Site Characterization
Sunnydell Dryke Shooting Range
292 Dryke Road
Sequim, WA 98382

Prepared for: Chuck Dryke and Rosemary Knotek
292 Dryke Road
Sequim, Washington 98382

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August 18, 2010

August 18, 2010
ESA Associates Project Number 711-012-03

Mr. Chuck Dryke and Rosemary Knotek
292 Dryke Road
Sequim, WA 98382

Subject: **Site Characterization**
292 Dryke Road
Sequim, WA 98382

Dear Mr. Dryke and Ms. Knotek:

We are pleased to present the Site Characterization for the above-referenced subject property. We trust the information presented in this report meets your needs at this time.

We appreciate this opportunity to provide our services to the Dryke and Knotek family. Should you require additional information or have any questions regarding this report, please contact us at (425) 870- 8481.

Sincerely,
ESA ASSOCIATES, INC.

Kristen Burgess, RG
President

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1.0 SUMMARY

At the request of Mr. Chuck Dryke and Rosemary Knotek, ESA Associates, Inc. (ESA Associates) has completed the first phase of site characterization for the property located at 292 Dryke Road of Sequim, Washington. This report was prepared by a qualified *Environmental Professional* with ESA Associates as set forth in 40 CFR §312.10(b). The qualifications of the Environmental Professional are presented in Section 10.0 of this report and are included in Appendix A.

According to our site reconnaissance, historical aerial photographs, records review, and interviews, the subject property was utilized as a shooting range from 1967 to the present. According to Mr. Dryke, the owner, the site is open seven days a week. Approximately 500 cartridges are sold each day of operation. Each cartridge holds 1.5 ounces of lead in the form of lead pellets. Mr. Dryke stated over 50 percent of the shooting performed at the site takes place over the "Upper Pond". If one assumes that the site operated at least 200 days a year, the amount of lead shot over the pond in the last 43 years would be 100 tons. Another 100 tons of lead would have been dispersed throughout the other shooting stations at the site.

The areas of concern (Upper Pond, Lower Pond, Weeping Willow, Rabbit Run, and the adjacent property) outlined in ESA Associates' Remedial Investigation/Feasibility Study (RI/FS) work plan were the areas of focus for our sampling program. The "Upper Pond" was divided into four quadrants. Based on our chemical analytical data the soil surrounding the "Upper Pond" contains concentrations of lead from 22 milligrams per kilogram (mg/kg) to 190,000 mg/kg. The higher concentrations of lead were found in quadrant 1 and quadrant 4 of the pond. At most sampling points in the "Upper Pond", the lead concentration diminished with depth with the exception of quadrant 1 which contained higher concentrations of lead reaching 100,000 mg/kg at 6 inches below ground surface (bgs). The sediment samples collected from the "Upper Pond" revealed lead concentrations from 230 mg/kg to 460 mg/kg. The surface water samples collected from the "Upper Pond" revealed lead concentrations from 8.1 micrograms per liter (µg/L) to 31 µg/L.

Chemical analytical results for polyaromatic hydrocarbons (PAHs) by EPA Method 8270 indicated that PAHs are present in the soil surrounding the "Upper Pond" at concentrations ranging from non-detect to 121 mg/kg. The highest concentrations of PAHs were found in quadrant 3 where there is a large deposit of clay targets. The Sediment was non-detect for PAHs in quadrants 1, 2, and 3. The sediment in Quadrant 4 contained 0.55 mg/kg of chrysene and other PAHs above the MTCA cleanup levels. The surface water samples collected from the "Upper Pond" were non-detect for PAHs.

Based on our chemical analytical data the “Lower Pond” contains concentrations of lead from 7 mg/kg to 700 mg/kg in the soil. At all sampling points, the lead concentrations decrease with depth. The south end of quadrant 3 contained the highest levels of lead at 700 mg/kg. The sediment samples collected from the “Lower Pond” revealed lead concentrations from 5 mg/kg to 73 mg/kg. The surface water samples collected from the “Lower Pond” revealed lead concentrations from 2.7 µg/L to 3.9 µg/L. The chemical analytical results for PAHs by EPA Method 8270 indicated that PAHs are present in only one soil sample of the “Lower Pond” collected from quadrant 3 at a concentration of 0.05 mg/kg. The remaining 25 soil and sediment samples were non-detect for PAHs. The surface water samples collected from the “Lower Pond” did not contain detectable concentrations of PAHs.

Based on our chemical analytical data, the soils in the area known as “Rabbit Run” contained lead concentrations ranging from 52,000 mg/kg to 180,000 mg/kg. Chemical analytical data also indicated that PAHs were present in the “Rabbit Run” soils at concentrations ranging from 1.2 mg/kg to 62 mg/kg. The lead and PAH concentrations diminished with depth in all five soil samples collected from the “Rabbit Run” area.

