sheeting. Contaminants in soil were primarily PCE, TCE, toluene and xylenes. The stockpiled soil was the subject of a Compliance Order with VDEQ. In 1990, Sperry transported the soil to an off-site hazardous waste landfill with VDEQs approval. VDEQ approved final closure in January 1995.

AOC-1: In March 1998, a delivery truck at a loading dock struck a bollard in the southwestern corner of the Manufacturing Building and an estimated 15 gallons of diesel fuel were released. Diesel flowed onto the pavement with some seeping through. The Sperry Spill Response and County Fire Department intercepted the spill before it reached the South Stream by using absorbents in stormwater boxes and a drain to the Stream. Asphalt was removed at the spill site and 46 tons of contaminated soil was excavated. The stormwater pipe was flushed and absorbent pads and booms contained the flushed water in a pit. The stormwater pipe was inspected by camera and some debris and diesel fuel were removed. There was no evidence that diesel reached South Stream. VDEQ approved the clean-up and required no further action.

AOC-2: The Former Weed Control Area was located on the current Costco Parcel and partially located on Parcel G. Information provided by employees who worked at the Facility in the 1970s suggested that spent solvents were used for weed control on the Costco Parcel and Parcel G. Later investigations confirmed cVOC contamination in soil, soil gas, GW, SW and sediments in the North Stream. Solvent

amount, types and frequency of application are unknown. The solvent application reportedly ended in the 1970s.

During the RFI investigations, the Facility proposed an Interim Measure (IM) at AOC-2 to further delineate soil contamination and determine if soil removal was necessary. PCE and TCE were found in soil in discrete areas. Only PCE levels exceeded EPA's Regional Screening Levels (RSLs) for non-residential uses. Thereafter, the Facility excavated 2,581 tons of contaminated soil and disposed of it at a permitted off-site landfill. EPA approved the *AOC-2 IM Report* (November 2012) for the soil removal. Groundwater monitoring data from the former AOC-2 show some cVOCs in GW, however contaminant levels are declining.

3.4 Findings of Facility Investigations:

1. Site Geology and Hydrogeology: The Facility is underlain by the Charlottesville Formation, a highly faulted gneiss, and is situated in the Blue Ridge physiographic province. The upper portion of bedrock is moderately to highly weathered rock called saprolite. Competent bedrock is present beneath the Facility at depths ranging from 12 to 57 feet below ground surface (bgs).

GW is 15 to 50 feet below ground surface (bgs) in both unconsolidated and bedrock beneath the Facility. GW flow is generally to the east and southeast across the Facility, with the former stream channels acting as GW discharge zones for shallow GW, even though the streams were diverted into underground pipes.

2. Soil Sampling Results: Soil sampling began in 1987, biased towards known or suspected release locations. Samples were analyzed for cVOCs and semi-volatile organic compounds (SVOCs), metals, and in some areas, total petroleum hydrocarbons (TPH). Constituents of potential concern in soil were PCE, TCE and chromium. Soil results for all SWMUs and AOCs were screened against EPA's Risk Based Concentrations (RBCs) for industrial settings and only PCE exceed RBC levels at two locations: SWMU-9A (6 feet bgs) and at AOC-2. See discussion above in Section 3.3 (Summary of Remedial Activities) for the remedial measures taken at AOC-2. Elevated levels of TPH were found at depth at SMWU-9A.

3. North and South Stream Sampling Results: Surface water (SW) samples were collected in multiple locations in North and South Streams over a 10-year period (1988 to 1998). North Stream samples contained concentrations of cVOCs that had migrated from AOC-2 and possibly the Manufacturing Parcel. SW cVOC levels declined over time. In 1988, sample results showed only TCE exceeded EPA Region 3's Biological Technical Assistance Group Screening Benchmarks (BTAG) levels for freshwater. In addition, in 1988, South Stream samples had no cVOC detections except for PCE in one location that diminished over time. Sediment samples were collected from both Streams at three locations in 1989. North Stream showed PCE exceedances of the BTAG level in two of three locations and South Stream in one location. In 2011, North Stream was sampled again before it was diverted into an underground pipe. One sediment sample exceeded the PCE BTAG level and in SW, PCE was below the applicable screening level. The intermittent streams are now conveyed through pipes underground due to development on Parcels surrounding the Manufacturing Parcel.

4. GW Sampling Results: GW MWs are currently monitored on the Manufacturing Parcel, Parcel G and the Costco Parcel and are shown on Figure 3. Table 1 shows GW contaminant levels from initial sampling to the most recent sampling. Except for MW W-3, all cVOCs levels have declining trends over time. MW W-3 has the highest level of cVOCs contamination on the Facility. TCE levels in MW W-3 increased after 1990 and remained above 2000 parts per billion (ppb) until 2005, when a declining trend began. The cVOCs in MW W-3 appears to be concentrated in a fine-grained layer below 45 feet bgs.

Declining cVOC levels in GW can be attributed to significant reduction of cVOCs use in manufacturing and modern waste handling practices which reduce the likelihood of releases. Without further contaminant loading to the aquifer, natural attenuation processes, such as dilution, dispersion and in some locations, reductive dechlorination (possibly at MWs W-3, -22, -25, -26) are reducing residual levels of cVOCs in GW, as seen in Table 1 below.

MWs are screened in the shallow aquifer zone, except MWs W-21 and W-22, which are screened in deeper zones. MW W-22 is screened in competent bedrock downgradient of MW W-3. MW W-22 currently shows PCE above that contaminant's Maximum Contaminant Level (MCL) (promulgated pursuant to Section 42 U.S.C. §§ 300f et seq. of the Safe Drinking Water Act and codified at 40 CFR Part 141), with TCE, cDCE and vinyl chloride below their applicable MCLs. MW W-21 shows non-detected levels of cVOCs. Data from MWs located on the perimeter of the Facility property boundary indicate contaminated GW is not flowing off-site.

