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August 28, 1998

Ms. Barbara Okorn
USEPA Region III
3HS41
1650 Arch Street
Philadelphia, PA 19103-2029

Reference: Navy CLEAN North Division
Contract Task Order No. 0298

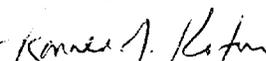
Subject: Assessment Endpoints
RFI/CMS
Naval Surface Warfare Center—White Oak
Silver Spring, Maryland

Dear Ms. Okorn:

The enclosed document identifies the assessment endpoints for the ecological risk assessment that is to be performed as part of the RCRA Facility Investigation for the NSWC—White Oak site. This document was prepared in response to the teleconference held among EPA, EFACHES and TtNUS on August 19, 1998.

Please feel free to contact Kent Cabbage at (803) 649-7683 or me at (412) 921-8291 if you have any comments or questions regarding this document.

Best regards,


Ronald J. Kotun, Ph.D.
Project Manager

Enclosure

c: Krista Grigg (EFACHES)
Kent Cabbage (TtNUS)
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**ASSESSMENT ENDPOINTS
NSWC WHITE OAK
SILVER SPRING, MARYLAND**

Specific protection goals for an ecological risk assessment (ERA) and the manner in which they will be assessed are integral parts of screening-level problem formulation. As discussed in EPA (1997), one of the major tasks in problem formulation is the selection of assessment endpoints. An assessment endpoint is defined as "an explicit expression of actual environmental values that are to be protected" (EPA, 1997). Before the ERA for the seven-site RI at NSWC White Oak can be initiated, assessment endpoints must be chosen for each site. Proposed assessment endpoints for each of the seven sites and the Paint Branch watershed are provided below.

Site 2 - Apple Orchard Landfill

Site 2 is a 4.3 acre abandoned landfill located on the south side of Perimeter Road in the northwestern end of NSWC-White Oak. It was operated as an open disposal area and landfill from 1948 until 1982. The top of the landfill is approximately twenty feet higher in elevation than the valley to the west, south, and east. An apartment complex is located to the north, adjacent to the Base property. The landfill toe on the west, south, and east is steep and contains exposed debris. The top of the landfill is flat and comprised of grasses, brush, disturbed bare soil, and gravel. The landfill toe and the adjacent valley are heavily wooded. A drainageway is located along the western edge of the landfill toe. This drainageway empties into an unnamed stream south of the landfill in the bottom of the valley. The stream flows to the northeast and empties into Paint Branch Creek approximately one mile from Site 2. The stream originates a few hundred feet east of Site 2 at two NPDES stormwater outfall culverts that discharge runoff from a large section of the northwestern portion of the Base. A site layout map is provided in the NSWC Oak RI/FS work plan.

The top of the landfill provides marginal but extensive terrestrial (old field) habitat, while the wooded valley provides excellent terrestrial (wooded) habitat. Water flow in the stream next to the landfill is intermittent and dependent on rainfall, but standing water is almost always present. Based on Malcolm-Pirnie surveys in the early 1990s (Malcolm-Pirnie, 1992) and a December 1997 site visit by B&RE ecologists, no fish are present in the stream in the landfill area. However, the sediments may contain a rudimentary benthic community. A large portion of the stream area has been classified as jurisdictional wetlands (Halliburton NUS, 1995).

Based on the ecology and physiography of Site 2, proposed assessment endpoints include protection of the following groups of receptors from adverse effects of contaminants on their survival, growth, and reproduction:

- benthic invertebrates
- aquatic invertebrates
- insects
- soil invertebrates
- birds feeding on soil invertebrates
- carnivorous birds
- insectivorous birds
- carnivorous mammals
- omnivorous mammals
- insectivorous mammals
- herbivorous mammals
- vegetation
- amphibians and reptiles

Based on these assessment endpoints, preliminary receptors to be used in the foodchain modeling, if necessary, include the short-tailed shrew (insectivorous/vermivorous small mammal), meadow vole (herbivorous small mammal), deer mouse (omnivorous small mammal), red fox (carnivorous large mammal), red-tailed hawk (avian predator), woodcock (vermivorous bird), American robin (omnivorous bird), bullfrog (amphibian), and raccoon (omnivorous large mammal). Input parameters for the foodchain modeling for Site 2 and all other sites are presented in Table 1. Toxicity data for reptiles are scarce and, therefore, potential risks to reptiles cannot be quantitatively assessed. Potential risks to aquatic invertebrates, benthic invertebrates, soil invertebrates, and terrestrial plants will be assessed using the screening guidelines presented in the NSWC White Oak work plan. Hence, the toxicity data in the foodchain modeling and screening guidelines will serve as measurement endpoints.