Based on our chemical analytical data, the soils in the area known as “Weeping Willow” contained lead concentrations ranging from 18 mg/kg to 73,000 mg/kg. Chemical analytical data also indicated that PAHs were present in the “Weeping Willow” soils at concentrations ranging from 1.9 mg/kg to 95 mg/kg. The lead and PAH concentrations diminished with depth in all five soil samples collected from the “Weeping Willow” area.

Based on our chemical analytical data, the soils in the area known as the adjacent property contained lead concentrations ranging from 110 mg/kg to 15,000 mg/kg. The lead concentrations diminished with depth in all three soil samples collected from the adjacent property.

ESA Associates concludes that monitoring wells must be installed around the “Upper Pond” and the “Lower Pond” in order to determine whether the contaminants, lead and PAHs, have impacted the groundwater on the Dryke property as well as the adjacent property. We recommend at least four monitoring wells and preferably six monitoring wells be placed around the ponds to ascertain the groundwater gradient and potential migration of contaminants. This summary and our report are subject to the limitations presented below in Section 9.0 of this report.

2.0 BACKGROUND

Mr. Chuck Dryke and Rosemary Knotek currently own the Sunnydell Dryke Shooting Range located at 292 Dryke Road in Sequim, Washington. On June 22, 2004, the Washington State Department of Ecology (Ecology) received a complaint from an adjacent property owner (ERTS # 541614) concerning pond water on the Dryke property draining onto their property and impacting the trees on the property owners land. An initial investigation was performed by the Clallam County Department of Health and Human Services on September 8, 2004. A composite soil sample was collected from the upper pond and lower pond of the shooting range and submitted for chemical analysis of lead by EPA Method 6010B. A discrete surface water samples were also collected from the upper and lower ponds on September 8, 2004 and submitted for chemical analysis of lead by EPA Method 7421.

Chemical analytical results indicated that lead was present in the upper pond sediments at a concentration of 77,800 milligrams per kilogram (mg/kg), exceeding the MTCA Method A cleanup level of 250 mg/kg (This is a MTCA Method A soil cleanup level used for screening purposes at this site, but not to be confused with freshwater sediment cleanup levels that will be set in the cleanup action plan.. Chemical analytical results of the surface water sample collected from the upper pond indicated that lead was present in the upper pond water at a concentration of 30 micrograms per liter (µg/L), which exceeded the chronic water quality criteria for lead in surface water. Chemical analytical results of the lower pond sediments indicated lead at concentrations below the MTCA cleanup level. Chemical analytical results of the lower pond water indicated lead concentrations at 10 µg/L, which exceeded the chronic water quality criteria.

Based on the September 8, 2004 chemical analytical results, Ecology mailed an early Notice Letter to the owners of Sunnydell on November 3, 2004. The Sunnydell Shooting Dryke Shooting Range was placed on Ecology's Confirmed and Suspected Contaminated Sites List on November 8, 2004. On June 22, 2005, the Clallam County Department of Health and Human Services performed a Site Hazard Assessment on the subject property. The site was ranked as a priority ranking #1, and was subsequently placed on the Hazardous Sites List on February 3, 2006. On January 22, 2009, the Clallam County Department of Health and Human Services performed an initial investigation on the adjoining parcel #130050 located to the north of the Sunnydell Dryke Shooting range. Chemical analytical results indicated that lead was in the surface water at concentrations ranging from 14.6 to 101 µg/L, which exceeded the chronic water quality criteria. The sediment samples from the adjoining parcel contained lead at concentrations below the MTCA method A cleanup levels in soil.

On August 10, 2009, an Agreed Order (N0. DE 6551) was signed by the Sunnydell property owners and a representative from Ecology to provide for remedial action at the facility where there was a release of hazardous substances (lead). The Agreed Order required Chuck Dryke and Rosemary Knotek to undertake a remedial investigation and feasibility study for their property located at 292 Dryke Road. The Agreed Order was issued pursuant to the MTCA RCW 70.105D.050(1).

ESA Associates performed a site visit on June 3 and gather information regarding site activities and shooting patterns as part of our scoping phase as outlined in our work plan. According to our site reconnaissance, historical aerial photographs, records review, and interviews, the subject property was utilized as a shooting range from 1967 to the present. According to Mr. Dryke, the owner, the site is open seven days a week. Approximately 500 cartridges are sold each day of operation. Each cartridge holds 1.5 ounces of lead in the form of lead pellets. Mr. Dryke stated over 50 percent of the shooting performed at the site takes place over the "Upper Pond". Given these parameters, approximately 183 tons of lead has been shot over the "Upper Pond" in the last 43 years; however, this is a high estimate based on the site operating 365 days a year, which is unlikely. If one assumes that the site operated at least 200 days a year, the amount of lead shot over the pond in the last 43 years would be 100 tons. Another 100 tons of lead would have been dispersed throughout the other shooting stations at the site.