Table 1 – cVOC levels in ppb[1]

MW ID	Date	PCE MCL= 5 ppb	TCE MCL=5 ppb	cDCE MCL=70 ppb	VC MCL=2 ppb
NGSC wells: W-1	9/13/1987	380	1.7	NA [2]	ND [3]
	6/18/2018	ND	ND	ND	ND
W-3	3/17/1987	21	560	130	ND
	6/18/2018	150	1900	420	ND
W-13	3/11/1988	3000	29	1.3	ND
	6/18/2018	89	5.2	ND	ND
W-19	11/12/1989	990	16	NA	ND
	6/18/2018	4.8	ND	ND	ND
W-21	9/24/2008	ND	ND	ND	ND
	6/20/2013	ND	ND	ND	ND
W-22	9/25/2008	7.9	56	22	ND
	6/18/2018	5.8	4.4	14	ND
Parcel G wells W-23	10/08/2015	6.1	1.3	ND	ND
	6/18/2018	6.6	1.2	ND	ND
W-24	10/08/2015	ND	ND	ND	ND
	6/18/2018	ND	ND	ND	ND
Costco wells: W-25	10/08/2015	21	13	8.2	ND
	6/18/2018	13	4.4	2.5	ND
W-26	10/08/2015	230	64	6.7	ND
	6/18/2018	180	43	4.9	ND
W-27	10/08/2015	ND	ND	ND	ND

[1] ppb - parts per billion; [2] NA – Not Analyzed; [3] ND – Not detected

5. Parcel G - Soil and Soil Gas Sampling Results: Prior to development of Parcel G, EDENS, the developer, sent EPA a Workplan for soil and soil gas sampling for cVOCs because a portion of AOC-2 is located on Parcel G. EPA approved the Workplan in December 2014. In July and September 2015, the developer collected six soil gas samples 5 feet below subgrade where five retail pad/sites were planned, and two deeper soil gas samples (>15 feet bgs) from the bedrock/soil interface. Soil samples were also collected. CVOCs were not detected in soil samples. However, some cVOCs in soil gas were found, with only PCE exceeding VADEQ's commercial screening levels at one planned retail pad. The developer's Report recommended a Vapor Control System (VCM) be installed in the building planned for that location. EPA approved the November 2015 *Vapor Intrusion Assessment (Stonefield G Parcels)*, including the recommendations for a VCM. The EPA-approved VCM system was installed.

6. Manufacturing Building Sub-Slab and Indoor Air Sampling: MW W-3 shows the highest TCE level in GW. W-3 is located within 20 feet of the Manufacturing Building. Because of W-3's proximity to the Manufacturing Building, EPA requested that Unisys conduct a vapor intrusion (VI) evaluation inside that building. EPA approved the *RFI Workplan Addendum #2, Vapor Intrusion Evaluation–1987 Building Addition* and sampling began in March 2017. The VI Evaluation consisted of six sub-slab sampling points inside the Manufacturing Building, an outdoor soil gas sample collected between the Manufacturing Building and W-3 and an outdoor ambient air sample collected upwind of the building. Indoor air samples were not collected because of concern that chemical storage and operations involving chemicals would inflate sampling results.

Sampling results from the Manufacturing Building presented in Unisys' *VI Evaluation Report* (May 2017) showed that cVOCs were present in sub-slab soil gas and in the outside soil gas sample. Sub-slab soil gas results were used to estimate potential indoor air VOC levels using EPA's default attenuation factor for sub-slab to indoor air (0.03). Cross-slab pressure differentials created by indoor heating and cooling were also measured. Estimated indoor air results were compared to EPA's Regional Screening Levels (RSLs) for industrial indoor air exposure for workers using 10-hrs/day exposure. The results for indoor air in the Manufacturing Building were within EPA's acceptable risk range, indicating that estimated VOC levels in indoor air would not pose unacceptable risk to workers. PCE was the primary cVOC detected with smaller concentrations of TCE detected. EPA approved the *VI Evaluation Report* in June 2017.

To confirm the results, Unisys repeated the sub-slab soil gas sampling at the same six indoor locations in February 2018. Using the sub-slab data, building air exchange rates and the estimated or calculated risk formula, indoor air level risk in the Manufacturing Building was within acceptable levels.

NGSC conducted its own sub-slab sampling event throughout the Manufacturing Building in November 2017 and indoor air sampling events in December 2017 and January 2018. NGSC collected sub-slab air samples from 12 locations in areas not already sampled by Unisys. NGSC then collected 5 indoor air and 2 outdoor air samples in December 2017 and again in January 2018. Outdoor air samples were collected near air intakes to the Manufacturing Building. NGSC submitted its Report of findings, *Sub-Slab Soil Vapor and Indoor Air Data Collected by Northrop Grumman* to EPA in April 2018.

In three locations, NGSC's sub-slab results showed PCE and TCE levels at much higher levels than Unisys sub-slab sample results, which were taken from different locations in the Manufacturing Building. EPA used the Vapor Intrusion Screening Level (VISL) calculator to evaluate potential indoor

air risks to worker health based on NGSC's sub-slab air results. According to the VISL calculator, 6 of the 12 NGSC sub-slab results exceeded acceptable risks for indoor air for non-carcinogenic effects. EPA used a 10 hour/day worker exposure time, which is a typical work shift as provided by NGSC (see Table 2). EPA's acceptable excess lifetime cancer risk range for carcinogens is 1 cancer incidence in 10,000 (10^{-4}) to 1,000,000 (10^{-6}) people and a non-cancer hazard index of no greater than 1.

