STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Northwest Regional Office • 3190 160th Avenue SE • Bellevue, Washington 98008-5452 • (425) 649-7000

March 17, 2009

Mr. James Kraft
Plum Creek Land Company
999 3rd Avenue, Suite 4300
Seattle, WA 98104

Dear Mr. Kraft:

Re: No Further Action at the following Site:

- **Site Name:** Plum Creek Land Company (aka Plum Creek Ravensdale Property)
- **Site Address:** Black Diamond-Ravensdale Road, King County, WA
- **Facility/Site No.: 3531259**
- **VCP Project No.: NW1661**
  CSID# 243

The Washington State Department of Ecology (Ecology) received your request for an opinion on your independent cleanup of the Plum Creek Ravensdale Property facility (Site). This letter provides our opinion. We are providing this opinion under the authority of the Model Toxics Control Act (MTCA), Chapter 70.105D RCW.

Issue Presented and Opinion

Is further remedial action necessary to clean up contamination at the Site?

NO. Ecology has determined that no further remedial action is necessary to clean up contamination at the Site.

This opinion is based on an analysis of whether the remedial action meets the substantive requirements of MTCA, Chapter 70.105D RCW, and its implementing regulations, Chapter 173-340 WAC (collectively "substantive requirements of MTCA"). The analysis is provided below.

Description of the Site

This opinion applies only to the Site described below. The Site is defined by the nature and extent of contamination associated with the following releases:

- Lead, arsenic, antimony, and mercury into the Soil

Enclosure A includes a detailed description and diagram of the Site, as currently known to Ecology.

Please note that a parcel of real property can be affected by multiple sites. At this time, we have no information that the parcel(s) associated with this Site are affected by other sites.

Basis for the Opinion

This opinion is based on the information contained in the following documents:

1. March 2009, *MTCA Voluntary Cleanup Action Closure Report, Unauthorized Target Shooting Ranges – Ravensdale Site, Plum Creek Land Company, Seattle, Washington,* CH2M HILL

2. July 18, 2008, *Re: Plum Creek Ravensdale – confirmation soil sampling approach,* email from Carolyn Kossik, CH2M HILL

3. June 2008, *Work Plan; Temporary Erosion and Sediment Control Plan, Traffic Control Plan Ravensdale Soil Remediation Site; Spill Control Plan Plum Creek Ravensdale Project,* Clean Harbors Environmental Services

4. June 20, 2008, *Sampling Approach, Confirmation and Disposal Related Sampling, Ravensdale Soil Remedial Action, Plum Creek Land Company,* CH2M HILL

5. January 2008, *TEE Site-Specific Field Investigation Report, Plum Creek Ravensdale Site,* CH2M HILL

6. June 2007, *Sampling and Analysis Plan for Terrestrial Ecological Evaluation Earthworm Tissue Lead Analyses,* CH2M HILL

7. March 2007, *Draft for Ecology Review – Report, Terrestrial Ecological Evaluation Report, Ravensdale Property: Unauthorized Shooting Ranges,* CH2M HILL

8. January 29, 2007, *Information concerning wetlands and the Open Space Agreement between Plum Creek Timber and King County*, provided by Becky Peterson, Acquisition Project Manager, Open Space Acquisitions, King County Water and Land Resources Division.

9. January 29, 2007, *Subject: Decision on Need for a TEE, Plum Creek Ravensdale Site,* email from Mark Adams, Ecology.

10. October 2006, *Source Area Characterization Report, Ravensdale Property: Unauthorized Target Shooting Ranges,* CH2M HILL

11. June 15, 2005, *Contamination Assessment, Plum Creek Timber Company Property, Parcels 022106-9013, -9025, -9026, King County, Washington,* CDM

Those documents are kept in the Central Files of the Northwest Regional Office of Ecology (NWRO) for review by appointment only. You can make an appointment by calling the NWRO resource contact, Sally Perkins, at 425 649-7190.