Based on ESA Associates site observations and interviews, lead pellets were not shot onto the land surrounding the main residence, bird pens, dog kennels, or club house. The areas of concern (Weeping Willow, Rabbit Run, Upper Pond, and Lower Pond) outlined in ESA Associates Remedial Investigation/Feasibility Study (RI/FS) remain areas of lead accumulation and require further investigation as outlined in the RI/FS. Based on our site observations, the "Rabbit Run" shooting station likely contains approximately 12 cubic yards of lead within the surface soils of this station. ESA Associates could not estimate the amount of lead within the "Weeping Willow" shooting station since the pattern of lead shot was spread out over a larger area. Based on the shooting demonstration by Mr. Dryke over the "Upper Pond", the northeast and southeast quadrants of the "Upper Pond" received higher deposits of lead pellets than the northwest and southwest quadrants. The "Lower Pond" may not have received a high volume of lead pellet deposition due to the testimony of Mr. Dryke stating that the "Lower Pond" has not been utilized as a shooting station for the past eight years.

The Washington State Department of Ecology (Ecology) Confirmed and Suspected Contaminated Sites (C&SCS) Report indicated the subject property was a known or suspected contaminated site. The subject property is also listed on the Washington State Hazardous Site List. The known contaminants are lead and polyaromatic hydrocarbons in the soil and surface water of the subject property. Our records review, site visit, and interviews did not reveal off-property current nor historical recognized environmental conditions. It is our opinion that off-property sources have not adversely impacted the site as related to contributions of lead contamination.

Based on the performed work, ESA Associates recommended following the sampling plan outlined in the RI/FS approved by Ecology on April 1, 2010 with the following exceptions: 1) The "Rabbit Run" shooting station may need additional samples taken from the bank at the south end of the station; and 2) The "Lower Pond" sampling points could be reduced from 44 samples to 32 samples since the "Lower Pond" has not been utilized as a shooting station for eight years and given the size of the pond, 32 samples will adequately characterize any lead deposition within the pond. ESA Associates' work was performed in accordance with our authorized proposal and contract (711-012-01), dated June 17, 2010.

3.0 OBJECTIVE AND SCOPE OF SERVICES

At the request of Mr. Chuck Dryke and Rosemary Knotek, and in compliance with Agreed Order (N0. DE 6551), ESA Associates has completed the Site Characterization for the subject property located at 292 Dryke Road in Sequim, Washington. ESA Associates conducted the site characterization in accordance with our authorized proposal dated July 8, 2010. The primary goals of the site characterization are to: 1) provide valid data of known and documented quality to characterize sources of contamination in areas of identified concern; and 2) document threats or potential threats that the site may pose to human health or the environment.

- Provided a Washington State Department of Ecology registered geologist to collect the appropriate number of soil, sediment, and surface water samples.
- Directed the placement of each sampling point based on site observations and the scoping phase findings.
- Observed and documented sampling activities for each sampling location.
- Documented any obvious indications of soil or surface contamination.
- Collected soil, sediment and surface water samples and documented the field screening results.
- Documented field conditions surrounding the areas of concern.
- Submitted the selected soil, sediment and surface water samples for lead by EPA Method 6020; Polyaromatic Hydrocarbons (PAHs) by EPA Method 8270.
- Provided verbal summaries of the chemical analytical results to the Sunnydell Shooting Range representative, Mr. Tom Kirkman and to the Washington State Department of Ecology's representative, Mr. Guy Barrett.
- Prepared a draft and final report.

4.0 SUBSURFACE INVESTIGATION

ESA Associates mobilized to the site on July 12 through July 14, 2010 to collect soil, sediment, and surface water samples in the vicinity of the areas of concern outlined in our approved RI/FS work plan and Sampling and Analysis Plan (SAP). ESA Associates screened the soil in each boring, characterized the subsurface soil, and inspected the areas of concern for any obvious signs of contamination.

The subsurface sampling program consisted of discrete, continuous soil sampling and grab samples for surface water. An ESA Associates geologist was present during the sampling activities to observe and document soil conditions. (Note: The geologist of ESA Associates is registered with the Washington Department of Ecology (Ecology) Underground Storage Tank Program to perform tank site assessments [WAC 173-360-600 through 173-360-680], and is a registered professional geologist with the State of Washington.)

All field sampling and decontamination procedures, soil sample preparation and shipping, and overall field procedures were performed in general accordance with protocol established by the EPA and the Washington State Department of Ecology. All soil classification was performed using the ASTM D2487 Soil Classification Method, "*Soil Survey Standard test Method, Unified Soil Classification System: Field Method"*. Field procedures pertaining to the soil sampling and decontamination protocol are presented in Appendix B.

Soil samples were collected directly from the stainless steel samplers for each sampling location. The ESA Associates geologist documented the condition of the soil and visually inspected it for signs of lead or clay target fragments. The site vicinity map is presented on Figure 1. The site map is presented on Figure 2. The sampling locations are presented on Figures 3 through 6. All representative soil samples were transported to an Ecology-approved analytical laboratory for appropriate analytical testing under chain-of-custody protocol. Chemical Analytical reports are included in Appendix C.