Site 3 - Pistol Range Landfill

Site 3 is 1.1 acres in size, located on the eastern half of NSWC-White Oak, directly north of Dahlgren Road and the Monroe Loop. The site was operated as a landfill from the late 1940s to the mid-1970s. The top of the landfill is relatively flat, although the southern end slopes down towards Dahlgren Road. West Farm Branch is located in a valley along the landfill toe to the west of the landfill. The top of the

landfill is approximately 15 feet higher in elevation than the bottom of the valley. The landfill toe is steep, contains exposed debris, and impinges on West Farm Branch in some locations. West Farm Branch flows to the south under Dahlgren Road and empties into Paint Branch Creek about two miles south of Site 3. A site layout map is provided in the NSWC White Oak work plan.

The top of the landfill provides marginal but extensive terrestrial (old field) habitat, while the wooded valley provides excellent terrestrial (wooded) habitat. Water flow in the stream next to the landfill is intermittent and dependent on rainfall, but standing water is almost always present. It is not known whether fish are present in the stream in the landfill area, but the sediments may contain a rudimentary benthic community. A large portion of the stream area has been classified as jurisdictional wetlands (Halliburton NUS, 1995).

Based on the ecology and physiography of Site 3, proposed assessment endpoints include protection of the following groups of receptors from adverse effects of contaminants on their survival, growth, and reproduction:

- benthic invertebrates
- fish
- insects
- soil invertebrates
- birds feeding on aquatic life
- birds feeding on soil invertebrates
- carnivorous birds
- insectivorous birds
- carnivorous mammals
- omnivorous mammals
- insectivorous mammals
- herbivorous mammals
- vegetation
- amphibians and reptiles

Based on these assessment endpoints, preliminary receptors to be used in the foodchain modeling include the short-tailed shrew (insectivorous/vermivorous small mammal), meadow vole (herbivorous small mammal), deer mouse (omnivorous small mammal), red fox (carnivorous large mammal), red-tailed hawk (avian predator), woodcock (vermivorous bird), American robin (omnivorous bird), great blue heron (piscivorous bird), bullfrog (amphibian), and raccoon (omnivorous large mammal). The largemouth bass will be used as a piscivorous fish, but it is not known whether any piscivorous fish are present in West

Farm Branch. Toxicity data for reptiles are scarce and, therefore, potential risks to reptiles cannot be quantitatively assessed. Potential risks to aquatic invertebrates, benthic invertebrates, soil invertebrates, and terrestrial plants will be assessed using the screening guidelines presented in the NSW White Oak work plan. Hence, the toxicity data in the foodchain modeling and screening guidelines will serve as measurement endpoints.

Site 4 - Chemical Burial Area

Site 4 is located along Perimeter Road in the northeast portion of the installation. The site was used from the mid-1950s to the early 1970s for disposal of chemicals in four locations within the site. The site is relatively flat, and although a small drainage swale is located along the road, rainfall will tend to pond and infiltrate rather than run off. The site is an open area with disturbed, bare soil, grasses, immature trees, and some brushy areas, which are surrounded by woodlands to the west, east, and south. One small wetland area (0.01 acres) was delineated in the woods east of Site 4 as part of wetland and forest stand delineation's on the Base (Halliburton NUS, 1995). As discussed in Section 3.3.2.6, the wetland appears to be man-made, becomes dry in drier seasons, and is too small and isolated to be of significant ecological value. The wetland is upgradient of Site 4 (both surficially and hydrogeologically) and, hence, Site 4-related contaminants are unlikely to migrate to the wetland via overland runoff or groundwater discharge. A site layout map is provided in the NSW White Oak work plan.

Based on the ecology and physiography of Site 4, proposed assessment endpoints include protection of the following groups of receptors from adverse effects of contaminants on their survival, growth, and reproduction:

- insects
- soil invertebrates
- birds feeding on soil invertebrates
- carnivorous birds
- insectivorous birds
- carnivorous mammals
- omnivorous mammals
- insectivorous mammals
- herbivorous mammals
- terrestrial vegetation
- reptiles

Based on these assessment endpoints, preliminary receptors to be used in the foodchain modeling include the short-tailed shrew (insectivorous/vermivorous small mammal), meadow vole (herbivorous small mammal), deer mouse (omnivorous small mammal), red fox (carnivorous large mammal), American robin (omnivorous bird), red-tailed hawk (avian predator), and woodcock (vermivorous bird). Toxicity data for reptiles are scarce and, therefore, potential risks to reptiles cannot be quantitatively assessed. Potential risks to soil invertebrates and terrestrial plants will be assessed using the screening guidelines presented in the NSWC White Oak work plan. Hence, the toxicity data in the foodchain modeling and screening guidelines will serve as measurement endpoints.