Table 2
NGSC Sub-Slab Air (SS) Results* & EPA VISL Risk Calculations

SS Sample ID VOC levels in ug/m³ *	PCE RSLi = 47	TCE RSLi=3	Carcinogenic Risk EPA Target 10^{-4} to 10^{-6}	Non-Cancer Hazard Risk EPA Target=1
SG-2	56,300	<391	4.48E-05	12.1
SG-3	39,300	<262	3.12E-05	8.41
SG-5	3,240	212	5.23E-06	1.60
SG-6	2,290	319	5.82E-06	1.86
SG-7	5,080	230	6.92E-06	2.07
SG-8	6,740	524	1.19E-05	3.69

*November 2017 data

Table 3 below shows the VISL risk calculations for the two of five IA samples where PCE and TCE were detected. For the actual measured indoor air (IA) results, indoor air risk was within EPA's acceptable risk range using EPA's risk calculator (VISL) for IA in industrial settings. IA-1 non-hazard risk of 1.44 rounds to 1. Outdoor air samples showed no detections for PCE or TCE. EPA used a 10 hour/day exposure. EPA's VISL calculation does not consider outdoor/indoor air exchange rates in the Plant or a site-specific attenuation factor for sub-slab vapor to indoor air.

Table 3
NGSC Indoor Air (IA) Results & EPA VISL Risk Calculations

IA Sample ID VOC levels in ug/m³ *	Date	PCE RSLi = 47	TCE RSLi=3	Toluene RSLi = 22,000	Carcinogenic Risk EPA Target 10^{-4} to 10^{-6}	Non-Cancer Hazard Risk EPA Target=1
IA-1	12/28/2017	159	2.12	19.4	5.10E-06	1.44
	01/20/2018	11.7	<2.15	152.0	3.10E-07	0.09
IA-2	12/28/2017	25.2	<7.20	45.9	6.68E-07	0.18
	01/20/2018	<5.43	<2.12	84.7	N/A**	0.0048

* ug/m³ – micrograms per cubic meter; ** N/A – Not Applicable - toluene is not considered a carcinogenic chemical.

Even though the VISL screen indicates that IA is within EPA's acceptable risk, the results for IA-1 and the elevated sub-slab levels of PCE and TCE in 6 of the 12 sub-slab locations indicates that vapor intrusion has the potential to pose unacceptable risk in the Manufacturing Building during the heating season.

3.5 Human Health Risk Assessment

Currently, there are no human or ecological exposures to Facility-related contaminants in areas outside and near the Manufacturing Building. However, NGCS sub-slab and indoor air sampling indicate that PCE and TCE vapor has the potential to enter the Manufacturing Building from the subsurface during the heating season at levels that may exceed EPA's acceptable risk.

Human exposure to soil is unlikely, given that soil surfaces at the Facility are paved or covered with buildings. Future construction worker exposure to any residual Facility-related contaminants at depth (soil or VOC vapors) can be controlled by implementing an EPA-approved Facility Soil Management Plan. According to GW data, contaminated GW remains within Facility boundaries. The Facility and surrounding area is supplied with public water and sewer. Land and GW use restrictions were placed in the land records for the Facility property under the VA VRP program, prohibiting residential use of the land and prohibiting GW use for drinking water or industrial source purposes.

3.6 Environmental Indicators

Under the Government Performance and Results Act ("GPRA"), EPA has set national goals to address RCRA corrective action facilities. Under GPRA, EPA evaluates two key environmental clean-up indicators for each facility: (1) Current Human Exposures Under Control; and (2) Migration of Contaminated Groundwater Under Control. The Facility met both indicators for the total Facility in July 2008 and January 2016, respectively. The environmental indicator forms are linked to EPA's Fact Sheet for this Facility (web address is in Section 1).

Section 4: Corrective Action Objectives (CAOs)

EPA's Corrective Action Objectives (CAOs) for environmental media for:

1. Soil

EPA has determined that the EPA RSLs for Industrial Soil for direct contact are protective of human health and the environment for individual contaminates throughout the Properties provided that the Properties are not used for residential purposes. Therefore, EPA's CAO for soils at the Properties is to maintain RSLs for Industrial Soils and control exposure to the hazardous constituents remaining in those soils.

2. Groundwater

EPA expects final remedies to return usable groundwater to its maximum beneficial use within a timeframe that is reasonable given the circumstances of the project. For projects where aquifers are either currently used for water supply or have the potential to be used for water supply, EPA will use drinking water standards, otherwise known as MCLs, as the cleanup standard. Therefore, EPA's CAO for groundwater at the Properties is to achieve MCLs and control exposure to the hazardous constituents remaining in the GW until applicable MCLs are achieved.

3. Indoor Air

The CAO for vapor intrusion in occupied buildings is to control human exposure to indoor air concentrations caused by Facility-related contaminants (PCE and TCE) that were released to soil and/or groundwater exceeding EPA's acceptable cancer risk range (10^{-4} to 10^{-6}), and a hazard quotient of 1 or less for non-carcinogenic health effects.

Section 5: EPA's Proposed Remedy

1. Soil:

Based on the available information, including the implementation of the Interim Measures, there are currently no unacceptable risks to human health and the environment via soil for the present and reasonable anticipated use of the property, which is non-residential. Most of the Facility surface is paved or covered with buildings, therefore, human exposure to soil is very limited. Because contaminants remain in the subsurface soils at the Properties above levels appropriate for residential uses, the proposed remedy for soils is (a) a land use restriction (see Institutional Controls below) and (2) conformance with an EPA- approved Soil Management Plan for any subsurface soil disturbance. Prior to any earth moving activities, including excavation, drilling and construction activities, in the areas at the Properties where any contaminants may remain in subsurface soils above EPA's Screening levels for non-residential use or groundwater above CAOs, shall be conducted in accordance with a Soils Management Plan which shall be developed and submitted to EPA for review and approval.