4.1 Area 1: Upper Pond

Area 1 is identified as the "Upper Pond". Please refer to Figure 3. The upper pond was excavated by Mr. Dryke to its current configuration by 1955. According to Mr. Dryke, the pond covers approximately ¾ of an acre and is 14 feet deep. The pond is fed by water that is directed from the state highway 101 via a ditch which runs down gradient to the north along Dryke Road. The "Upper Pond" has been utilized since 1967 (43 years) as a sporting clay target range. The clay targets are reportedly made up of lime and pitch. The ammunition that has been utilized in this area is 12 gage, 1 ounce, lead No. 8 shot.

The pond was divided into four quadrants: the northeast quadrant (Q 1), the northwest quadrant (Q 2), the southwest quadrant (Q 3), and the southeast quadrant (Q 4). Please refer to Figure 2 for quadrant locations. In order to determine the vertical extent of contamination, discrete soil samples were collected from each quadrant at the surface water/soil interface beginning at grade. ESA Associates utilized a stainless steel auger to collect soil samples around the perimeter of the pond. The sample was extruded into a stainless steel pan followed by immediate placement into appropriate sample containers. Once grade samples were collected, the hand auger was advanced 3 inches and an additional sample was collected. Once the 3 inch samples were collected, the auger was advanced to 6 inches bgs. Therefore three soil samples were collected at each sampling location for a total of nine soil samples per quadrant.

One sediment sample was collected in the center of each quadrant. The sediment samples were accessed using a row boat. A one-inch plastic sampling tube was then inserted into the water of the pond until the base was detected at 8 feet below the surface water. The plastic tubing was driven two inches into the sediment and withdrawn using suction. The sediment samples were withdrawn from the tubing using a stainless steel knife and placed directly into glass 4-ounce jars. Four sediment samples (one from each quadrant) were collected from the pond.

Surface water samples were collected from each quadrant using a row boat to access the center of each quadrant. The sampling containers were lowered directly below the surface of the water and filled in place. Four surface water samples were collected from the pond.

Nine soil samples, one sediment, and one surface water sample for a total of 11 samples from each quadrant were submitted to ESN Northwest, Inc. for chemical analysis.

4.2 Area 2: Lower Pond

Area 2 is identified as the lower pond. Please refer to Figure 4. Reportedly, the lower pond has always been present as a marshy area. The lower pond was dug out to its current configuration by Mr. Dryke in the last 20 years. The pond covers approximately 1/2 of an acre and is 8 feet deep. The pond is fed by water from the upper pond. Reportedly the water from the lower pond is pumped back up to the upper pond and recycled. The lower pond has been utilized as a dog training facility. Mr. Dryke reports that no ammunition has been utilized in this area for the past 8 years.

The pond was divided into four quadrants: the southeast quadrant (Q 1), the northeast quadrant (Q 2), the Northwest quadrant (Q 3), and the southwest quadrant (Q 4). In order to determine the vertical extent of contamination, discrete soil samples were collected from each quadrant at the surface water/soil interface beginning at grade. ESA Associates utilized a stainless steel auger to collect soil samples around the perimeter of the pond. The sample is extruded into a stainless steel pan followed by immediate placement into appropriate sample containers. Once grade samples were collected, the auger was advanced 3 inches and an additional sample was collected. Once the 3 inch samples were collected, the auger was advanced to 6 inches bgs to allow for the collection of a soil sample at 6 inches below ground surface at the surface water/soil interface. Therefore three soil samples were collected at each sampling location for a total of six soil samples per quadrant.

One sediment sample was collected in the center of each quadrant. The sediment samples were accessed using a row boat. A one-inch plastic sampling tube was then inserted into the water of the pond until the base was detected at 8 feet below the surface water. The plastic tubing was driven two inches into the sediment and withdrawn using suction. The sediment samples were withdrawn from the tubing using a stainless steel knife and placed directly into glass 4-ounce jars. Four sediment samples (one from each quadrant) were collected from the pond.

Surface water samples were collected from each quadrant using a row boat to access the center of each quadrant. The sampling containers were lowered directly below the surface of the water and filled in place. Four surface water samples were collected from the pond.

Six soil samples, one sediment, and one surface water sample for a total of 8 samples from each quadrant were submitted to ESN Northwest, Inc. for chemical analysis.

4.3 Area 3: The Rabbit Run

Area 3 is identified as the "Rabbit Run". The "Rabbit Run" is located to the southwest of the upper pond in the area identified as the Fur & Feather on the Sunnydell site map (Figure 1). The "Rabbit Run" has been utilized as a shooting range in which live rabbits are released and shot. Typically, 28 gage, 20 gage, 12 gage and 4-10 gage lead No. 8 and No. 9 shot has been used in this area. In July of 2005, a representative from the Clallam County Department of Health and Human Services sampled the surface soils of the rabbit run shooting range. Chemical analytical results indicated concentrations of lead at 618 mg/kg and benzo(a)pyrene at 8.5 mg/kg, both concentrations exceeding the MTCA Method A cleanup level for those constituents. For that reason, the rabbit run area will be sampled for lead and PAHs.