Site 7 - Ordnance Burn Area

Site 7 is located near the northeastern corner of the Base. Ordnance burning activities were conducted in a drainage swale north of Buildings 501 and 508 from 1948 to 1968. The swale is relatively flat and narrow at its westernmost point and widens out downgradient to the east. The swale passes under Perimeter Road via a culvert approximately 400 feet east of the origin of the swale near Buildings 501 and 508, but the culvert is completely plugged with leaves and other debris, inhibiting water flow under the road. The swale is located in a wooded area and water is present only after periods of heavy rainfall. Since the swale is relatively flat and wide in the wooded area and along Perimeter Road, rainfall ponds and infiltrates. The swale was completely dry during a November 1997 site visit. Therefore, no aquatic or semi-aquatic community is present in the swale. No wetlands were delineated on the site as part of wetland and forest stand delineations on the Base (Halliburton NUS, 1995). Also, no aquatic resources are present downgradient of the site that contaminants could potentially migrate to via overland flow or groundwater discharge. A site layout map is provided in the NSWC White Oak work plan.

Based on the ecology and physiography of Site 7, proposed assessment endpoints include protection of the following groups of receptors from adverse effects of contaminants on their survival, growth, and reproduction:

- insects
- soil invertebrates
- birds feeding on soil invertebrates
- carnivorous birds
- insectivorous birds
- carnivorous mammals
- omnivorous mammals
- insectivorous mammals

- herbivorous mammals
- vegetation
- reptiles

Based on these assessment endpoints, preliminary receptors to be used in the foodchain modeling that may be present in the heavily wooded area include the short-tailed shrew (insectivorous/vermivorous small mammal), meadow vole (herbivorous small mammal), deer mouse (omnivorous small mammal), red fox (carnivorous mammal), American robin (omnivorous bird), and woodcock (vermivorous bird). Toxicity data for reptiles are scarce and, therefore, potential risks to reptiles cannot be quantitatively assessed. Potential risks to soil invertebrates and terrestrial plants will be assessed using the screening guidelines presented in the NSWC White Oak work plan. Hence, the toxicity data in the foodchain modeling and screening guidelines will serve as measurement endpoints.

Site 8 - Abandoned Chemical Disposal Pit

Site 8 is located along the southern facility boundary at the terminus of Perimeter Road. Site 8 was used from 1951 to 1971 for disposal of miscellaneous waste chemicals from facility laboratories. The site is approximately 10 feet by 10 feet wide and 12 feet deep, and was excavated and replaced with clean soil in late 1996. The site is located in a flat, heavily wooded area. No surface waters are located near the site. Paint Branch Creek is located approximately 1,000 feet to the east, but given the flat nature of the site proper and distance to Paint Branch Creek, contaminant migration to the Creek is unlikely. A site layout map is provided in the NSWC White Oak work plan.

Based on the ecology and physiography of Site 8, proposed assessment endpoints include protection of the following groups of receptors from adverse effects of contaminants on their survival, growth, and reproduction:

- insects
- soil invertebrates
- terrestrial vegetation

Due to the small aerial extent of the site (10 feet by 10 feet), foodchain modeling does not appear to be reasonable or appropriate since even the home range of small mammals would be several times larger than this site. However, if the data indicate that significant off-site migration has occurred via overland runoff, foodchain modeling for terrestrial receptors will be considered. Potential risks to soil invertebrates

and terrestrial plants will be assessed using the screening guidelines presented in the NSWC White Oak work plan, which will serve as measurement endpoints.

Site 9 - Industrial Wastewater Disposal Area 300

Site 9 is located south of Dahlgren Road along the Montgomery/Prince George County line and extends south to the facility boundary. The site was used from the early 1950s until the mid-1970s for disposal of liquid wastes via a series of leaching wells. Paint Branch Creek is located south of the site, a few hundred feet from the Base boundary. A tributary of Paint Branch Creek is located along the western and southern edge of the site, and is unofficially known as West Farm Branch. An intermittent drainageway is located along the eastern edge of Site 9, and it also connects with Paint Branch Creek south of the site. A site layout map is provided in the NSWC White Oak work plan.