2. Groundwater (GW):

EPA's proposed GW remedy for the Properties consists of monitored natural attenuation with continued monitoring until MCLs or RSLs are met in the areas of the Facility with GW contaminants. GW monitoring will be in conformance with an EPA approved GW Monitoring Plan.

EPA anticipates that remaining GW contamination will attenuate naturally over time, ultimately achieving GW drinking water standards (MCLs) without further treatment. Therefore, EPA's proposed remedy for GW at the Properties consists of monitored natural attenuation with continued monitoring, and compliance with and maintenance of GW use restrictions, as implemented though institutional controls at the Property, until drinking water standards (MCLs) are met. EPA also proposes that use restrictions be maintained to prevent exposure to contaminants while contaminants remain above drinking water standards.

3. Vapor Intrusion (VI):

Based on the available information, there currently is a potential for unacceptable risk in occupied buildings at the Properties located above the contaminated GW plume and within 100 feet of the contaminated GW plume through the vapor intrusion pathway. See Figure 3 for a depiction of the GW plume area. Therefore, EPA's proposed remedy is for the installation of a vapor control system ("VCS") and compliance with an EPA-approved Operation and Maintenance Plan for such VCS in any existing occupied building and any building to be constructed on the Properties located above the

contaminated GW plume or within 100 feet of the perimeter of the contaminated GW plume, unless otherwise demonstrated to EPA that vapor intrusion does not pose unacceptable risk to human health in such building and EPA provides written approval that no vapor control system is needed. With respect to existing buildings on the Properties, a VCS was installed in a retail building located on Parcel G (Retail G3 shown in Figure 4) during that building's construction.

4. Intermittent Streams:

EPA is proposing no further action for the streams because surface water and sediment no longer presents an unacceptable risk to human health or ecological receptors and the intermittent streams are now conveyed in underground pipes.

5. Institutional controls (ICs)

ICs are non-engineered instruments, such as administrative and legal controls to minimize potential human exposure to contamination and/or protect the integrity of the remedy decision by limiting land or resource use. Under the proposed remedy, some contaminants remain in groundwater and soil at the Properties above levels appropriate for residential uses. Therefore, EPA's proposed decision requires compliance with and maintenance of land and groundwater use restrictions. The ICs shall include, but are not limited to, the following land and groundwater use restrictions:

a. Groundwater at the Properties shall not be used for any purpose other than operation, maintenance and monitoring activities required by EPA and/or VDEQ, unless its demonstrated to EPA, in consultation with VDEQ, that such use will not pose a threat to human health or the environment or adversely affect or interfere with the selected remedy and EPA, in consultation with VDEQ, provides prior written approval for such use;

b. The Properties shall not be used for residential purposes unless it is demonstrated to EPA, in consultation with VDEQ, that such use will not pose a threat to human health or the environment or adversely affect or interfere with the selected remedy, and EPA, in consultation with VDEQ, provides prior written approval for such use;

c. A vapor intrusion control system ("VCS") shall be installed in each structure where testing indicates an unacceptable indoor risk. Each installed VCS shall be operated until it is demonstrated to EPA that vapor intrusion in such structure does not pose unacceptable risk to human health, and EPA provides written approval to terminate the operation of the VCS;

d. No new wells will be installed on the Properties unless it is demonstrated to EPA and VDEQ that the wells are necessary for final remedy implementation and EPA provides prior written approval to install the wells;

e. Compliance with an EPA-approved groundwater monitoring plan;

f. Compliance with an EPA-approved Soil Management Plan for any subsurface soil disturbance;

g. Compliance with an EPA-approved Vapor Control System Operating & Maintenance Plan.

In addition, Unisys shall provide EPA with a coordinate survey of Properties' boundaries. Mapping the extent of the land and groundwater use restrictions will allow for presentation in a publicly accessible mapping utility such as Google Earth or Google Maps.

EPA, VDEQ and/or their authorized agents and representatives, shall have access to the Properties to inspect and evaluate the continued effectiveness of the final remedy and if necessary to conduct additional remediation to ensure the protection of the public health and safety and the environment upon the final remedy selection in the Final Decision and Response to Comments (FDRTC).

Section 6: Evaluation of EPA's Proposed Remedy

This Section describes EPA's evaluation criteria of the proposed remedy, consistent with EPA guidance. The evaluation is two phased. EPA first evaluates the proposed remedy using three threshold decision criteria as general goals. Remedies that meet the initial threshold criteria are then evaluated further in phase two, where EPA evaluates remaining proposed remedies using seven balancing criteria (Table 3).

Table 3

Threshold Criteria	Evaluation
1) Protect human health and the environment	The primary risks posed to human health and the environment by exposure to contaminants remaining at the Properties are related to potential: (1) ingestion of contaminated GW and soil and (2) inhalation of volatile vapors in indoor air from contaminated GW and/or soil beneath structures. The proposed remedy is to: (1) restrict the Properties to non-residential use; (2) provide a vapor control system in existing buildings and any new structures constructed over or within 100 feet of the contaminated GW plume; (3) prohibit use of the GW aquifer for potable use until MCLs are attained throughout the plume and (4) require compliance with an EPA-approved Soil Management Plan for any subsurface soil disturbance.
2) Achieve media cleanup objectives	Soil investigations showed that Facility related contaminants were generally not found at levels exceeding residential RSLs and exposure to soil is limited. Future land use is expected to remain industrial/non-residential. CVOCs were found in GW in limited areas. GW plumes are delineated, stable and contaminant levels have declined. Declines can be attributed to the removal of contaminated soil and improved waste handling practices. Contaminant levels are declining because contaminant loading has ceased and attenuation through dilution, dispersion and biochemical break down is occurring. The proposed GW remedy of monitoring the attenuation of GW constituents is expected to achieve media clean-up objectives over 10 to 20 years. Vapor intrusion will also diminish as volatile GW constituent levels diminish.