A hand auger was utilized to collect soil samples in order to determine extent of contamination. Samples were collected from grade to one foot below grade. Five sampling locations were placed in the "Rabbit Run" area to determine the vertical and lateral extent of contamination. Approximately 10 soil samples from this area were submitted to ESN Northwest, Inc. for chemical analysis. Please refer to Figures 2 and 5 for sample locations.

4.4 Area 4: The Weeping Willow

Area 4 is identified as the "Weeping Willow". The "Weeping Willow" area is located to the northwest of the upper pond in the lower front field indicated on Figure 1. The weeping willow area has been utilized as a shooting range in which live birds are released and shot. Reportedly, lead shot was not used frequently in this area. In July of 2005, a representative from the Clallam County Department of Health and Human Services sampled the surface soils of the "Weeping Willow" shooting range. Chemical analytical results indicated concentrations of benzo(a)pyrene at 200 mg/kg and napthalenes at 0.33 mg/kg, both concentrations exceeding the MTCA Method A cleanup level for those constituents. For that reason, the "Weeping Willow" area was sampled for PAHs and lead.

A hand auger was utilized to collect soil samples in order to determine extent of contamination. Samples will be collected from grade to one foot below grade. Five sampling locations were placed in the "Weeping Willow" area to determine the vertical and lateral extent of contamination. Approximately 10 soil samples from this area were submitted to ESN Northwest, Inc. for chemical analysis. Please refer to Figures 2 and 6 for sample locations.

4.5 Area 5: Adjacent Property

In January of 2009, a representative from the Clallam County Department of health and Human Services collected soil and surface water samples from the adjacent property to the north of the Sunnydell Dryke Shooting range. Chemical analytical data indicated that lead was present in the surface water of the adjacent property at concentrations exceeding MTCA Method A cleanup levels. Chemical analytical data from the soil samples taken from the adjacent property indicated lead concentrations just below the MTCA Method A cleanup level for soil. Based on the results of DOH sampling program, the adjacent property should be sampled to determine the lateral and vertical extent of lead contamination potentially originating from the lower pond of the Sunnydell Dryke Shooting Range.

A hand auger was utilized along the property line to collect soil samples in order to determine the extent of contamination on the adjacent property. Samples were collected from grade to three feet bgs. Three sampling locations were selected on the adjacent property owners' property just north of the lower pond. Approximately six soil samples selected from the adjacent property were submitted to ESA Northwest, Inc. for chemical analysis. Surface water was not present on the adjacent property at the time of our site visit; therefore, surface water samples were not collected. Please refer to Figure 7 for sample locations.

5.0 LABORATORY ANALYSIS OF SOIL, SEDIMENT, AND SURFACE WATER

The soil samples were submitted to Environmental Services Network (ESN) of Lacey, Washington, a Washington State Department of Ecology (Ecology)-certified laboratory, for analysis in accordance with applicable Ecology and Environmental Protection Agency (EPA) methods. Quality Assurance/Quality Control (QA/QC) included generally accepted procedures for sample collection, storage, tracking, and documentation.

All sampling equipment was washed and rinsed prior to the collection of the samples. All samples were labeled with a sample number, date, time, and sampler name, and stored in an ice chest containing frozen "blue ice" under appropriate chain-of-custody documentation. Detailed information regarding the field sampling protocol and decontamination procedures is presented in Appendix B. Copies of the laboratory analysis reports and Chain-of-Custody documentation are presented in Appendix C.

The discrete soil, sediment, and surface water samples submitted from Areas 1 through 4 were analyzed for total lead by EPA Method 6020 and Semi-Volatile Organic Compounds (PAHs only) by EPA Method 8270. The surface water samples were not filtered; therefore, they were analyzed for total lead by EPA Method 6020. The six soil samples collected from the adjacent property were analyzed for lead by EPA Method 6020.

6.0 SUBSURFACE FINDINGS AND ANALYTICAL RESULTS

In general, the site surface soils consisted of a light brown fine silty sand with occasional lenses of silt. The fine silty sand was encountered at each sampling location from grade to the completion of each hand augering, which ranged from 6 inches below ground surface (bgs) to 3 feet bgs. Groundwater was not encountered in the hand auger samples.

6.1 Subsurface Soil, Sediment, Surface Water Sampling

As stated in Section 4.0, 36 soil, 4 sediment, and 4 surface water samples were taken from the "Upper Pond" area; 24 soil, 4 sediment, and 4 surface water samples were taken from the "Lower Pond" area; 10 soil samples were taken from the "Rabbit Run" area; 10 soil samples were taken from the "Weeping Willow" area; and 6 soil samples were taken from the adjacent property during our investigation activities. The cuttings from each hand auguring were placed back in their respective holes.