This opinion is void if any of the information contained in those documents is materially false or misleading.

Analysis of the Cleanup

Ecology has concluded that **no further remedial action** is necessary to clean up contamination at the Site. That conclusion is based on the following analysis:

1. Characterization of the Site.

Ecology has determined your characterization of the Site is sufficient to establish cleanup standards and select a cleanup action. The Site is described above and in **Enclosure A.**

2. Establishment of cleanup standards.

Ecology has determined the cleanup levels and points of compliance you established for the Site meet the substantive requirements of MTCA.

a. Cleanup levels.

The Site is accessible to the public and to wildlife. Soil cleanup levels protective of direct human contact and of terrestrial plants and animals are therefore necessary and have been established. The lower of the two was chosen as the overall cleanup level for the Site.

Other soil cleanup levels protective of surface water or ground water are not necessary given the distance to surface water and the relative resistance of the heavy metals, particularly lead, to leaching and infiltration. Arsenic can be leachable, but was not especially elevated in concentration at the Site. The direct contact and terrestrial species protection cleanup levels are further described as follows:

- Soil Direct Contact: Method A cleanup levels for unrestricted use were chosen. Specifically the cleanup level for lead was set at 250 mg/kg and for arsenic at 20 mg/kg. Cleanup levels were not established for the other metals since they were a minor component of the contamination at the Site and soils containing these metals were removed together with the lead-contaminated soils.

- Soil Terrestrial Species Protection: A site-specific terrestrial ecological evaluation (TEE) was required at this Site because it did not qualify for an exclusion and is located next to an extensive area of forest with a connected wetland corridor. This site-specific study provided empirical data on lead-uptake in earthworms at the Site, and concluded that mammalian carnivores would be unlikely to have diets composed of species directly exposed to soil contamination. As a result, Ecology concluded that human health clean-up levels would be sufficiently protective of ecological receptors. Ecology also concluded soil cleanup levels protective of plant species were not necessary given the widespread presence of invasive species and the ongoing maintenance of vegetation in the power transmission corridor.

b. Points of compliance.

- The point of compliance for soil was set as the standard under MTCA - all soil to a depth of 15 feet below ground surface.

3. Selection of cleanup action.

Ecology has determined the cleanup action you selected for the Site meets the substantive requirements of MTCA.

The selected cleanup action consisted of excavating and removing the top 6 to 36 inches of soil containing lead, arsenic, mercury, and antimony above cleanup levels. Following soil removal and off-property disposal, the Site was to be graded smooth and re-seeded with grass.

Lead concentrations were sufficiently high in some areas that soils tested as a Hazardous Waste via the toxicity characteristic leaching procedure (TCLP)(Dangerous Waste Regulations, WAC 173-303). A process for treating the soil on-site was developed under the provisions of the Treatment by Generator policy. The process used a phosphoric acid based reagent to stabilize the lead, such that the soils met the TCLP standard for hazardous waste (less than 5 mg/L leachable lead).

Areas of hazardous and non-hazardous waste and the depth of contaminated soil were defined prior to the start of the remediation.

4. Cleanup.

Ecology has determined the cleanup you performed meets the cleanup standards established for the Site.

Remediation began with mobilization to the Site on July 7, 2008, and was completed by September 10, 2008. The remediation consisted of the following:

- The ground surface was raked and loose surface debris removed for off-property disposal.
- Surface soils were excavated in the locations and to the depth outlined in the project plans.
- Excavated soils were segregated into discrete stockpiles for treatment and testing. The stockpiles contained soils that had been determined previously to be either hazardous waste (with lead concentrations above the TCLP threshold) or non-hazardous waste (with lead concentrations below the TCLP threshold).
- Soils in the non-hazardous pile were tested for TCLP lead to confirm they were not hazardous. If so confirmed, the soils were screened to remove oversize gravel (larger than 2 inches), which were left on the Site. The remaining soil was transported off-property to the Roosevelt Regional Landfill
- Soils in the hazardous pile were also screened to remove oversize gravel, and the remaining soil treated on-site as described previously. The resulting non-hazardous soils were also disposed of at the Roosevelt Regional Landfill.
- Performance sampling was completed at the base and sides of the excavated areas in accordance with the approved plan. Soil samples were analyzed for lead and arsenic. All of the final performance samples were at or below the cleanup levels.