Table 3 (con't)	
3) Remediating the Source of Releases	In all proposed remedies, EPA seeks to eliminate or reduce further release of any remaining hazardous wastes/hazardous constituents from the facility that may pose an unacceptable risk to human health and the environment. Unisys removed contaminated soil from SWMU-1, AOCs-1 and 2. Removal of these sources removed contaminant loading to GW and exposure risks to workers and trespassers.
Balancing Criteria	Evaluation
4) Long-term effectiveness	EPA's proposed remedy will maintain protection of human health and the environment over time by reducing Facility-related GW contaminants through monitored natural attenuation (MNA) and by controlling exposure to any hazardous constituents remaining in GW. EPA's proposed remedy requires MNA and the compliance with and maintenance of a GW use restrictions and installation and installation and maintenance of vapor control systems (VCSs).
5) Reduction of toxicity, mobility, or volume of hazardous constituents	The removal of contaminated soil in SWMU-1, AOC-1 and AOC-2 and diminishing levels of cVOCs in GW meets the goals of criteria 5. Installation and maintenance of a VCS will reduce exposure to cVOC in air.
6) Short-term effectiveness	Removal of contaminated soil has been completed, a VCS was installed in a Parcel G building and is proposed for the Manufacturing Plant. GW is not used for drinking water. Therefore, the potential for exposures to contaminants in the short-term will be eliminated.
7) Implementability	Most of the elements in the proposed remedy are already being implemented. EPA proposes to implement use restrictions through an Environmental Covenant.
8) Cost	The estimated cost to implement the proposed remedy is less than $25,000 per year for 20 years.
9) Community Acceptance	EPA will evaluate community acceptance of the proposed remedy by reviewing any comments submitted to EPA during the public comment period, which may include a public meeting, if requested. Responses to comments and any subsequent modifications to the proposed remedy will be written and included in the Final Decision and Response to Comments.
10) Agency Acceptance	VDEQ reviewed this SB and concurred with the proposed remedy.

Section 7: Financial Assurance

EPA has evaluated whether financial assurance for corrective action is necessary to implement EPA's proposed remedy at the Properties. The estimated costs for the proposed implementation of land use restrictions, implementing the EPA-approved Soil Management Plan, GW monitoring and installation and maintenance of vapor control systems over 10 to 20 years falls below the financial assurance threshold; therefore, financial assurance is not required.

Section 8: Public Participation

Those interested are invited to comment on EPA's proposed remedy. The public comment period will last 30 calendar days from the date that notice is published in a local newspaper. Comments may be submitted by mail, fax, e-mail, or phone to Barbara Smith at the address listed below.

A public meeting will be held upon request. Requests for a public meeting should be made to Barbara Smith at the address listed below. A meeting will not be scheduled unless one is requested.

The Administrative Record contains all the information considered by EPA for the proposed remedy at the Properties. The Administrative Record is available at the following location:

U.S. EPA Region III
1650 Arch Street (3LC10)
Philadelphia, PA 19103

Contact: Barbara Smith
Phone: (215) 814-5786
Fax: (215) 814-3113
Email: Smith.Barbara@epa.gov