6.2 Upper Pond Analytical Results

Soil samples were collected using a stainless steel auger. Soil samples were collected around the perimeter of the pond where the surface water interfaced with the soil. Soil samples were collected at 1 inch, 3 inches, and 6 inches at each sampling location to characterize the vertical extent of contaminant migration around the pond. A row boat was utilized to access sediment samples. Sediment samples were collected in plastic tubing driven to the depth of the pond at 8 feet below water surface and held in place by suction. Water samples were collected at the surface of each quadrant as accessed by a row boat. A total of 44 samples were submitted to the laboratory for chemical analysis. Soil analytical results from each sampling location are presented on Tables 1 and 2. Chemical analytical reports and the laboratory Quality Assurance/Quality Control (QA/QC) are presented in Appendix C.

6.2.1 Total Lead by EPA Method 6020

Analytical results indicated lead by EPA Method 6020 was detected in the soil of quadrants 1, 2, 3, and 4 at concentrations ranging from 22 mg/kg to 190,000 mg/kg. Lead was detected in the sediment of quadrants 1, 2, 3, and 4 at concentrations ranging from 230 mg/kg to 460 mg/kg. Lead was detected in the surface water in quadrants 1, 2, 3, and 4 at concentrations ranging from 8.1 to 31 µg/L.

6.2.2 Semi-Volatile Organic Compounds (PAHs) by EPA Method 8270

Analytical results indicated Semi-Volatile Organic Compounds (PAHs) by EPA Method 8270 were detected in the soil of quadrants 1, 2, 3, and 4 at concentrations exceeding the MTCA Method B cleanup levels for individual PAHs. Specifically, chrysene concentrations ranged from non-detect to 121 mg/kg. The sediment samples from quadrants 1 and 2 did not contain detectable concentrations of PAHs. The sediment samples from quadrants 3 and 4 contained concentrations of PAHs ranging from 0.20 mg/kg to 0.61 mg/kg. The surface water samples from quadrants 1, 2, 3, and 4 did not contain detectable concentrations of PAHs.

6.3 Lower Pond Analytical Results

Soil samples were collected using a stainless steel auger. Soil samples were collected around the perimeter of the pond where the surface water interfaced with the soil. Soil samples were collected at 1 inch, 3 inches, and 6 inches at each sampling location to characterize the vertical extent of contaminant migration around the pond. A row boat was utilized to access sediment samples. Sediment samples were collected in plastic tubing driven to the depth of the pond at 8 feet below water surface and held in place by suction. Water samples were collected at the surface of each quadrant as accessed by a row boat. A total of 32 samples were submitted to the laboratory for chemical analysis. Soil analytical results from each sampling location are presented on Tables 3 and 4. Chemical analytical reports and the laboratory Quality Assurance/Quality Control (QA/QC) are presented in Appendix C.

6.3.1 Total Lead by EPA Method 6020

Analytical results indicated lead by EPA Method 6020 was detected in the soil of quadrants 1, 2, 3, and 4 at concentrations ranging from 4.7 mg/kg to 700 mg/kg. Lead was detected in the sediment of quadrants 1, 2, 3, and 4 at concentrations ranging from 5 mg/kg to 73 mg/kg. Lead was detected in the surface water in quadrants 1, 2, 3, and 4 at concentrations ranging from 2.7 to 3.9 µg/L.

6.3.2 Semi-Volatile Organic Compounds (PAHs) by EPA Method 8270

Analytical results indicated Semi-Volatile Organic Compounds (PAHs) by EPA Method 8270 were detected in the soil of quadrant 1 at concentrations exceeding the MTCA Method B cleanup levels for individual PAHs. Specifically, chrysene concentrations ranged from non-detect to 8.5 mg/kg. The sediment samples from quadrants 1, 2, 3, and 4 did not contain detectable concentrations of PAHs. The surface water samples from quadrants 1, 2, 3, and 4 did not contain detectable concentrations of PAHs.

6.4 Rabbit Run Soil Analytical Results

Two soil samples were collected from each sampling point using a post hole digger within the "Rabbit Run" area. The first sample was collected from the surface of the "Rabbit Run" area. A second soil sample was collected at one foot bgs to characterize the vertical extent of contaminant migration. A total of 10 soil samples were submitted to the laboratory for chemical analysis. Soil analytical results are presented on Table 5. Chemical analytical reports and the laboratory Quality Assurance/Quality Control (QA/QC) is presented in Appendix C.

6.4.1 Total Lead by EPA Method 6020

Analytical results indicated lead by EPA Method 6020 was detected in the soil of the "Rabbit Run" area at concentrations ranging from 52,000 mg/kg to 180,000 mg/kg for the surface samples and 38 to 3,100 mg/kg at one foot bgs.