Listing of the Site

Based on this opinion, Ecology will remove the Site from our Confirmed and Suspected Contaminated Sites List.

Limitations of the Opinion

1. Opinion does not settle liability with the state.

Liable persons are strictly liable, jointly and severally, for all remedial action costs and for all natural resource damages resulting from the release or releases of hazardous substances at the Site. This opinion **does not**:

- Resolve or alter a person's liability to the state.

- Protect liable persons from contribution claims by third parties.

To settle liability with the state and obtain protection from contribution claims, a person must enter into a consent decree with Ecology under RCW 70.105D.040(4).

2. Opinion does not constitute a determination of substantial equivalence.

To recover remedial action costs from other liable persons under MTCA, one must demonstrate that the action is the substantial equivalent of an Ecology-conducted or Ecology-supervised action. This opinion does not determine whether the action you performed is substantially equivalent. Courts make that determination. *See* RCW 70.105D.080 and WAC 173-340-545.

3. State is immune from liability.

The state, Ecology, and its officers and employees are immune from all liability, and no cause of action of any nature may arise from any act or omission in providing this opinion. *See* RCW 70.105D.030(1)(i).

Termination of Agreement

Thank you for cleaning up the Site under the Voluntary Cleanup Program (VCP). This opinion terminates the VCP Agreement governing this project (#**NW1661**).

For more information about the VCP and the cleanup process, please visit our web site: www.ecy.wa.gov/programs/tcp/vcp/vcpmain.htm. If you have any questions about this opinion or the termination of the Agreement, please contact me at 425.649.7107.

Sincerely,

Mark Adams
NWRO Toxics Cleanup Program

ma/kp

Enclosures (1): A – Description and Diagram of the Site

cc: Carolyn Kossik, CH2M HILL
Delores Mitchell, VCP Financial Manager (without enclosures)

Enclosure A

Description and Diagram of the Site

Plum Creek Ravensdale Property

The Site is defined as comprising four discrete areas of mostly lead and arsenic contamination associated with unauthorized firing ranges on Plum Creek property. The firing ranges are within a Bonneville Power high-voltage power line easement in unincorporated King County about two miles north of Black Diamond (see enclosed figure). The closest access to the Site is from the Ravensdale-Black Diamond Road.

The area immediately around the Site is predominantly undeveloped rural land, except for Reserve Silica, a mining operation located to the east and northeast of the Site. Plum Creek forest lands abut the Site to the south. These forest lands contain an extensive series of interconnected natural wetlands and lakes extending about two miles to the Green River. King County has designed some of these wetlands as sensitive areas, and has identified a "Wildlife Network" route extending from the wetlands through the Site.

Anecdotal evidence suggests the unauthorized firing ranges had been widely known to the locals and in use for decades. Most of the shooting activities took place in two areas, an approximately one-acre "small range" and an approximately five-acre "large range". An old growth stump separate from these areas had also been used for target practice. This area is termed the "stump area". Another separate area, the "arsenic area", was identified as part of the Site.

The Site and surrounding area is located on a glaciated upland close to the foothills of the Cascade Mountains. Meltwater flows associated with the latest glaciation appear to have been a dominant factor in shaping the topography of the area, as indicated by sculpted hills bordered by flat, wide valleys. The Site sits on the eastern side of one these meltwater troughs, with the small range on the top of a hillside and the large range about 100 feet lower in the valley. The large range occupied a former gravel pit excavated 10 to 15 feet into the valley floor.