Section 9: Signature

John A. Armstead, Director
Land and Chemicals Division
US EPA, Region III

Date: 12.6.18

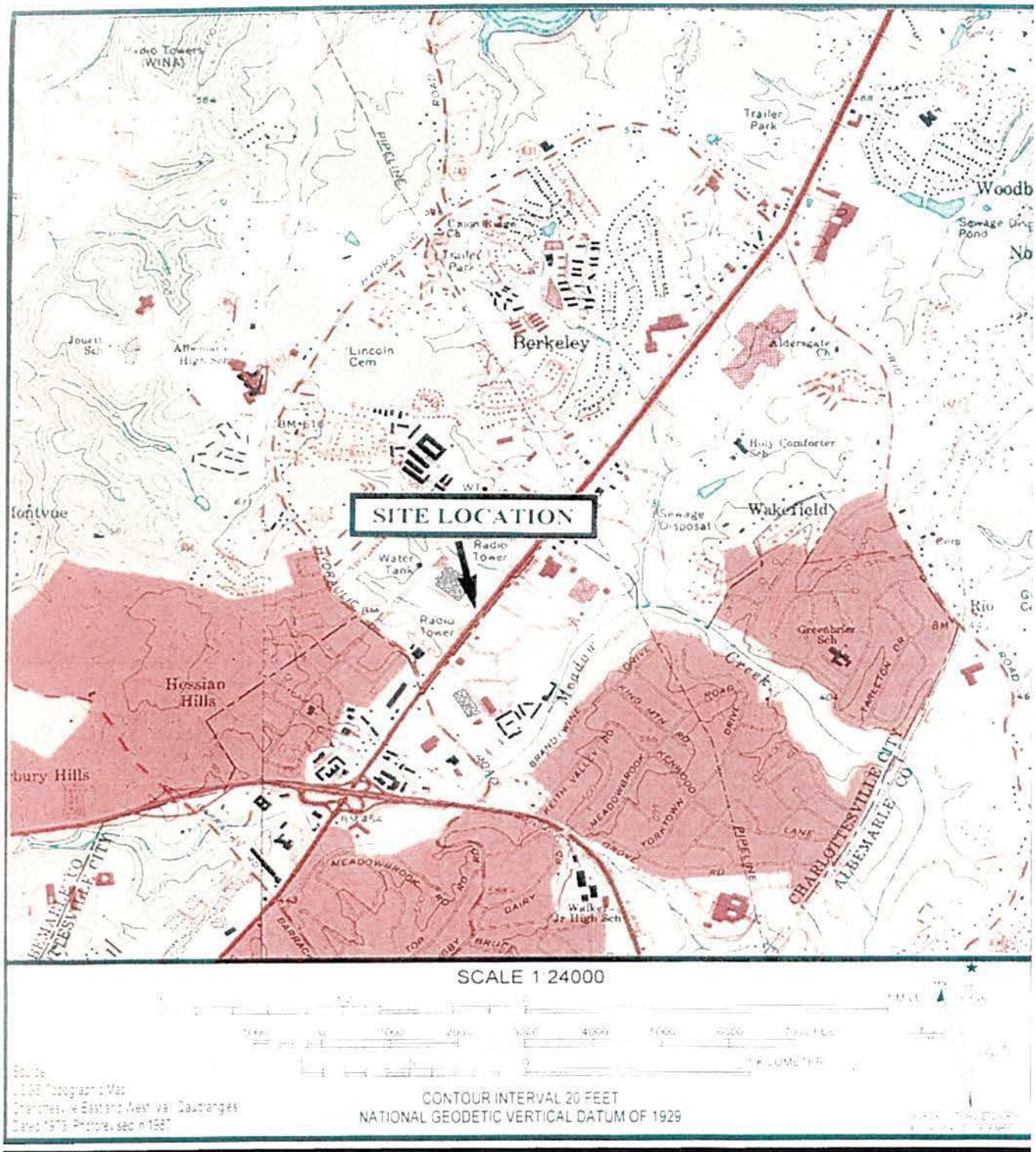
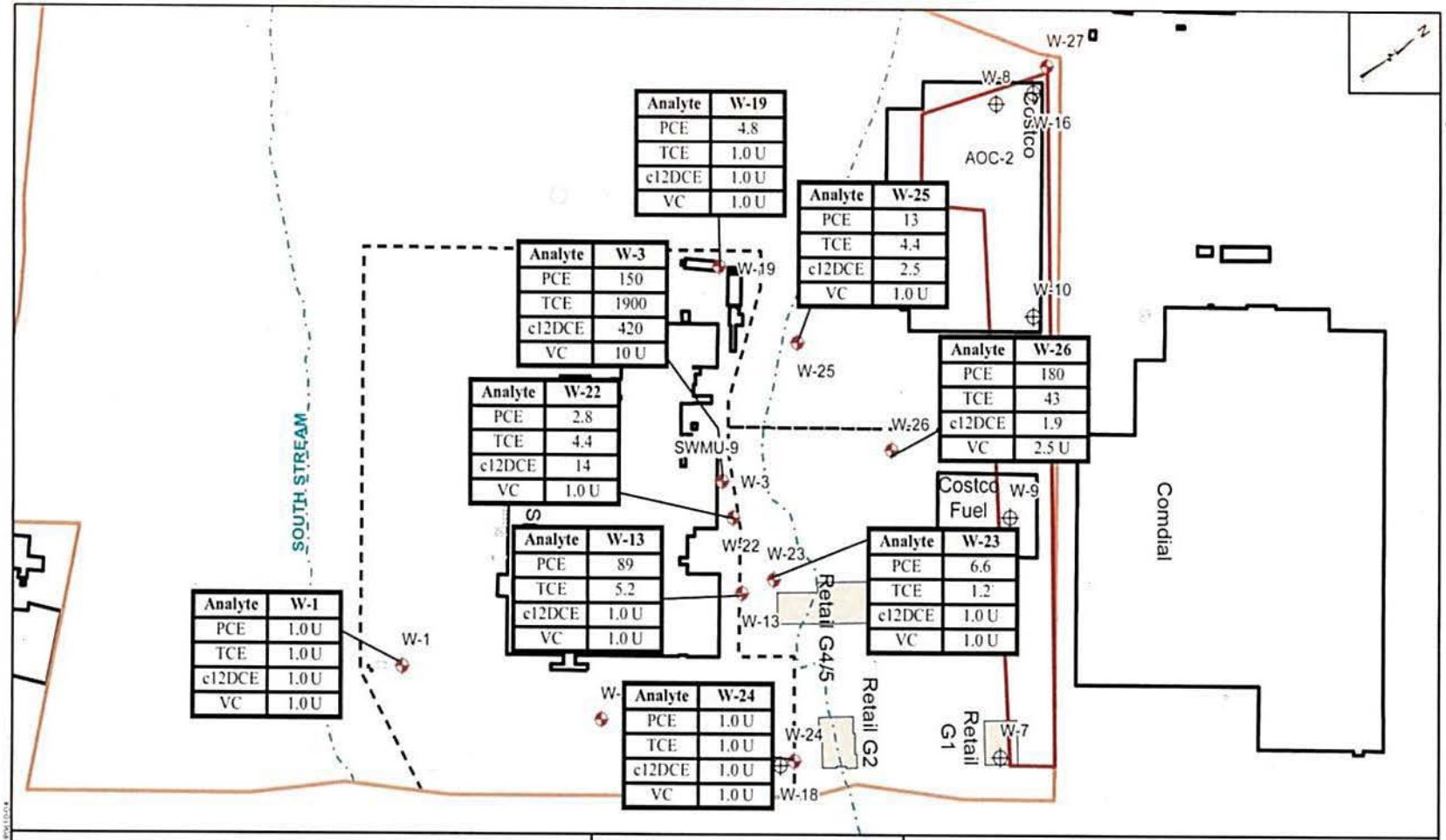