6.4.2 Semi-Volatile Organic Compounds (PAHs) by EPA Method 8270

Analytical results indicated Semi-Volatile Organic Compounds (PAHs) by EPA Method 8270 were detected in the soil of the "Rabbit Run" area at concentrations ranging from non-detect to 222 mg/kg in both surface samples and samples collected from one foot bgs.

6.5 Weeping Willow Soil Analytical Results

Two soil samples were collected from each sampling point using a post hole digger within the "Weeping Willow" area. The first sample was collected from the surface of the "weeping Willow" area. A second soil sample was collected at one foot bgs to characterize the vertical extent of contaminant migration. A total of 10 soil samples were submitted to the laboratory for chemical analysis. Soil analytical results are presented on Table 6. Chemical analytical reports and the laboratory Quality Assurance/Quality Control (QA/QC) is presented in Appendix C.

6.5.1 Total Lead by EPA Method 6020

Analytical results indicated lead by EPA Method 6020 was detected in the soil of the "Weeping Willow" area at concentrations ranging from 300 mg/kg to 73,000 mg/kg for the surface samples and 18 to 15,000 mg/kg at one foot bgs.

6.5.2 Semi-Volatile Organic Compounds (PAHs) by EPA Method 8270

Analytical results indicated Semi-Volatile Organic Compounds (PAHs) by EPA Method 8270 were detected in the soil of the "Weeping Willow" area at concentrations ranging from non-detect to 83 mg/kg in both surface samples and samples collected from one foot bgs.

6.6 Adjacent Property Soil Analytical Results

Two soil samples were collected from each sampling point using a post hole digger within the "Adjacent Property" area. The first sample was collected from the surface of the "Adjacent Property" area. A second soil sample was collected at from either one foot bgs or three feet bgs to characterize the vertical extent of contaminant migration. A total of 6 soil samples were submitted to the laboratory for chemical analysis. Soil analytical results are presented on Table 7. Chemical analytical reports and the laboratory Quality Assurance/Quality Control (QA/QC) is presented in Appendix C.

6.6.1 Total Lead by EPA Method 6020

Analytical results indicated lead by EPA Method 6020 was detected in the soil of the "Adjacent Property" area at concentrations ranging from 130 mg/kg to 15,000 mg/kg for the surface samples and 130 to 180 mg/kg at one foot bgs.

7.0 CONCLUSIONS

The subsurface sampling program consisted of 102 soil, sediment, and surface water samples collected from the Sunnydell Shooting Range and adjacent property owned by Mrs. Miller. Five areas of concern were addressed during our site reconnaissance as follows: Upper Pond, Lower Pond, Rabbit Run, Weeping Willow, and the adjacent property. A summary of our findings and recommendations for each area is presented below.

7.1 Upper Pond

Lead and PAH contamination is present in the soil, sediment, and surface water of the "Upper Pond". The vertical and lateral extent of these contaminants has not been entirely defined. Lead and PAH concentrations decrease with depth. The soil in quadrants 1, 2, and 4 contains higher levels of lead than quadrant 3 likely due to the higher accumulation of lead bullets in these areas. The soil in quadrant 3 contains higher levels of PAHs likely due to the disposal of clay targets in this area. The sediment and surface water within the pond contain lower levels of both lead and PAHs than the soil which surrounds the pond.

Approximately 2,233 cubic yards of soil and sediment within the pond are contaminated with lead and PAHs. Approximately 180, 000 gallons of water were contained within the pond at the time of our site characterization.

7.2 Lower Pond

Lead and PAH contamination is present in the soil of the "Lower Pond". The area of lead contamination at concentrations exceeding the MTCA Method A cleanup level for soil is confined to quadrant 3 with concentrations ranging from 660 mg/kg to 700 mg/kg. The vertical and lateral extent of the lead contamination has not been entirely defined in quadrant 3. The lead concentrations in quadrants 1, 2, and 4 are below the MTCA cleanup level of 250 mg/kg. Lead and PAH concentrations do decrease with depth in all four quadrants. The soil in quadrant 1 contains two samples with concentrations of PAHs which exceed the MTCA Method B cleanup levels. All other quadrants contain concentrations of PAHs ranging from non-detect to 0.05 mg/kg which is below the MTCA Method B cleanup level for these constituents. The sediment and surface water within the pond contain very low levels of lead and the concentrations of PAHs are non-detect for all sediment and surface water samples.

7.3 Rabbit Run

Lead and PAH contamination is present in the soil of the "Rabbit Run" area from the surface to one foot bgs. The lateral and vertical extent of the lead and PAH contamination has not been entirely defined. Lead and PAH concentrations do decrease with depth. An area measuring 40 feet by 20 feet in plan dimensions and reaching a total depth of one foot bgs has been impacted by the lead shot and PAHs of the clay targets. Approximately 30 cubic yards (40 tons) of soil are contaminated by lead and PAHs within the "Rabbit Run" area.