For the most part, surface soils have not been impacted by disposal activities. The drainageway to the east is intermittent and contains water only after periods of heavy rainfall. The gradient to the south is steep, which causes water in the drainageway to flow swiftly. As a result, the drainageway is usually dry and does not contain a diverse or abundant aquatic community, although some semi-aquatic receptors (e.g., amphibians) may be present in the wetter months of the year along its southernmost reaches (where water would be most prevalent). The tributary to the west (West Farm Branch) is small, but may contain some small fish and a rudimentary benthic community.

Foodchain modeling will be conducted on semi-aquatic species, including the raccoon (West Farm Branch and the drainageway), bullfrog (West Farm Branch and the drainageway), and the great-blue heron (West Farm Branch). Potential risks to aquatic invertebrates and benthic invertebrates will be assessed using the screening guidelines presented in the NSWC White Oak work plan, which along with the foodchain modeling toxicity data, will serve as the measurement endpoints.

Site 11 - Industrial Wastewater Disposal Area 100

Site 11 is located in the western portion of NSWC-White Oak in an area covering approximately 16 acres. The site is comprised of 13 leaching wells in nine areas that were used for disposal of liquid wastes until the late 1970s. The site is highly developed, consisting of buildings, roads, and graveled areas. The only vegetation present is mowed turfgrass and ornamental trees. A site layout map is provided in the NSWC White Oak work plan.

For the most part, surface soils have not been impacted by disposal activities. Groundwater under the site may discharge to two drainageways to the east. Previous investigations indicate that groundwater under Site 11 flows to the east. Therefore, surface water and sediment sampling will be conducted in these two drainageways to investigate potential impacts to surface water resources primarily via groundwater discharge

A small drainageway and pond are located to the west and southwest of Site 11 (in the Base golf course) and were included in the Site 11 assessment as part of previous RIs. However, groundwater flows in the opposite direction (to the east) and no surface soil contamination is associated with Site 11, precluding impacts to the golf course area. Also, the golf course pond is currently being studied under a separate investigation. Therefore, these areas will not be included in the Site 11 assessment.

Due to the lack of surface soil contamination, the small size of the drainageways, and the absence of aquatic receptors in the drainageways, foodchain modeling is not applicable. The objective of the assessment of drainageway surface water and sediment is to ascertain whether groundwater contaminants are discharging to these media that could be carried downgradient into the Paint Branch watershed. Potential risks to aquatic invertebrates and benthic invertebrates will be assessed using the screening guidelines presented in the NSWC White Oak work plan, which will serve as the measurement endpoints.

Paint Branch Creek Watershed

A detailed description of Paint Branch Creek is presented in the NSWC White Oak work plan. Briefly, Paint Branch Creek bisects the Base in a north/south direction. Paint Branch Creek and all its tributaries above I-495 are designated as Class III - Natural Trout Waters. As a result, the creek is thought to have the potential for growth and propagation of trout and is capable of supporting self-sustaining trout populations and their associated food organisms.

The presence of brown trout in Paint Branch Creek was documented by Maryland DNR in 1973, from the extreme headwaters to the upper boundary of NSWC-White Oak (C. Gougeon, 1985). The trout population had declined severely by the 1970s due to man-made and natural factors, but has since rebounded. Sampling on the Base in April 1991 confirmed the presence of brown trout in the stream on the facility. However, juvenile trout and fry are limited in this portion of the stream due to fluctuating water levels, temperature, and possible sedimentation. Aside from its ecological value, Paint Branch Creek is also aesthetically, politically, and socially important in the region.

Surface water runoff from almost all sections of the Base eventually flows to Paint Branch Creek via a series of drainageways and tributaries. Therefore, the waterways on the Base are part of the Paint Branch Creek watershed. Regardless of whether any of the RI sites have ecological impacts in their particular areas, they could have cumulative impacts on Paint Branch Creek via contaminant introduction into the watershed. Also, other potential contaminant sources (e.g., RCRA SWMUs, roadways) may exist on the Base that could contribute contaminants to the Creek.

For these reasons, an ERA will be conducted for Paint Branch Creek with emphasis on potential contaminant inputs from its tributaries on the Base. In addition to assessing the potential risks to aquatic, semi-aquatic, and benthic receptors from contaminants in Paint Branch media, the watershed study may also help identify potential contaminant sources via spatial analysis of concentrations.