FIGURE 1 - SITE LOCATION MAP
SPERRY MARINE-NORTHROP GRUMMAN PROPERTY
1070 SEMINOLE TRAIL
CHARLOTTESVILLE, VIRGINIA 22901

AOC-2
FORMER WEED CONTROL PROGRAM
LOT 1
SWMU-1
FORMER PAINT PIT
SWMU-9B
FORMER HAZARDOUS
WASTE STORAGE AREA
SOUTH STREAM
LOT 3
SWMU-9A
FORMER USED DRUM
STORAGE AREA
LOT 2
NORTH STREAM
SEMINOLE TRL
400 200 0 400 Feet
Legend
SWMU/AOC
Site Boundary
Property Boundary
Stream
Sources:
Stream centerlines: County of Albemarle/
Department of Planning and Community Development/Office of
Geographic Data Services
Aerial Photo: National Agricultural Imagery Program (July 2005)
Site Plan
Sperry Marine RFI Work Plan
Charlottesville, Virginia
Geosyntec consultants
Figure
2
Columbia, Maryland
April 2008



Legend

- Existing Monitoring Well Location
- Former Well Location
- Stream (historical)
- SWMU/AOC
- Proposed Buildings
- Buildings
- Tanks
- Site Boundary
- Property Boundary

Notes
VOC - Volatile Organic Compounds
PCE - Tetrachloroethene
TCE - Trichloroethene
c12DCE - cis-1,2-Dichloroethene
VC - Vinyl Chloride

All values are presented in micrograms per liter (µg/l).

Proposed Buildings are from Exhibit 3 - Potentiometric Surface Map produced by Terracon Consulting Engineers and Scientists (Raleigh, North Carolina) dated May 2013.