7.4 Weeping Willow

Lead and PAH contamination is present in the soil of the "Weeping Willow" area from the surface to one foot bgs. The lateral and vertical extent of the lead and PAH contamination has not been entirely defined. Lead and PAH concentrations do decrease with depth. An area measuring 37 feet by 40 feet in plan dimensions and reaching a total depth of one foot bgs has been impacted by the lead shot and PAHs from the clay targets. Approximately 57 cubic yards (80 tons) of soil are contaminated by lead and PAHs within the "Weeping Willow" area.

7.5 Adjacent Property

Lead contamination is present in the soil of the "Adjacent Property" area from the surface to three bgs. The lateral and vertical extent of the lead contamination has not been entirely defined. Lead concentrations do decrease with depth. The total area impacted by the lead shot on the adjacent property has not been established.

8.0 RECOMMENDATIONS

Based on the chemical analytical data collected and analyzed during our July 2010 site characterization of the Sunnydell Dryke Shooting Range, ESA Associates recommends placing monitoring wells around the Upper Pond and Lower Pond in order to establish the groundwater gradient and to determine whether lead and/or PAHs have migrated to the groundwater table. The monitoring wells should be placed as outlined in our approved work plan dated April 1, 2010.

9.0 LIMITATIONS

The site characterization performed during this investigation is non-comprehensive by nature and is unlikely to identify all environmental problems or eliminate all risk. ESA Associates offers a range of investigative and engineering services to suit the needs of our clients, including more quantitative investigations. Although risk can never be eliminated, more detailed and extensive investigations yield more information, which may help to better understand and manage site risks. Since such detailed services involve greater expense, we ask our clients to participate in identifying the level of service, which will provide them with an acceptable level of risk. Please contact the signatories of this report if you would like to discuss this issue of risk further.

The scope of work on this project was presented in our identified proposal and subsequently approved by our client. Please be aware our scope of work was limited to those items specifically identified in the proposal. Other activities not specifically included in the presented scope of work (in the proposal, correspondence, or this report) are excluded and should not be considered to be a part of our scope of services.

Land use, site conditions (both on-site and off-site) and other factors will change over time. Since site activities and regulations beyond our control could change at any time after the completion of this report, our observations, findings and opinions can be considered valid only as of the date of the site visit. This report should not be relied upon after 180 days from the date of its issuance (ASTM Standard E-1527, Section 4.6).

The property owner is solely responsible for notifying all governmental agencies, and the public at large, of the existence, release, treatment or disposal of any hazardous materials observed at the project site. ESA Associates assumes no responsibility or liability whatsoever for any claim, loss of property value, damage, or injury which results from pre-existing hazardous materials being encountered or present on the project site, or from the discovery of such hazardous materials.

Any party other than the Dryke family, Knotek family or Washington State Department of Ecology who would like to use this report shall notify ESA Associates of such intended use by executing the "Application for Authorization to Use" contained in this document. Based on the intended use of the report, ESA Associates may require that additional work be performed and that an updated report be issued. Non-compliance with any of these requirements by the Dryke family or Knotek family or anyone else will release ESA Associates from any liability resulting from the use of this report by any unauthorized party. No warranty, either express, or implied is made.

If additional site information is required to satisfy the family's risk management objectives, a site exploration could be performed to better evaluate the presence or absence of contamination. If required, ESA Associates recommends this work scope be prepared upon completion of review of this report. ESA Associates can prepare a specific scope of work for this exploration at that time.

10.0 QUALIFICATIONS OF ENVIRONMENTAL PROFESSIONALS

I declare that, to the best of my professional knowledge and belief, I meet the definition of *Environmental Professional* as defined in §312.10 of 40 CFR 312, and I have the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the subject property.

Respectfully Submitted,
ESA ASSOCIATES, Inc.

Kristen L Burgess,
Registered Geologist, No. 1322

APPLICATION FOR AUTHORIZATION TO USE

Site Characterization
292 Dryke Road
Sequim, WA 98382

ESA ASSOCIATES PROJECT NUMBER: *711-012-03*

August 18, 2010

TO: ESA Associates, Inc.
2820 132nd Avenue SE
Snohomish, Washington 98290

FROM:

Applicant _____ hereby applies for permission to:
[State here the use(s) contemplated]

for the purpose(s) of:
[State here why you wish to do what is contemplated as set forth above]

Applicant understands and agrees that the above identified report prepared by ESA Associates, Inc. is the copyright owner and that unauthorized use or copying of the above identified report is strictly prohibited without the express written permission of ESA Associates, Inc. and ESA Associates' client. Applicant understands that ESA Associates and/or ESA Associates' client, may withhold such permission at its sole discretion, or grant such permission upon such terms and conditions as it deems acceptable.

Dated: _____ _____
Applicant

by _____

its _____