Geologic conditions are not known below a few feet at the Site. Sediments at the surface consist of cobbly outwash sands and gravels. These grade downward into finer-grained deposits of silty sandy till. The maximum depth explored at the Site was about 4 feet.

No surface water is present at the Site, except for seasonal ponding in one hollow at the edge of the large range. The Green River is located about two miles southeast of the Site as mentioned above. The Cedar River is also located about two miles north of the Site. The nearest surface water is Ravensdale Creek, a seasonal stream located about one-half mile to the west.

Ground water conditions are not known at the Site. However, ground water is likely to be relatively shallow at the large range, given its location on the floor of a valley. Ground water beneath the small range should be deeper.

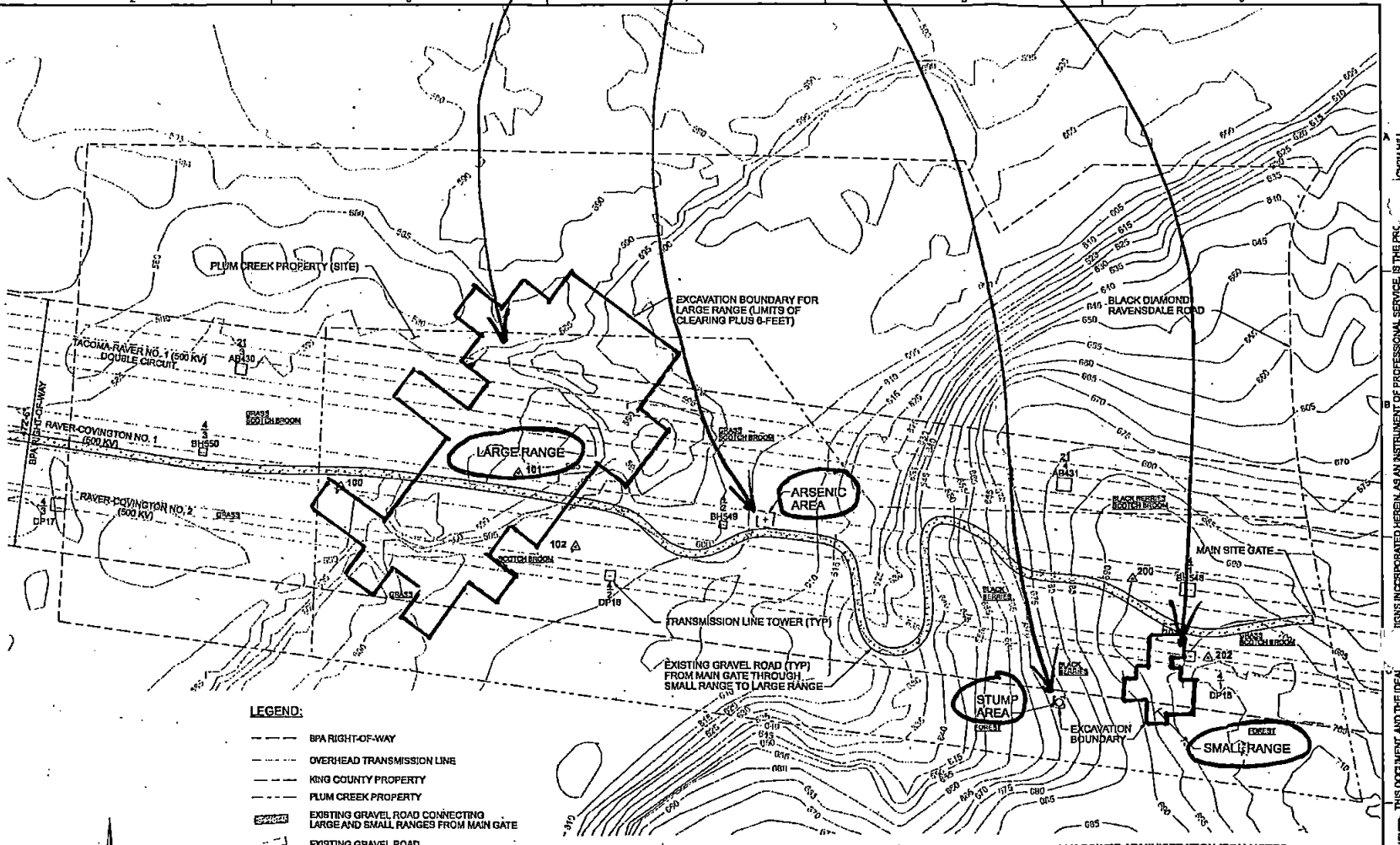
Prior to cleanup, the ground surface at both the small and large ranges, but especially the large range, was densely littered with bullet and rifle cartridges along with glass, plastic, metal, and other debris. Fragments of trap shooting clay targets were not present at the Site indicating that this activity was not common. The small range had one elevated berm, indicating a fairly consistent direction of fire. The large range, by contrast, consisted of an excavated depression with berms on three sides. The direction of fire would have been considerably more variable, with a much larger perimeter of overshot and ricochet.