300 150 0 300 Feet

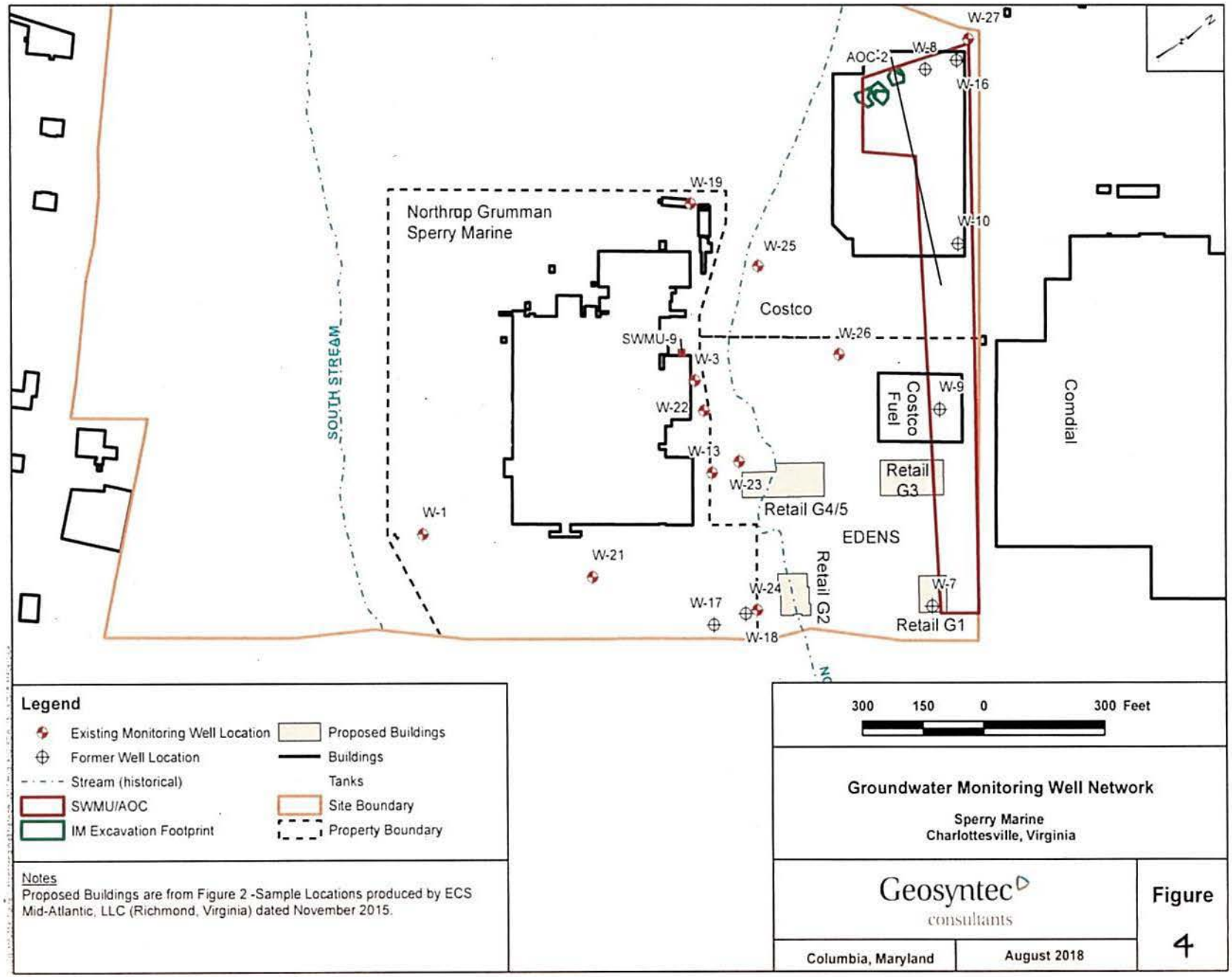
Groundwater VOC Analytical Results Map

Sperry Marine
Charlottesville, Virginia

Geosyntec consultants

Columbia, Maryland | August 2018

Figure 3


W-27
AOC-2
W-8
W-16
W-19
Northrop Grumman
Sperry Marine
W-10
W-25
Costco
SWMU-9
W-26
W-3
SOUTH STREAM
Costco Fuel
W-9
Comdial
W-22
W-13
W-23
Retail G3
Retail G4/5
W-1
EDENS
W-21
Retail G2
W-24
W-7
W-17
Retail G1
W-18
Legend
Existing Monitoring Well Location
Former Well Location
Stream (historical)
SWMU/AOC
IM Excavation Footprint
Proposed Buildings
Buildings
Tanks
Site Boundary
Property Boundary
Notes
Proposed Buildings are from Figure 2 -Sample Locations produced by ECS Mid-Atlantic, LLC (Richmond, Virginia) dated November 2015.
300 150 0 300 Feet
Groundwater Monitoring Well Network
Sperry Marine
Charlottesville, Virginia
Geosyntec consultants
Columbia, Maryland
August 2018
Figure
4

Attachment A

Administrative Record Index

1980, August; *Notification of Hazardous Waste Activity*, signed Form from Sperry Rand Corp. to EPA.

1996, September; *Site Assessment Report, National Corrective Action Prioritization System (NCAPS), Sperry Marine, Inc., Charlottesville, VA*, VDEQ.

1997, November; *Site Characterization Report, "Lot 3", Sperry Marine Facility, Charlottesville, VA*, Environmental Standards, Inc. for Unisys.

1999, August; *Post-Certification Monitoring Plan, Sperry Marine, Charlottesville, VA, Site Voluntary Remediation Program*, Unisys.

2000, February; Lot 3 *Certification of Satisfactory Completion of Remediation, Voluntary Remediation Program,* and *Declaration of Restrictive Covenants*, signed by VDEQ and Participant and Owner.

2000, June; Lot 2 *Certification of Satisfactory Completion of Remediation, Voluntary Remediation Program,* and *Declaration of Restrictive Covenants*, signed by VDEQ and Grantee.

2002, October; Lot 1 *Declaration of Restrictive Covenants*, signed by Albeville Station JV, LLC.

2006, June; *Final RCRA Site Visit Report, Northrop Grumman Systems Corporation, Sperry Marine, Charlottesville, VA*, ICOR, Ltd., and USACE [Includes data submitted to VDEQ under VRP].

2008, January 2; Letter of Commitment to EPA from Unisys to perform work under EPA's Facility Lead Program.

2008, April; *RCRA Facility Investigation (RFI) Work Plan, Sperry Marine, Charlottesville, VA*, Geosyntec.

2008, June 27; Approval Letter of *RFI Work Plan* from EPA to Unisys.

2008, July; Environmental Indicator, Current Human Health Exposures Under Control, EPA.

2010, September; *RCRA Facility Investigation (RFI) Report, Sperry Marine, Charlottesville, VA*, Geosyntec.

2013, March 21; Approval Letter of *RFI Report* from EPA to Unisys.

2013 – 2018; Groundwater Monitoring Reports for Sperry Marine Facility by Geosyntec.

2014, July; *Final Decision and Response to Comments – Costco Parcel, Sperry Marine Facility, Charlottesville, VA*, EPA.

2014, October; *Proposal for Vapor Intrusion Assessment, Stonefield Out-Parcels, Charlottesville, VA*, ECS Mid-Atlantic, LLC.

2014, December 1; EPA approved the Proposal for Vapor Intrusion Assessment via e-mail to EDENS.

2015, November; *Vapor Intrusion Assessment, Stonefield Parcels G1 – G5, Charlottesville, VA*, ECS.

2015, December 9; EPA approved the Vapor Intrusion Assessment, Stonefield vial e-mail to EDENS.

2016, January; Environmental Indicator, Migration of Contaminated GW under Control, EPA.

2016, October 18; *Vapor Intrusion Evaluation – Monitoring Well W-3, Sperry Marine Facility, Charlottesville, VA*, Geosyntec.

2016, October 18; Letter to EPA from Northrop Grumman with comments on Geosyntec's MW W-3 VI Evaluation Letter, dated October 18, 2017.

2017, March; *RFI Work Plan Addendum #2, VI Evaluation – 1987 Building Addition, Sperry Marine Facility, Charlottesville, VA*, Geosyntec.

2017, March 13; EPA approves the *RFI Work Plan Addendum #2* in e-mail to Unisys.

2017. May; *Vapor Intrusion (VI) Evaluation Report, Sperry Marine Facility*, Geosyntec.

2017, May 18; *Technical Memo: Potential for Vapors into the Site Building Containing Elevated Concentrations of Volatile Organic Compounds-Sperry Marine Facility Located in Charlottesville, Virginia*, Stantec.

2017, June 13; EPA approved the *VI Evaluation Report, Sperry Marine Facility* in Letter to Unisys.

2017, June 26; EPA Letter to Northrop Grumman, responding to Letter with Technical Memo, dated May 18, 2017.

2017, November 7; Letter from EPA to Unisys with EPA's comments on the October 18, *2017 MW W-3 VI Evaluation*.

2017, December 15; *Technical Memo: Results of Sub-Slab Vapor Sampling at Select Locations beneath the Site Building-Sperry Marine Facility Located in Charlottesville, Virginia*, Stantec.

2018, April 3; *Sub-Slab Vapor and Indoor Air Data Collected by Northrop Grumman Systems Corporation*, Stantec.

2018, May; *Update to Vapor Intrusion Evaluation Report, Sperry Marine Facility, Charlottesville, Virginia,* Geosyntec.

2018, July 13; EPA Emails to Northrop Grumman and Unisys: Acceptance/Approval of April 3, 2018 Report by Stantec and May 2018 Sperry Marine Report by Geosyntec.