Based on the ecology and physiography of Paint Branch Creek and its tributaries, proposed assessment endpoints include protection of the following groups of receptors from adverse effects of contaminants on their survival, growth, and reproduction:

- benthic invertebrates
- aquatic invertebrates
- fish
- birds feeding on aquatic life
- omnivorous mammals
- amphibians and reptiles

Based on these assessment endpoints, preliminary receptors to be used in the foodchain modeling include the great blue heron (piscivorous bird), largemouth bass (piscivorous fish), bullfrog (amphibian), and raccoon (omnivorous large mammal). Toxicity data for reptiles are scarce and, therefore, potential risks to reptiles cannot be quantitatively assessed. Potential risks to aquatic invertebrates and benthic invertebrates will be assessed using the screening guidelines presented in the NSWC White Oak work plan. Hence, the foodchain modeling toxicity data and screening guidelines will serve as measurement endpoints.

TABLE 1
FOODCHAIN MODELING RECEPTORS AND EXPOSURE PARAMETERS
NSWC WHITE OAK
SILVER SPRING, MARYLAND

Receptor	Guild (Representative Group)	Body Weight (kg)	Body Weight Notes	Food Ingestion Rate (kg/day)	Food Ingestion Rate Notes	Soil/Sediment Ingestion Rate (kg/day)	Soil/Sediment Ingestion Rate Notes	Surface Water Ingestion Rate (L/day)	Surface Water Ingestion Rate Notes
Short-tailed Shrew (<i>Blarina brevicauda</i>)	Insectivorous Small Mammal	0.015	EPA, 1993 ⁷	0.0093	EPA, 1993	0.0002	Calculated from EPA, 1993 using 2% of diet for white-footed mouse	0.0033	EPA, 1993
Deer Mouse (<i>Peromyscus maniculatus</i>)	Omnivorous Small Mammal	0.015	Conservative Ave. of male and female deer mice from EPA, 1993	0.0068	EPA, 1993	0.0014	Calculated from EPA, 1993 using 2% of diet for white-footed mouse	0.0051	EPA, 1993
Great Blue Heron (<i>Ardea herodias</i>)	Piscivorous Bird	2.229	EPA, 1993	0.401	EPA, 1993	0.008	Calculated from EPA, 1993 using 2% of diet for mallard	0.1	EPA, 1993
American Woodcock (<i>Scolopax minor</i>)	Vermivorous Bird (wooded areas)	0.164	Conservative Ave. of males and females from EPA, 1993	0.127	EPA, 1993	0.13	Calculated using 10.4% of diet from EPA, 1993	0.0127	EPA, 1993
Red-tailed Hawk (<i>Buteo jamaicensis</i>)	Avian Predator	1.056	Conservative Ave. of males and females from EPA, 1993	0.116	EPA, 1993	0.0035	Calculated using 3% of diet from EPA, 1993	0.0068	EPA, 1993
Red Fox (<i>Vulpes vulpes</i>)	Mammalian Predator	4.38	Conservative Ave. of males and females from EPA, 1993	0.613	EPA, 1993	0.017	Calculated using 2.8% of diet from EPA, 1993	0.376	EPA, 1993

TABLE 1
FOODCHAIN MODELING RECEPTORS AND EXPOSURE PARAMETERS
NSWC WHITE OAK
SILVER SPRING, MARYLAND

Raccoon (<i>Procyon lotor</i>)	Mammalian Omnivore	3.99	Conservative Ave. of males and females from EPA, 1993	0.21	Calculated using body weight equation from EPA, 1993	0.002	Calculated using 9% of diet from EPA, 1993	0.331	EPA, 1993
Bullfrog (<i>Rana catesbeiana</i>)	Amphibian	0.1428	EPA, 1993	0.0101	EPA, 1993	0.00059	Calculated using 5.9% of diet for the eastern painted turtle from EPA, 1993	NA	
Meadow Vole (<i>Microtus pennsylvanicus</i>)	Herbivorous Small Mammal	0.017	Conservative Ave. of males and females from EPA, 1993	0.00595	EPA, 1993	0.0018	EPA, 1993	0.00357	EPA, 1993
American Robin (<i>Turdus migratorius</i>)	Omnivorous Bird	0.0773	EPA, 1993	0.117	EPA, 1993	0.012	Calculated from EPA, 1993 using 10.4% of diet for woodcock	0.0108	EPA, 1993

* EPA, 1993 = USEPA's Exposure Factors Handbook Volumes 1 and 2 (EPA/600/R-93/187)

NA = Not Available