As a result of the shooting, surface soils at the Site were contaminated mostly with lead. Elevated arsenic was also present, but greatly subordinate to the lead. Two other metals, antimony and mercury, were also found at elevated concentrations at a few locations. The metals contamination was mostly restricted to soils within 24 inches of land surface. In a few areas it extended down to 36 inches below land surface. Lead concentrations were sufficiently high in some areas to characterize as a hazardous waste.

Although ground water testing was not completed at the Site, the potential for impact is limited given the silty fine-grained nature of the soils underlying the firing ranges. In addition all of the metals, except arsenic, have limited solubility and low mobility in ground water. Arsenic can be quite mobile, but was present at relatively low concentrations at this Site.

In summary, the Site is defined mostly by high lead concentrations present in soil at and within a few feet of land surface at the former firing ranges. Ground water is not expected to have been impacted.

MTCA SITE



LEGEND:

- BPA RIGHT-OF-WAY
- OVERHEAD TRANSMISSION LINE
- KING COUNTY PROPERTY
- PLUM CREEK PROPERTY
- EXISTING GRAVEL ROAD CONNECTING LARGE AND SMALL RANGES FROM MAIN GATE
- EXISTING GRAVEL ROAD
- TRANSMISSION LINE TOWER WITH TOWER DESIGNATION
- EXCAVATION BOUNDARY
- CONTOUR
- SURVEY CONTROL COORDINATES

N

0 100 200 300
Scale in Feet

BONNEVILLE POWER ADMINISTRATION (BPA) REFERENCE DRAWINGS

VANTAGE - COVINGTON NO. 2
(OPERARED AS MILE 4 OF RAVER-COVINGTON NO. 2), 13117 DTM-D, SHEET 117 of 123, 18 JUNE 1964.

VANTAGE - COVINGTON, NO. 1
(OPERATED AS MILE 4 OF RAVER-COVINGTON NO. 1), 129117 DTM-D, SHEET 117 OF 123, 11 JUNE 1964.

TACOMA - RAVER NO. 1 & 2
(OPERATED AS TACOMA-RAVER NO. 1), 84841 DTM-D, 31 JANUARY 1974.

TACOMA - RAVER NO. 1 & 2
(OPERATED AS TACOMA-RAVER NO. 1), 154541A DTM-D, 15 MARCH 1974.

RAVER - COVINGTON NO. 1, AERIAL PHOTOMAP, RCV 27 JUNE 1991.

BONNEVILLE POWER ADMINISTRATION (BPA) NOTES

1. ALL TRANSMISSION LINES ARE 500 KV. TACOMA RAVER NO. 1 IS A DOUBLE CIRCUIT LINE. THE LOCATION OF THE TOWERS AND LINES ARE APPROXIMATED. REFER TO BPA REFERENCES FOR SPECIFICS.
2. BPA RIGHT-OF-WAY IS 472.5-FEET WIDE PER BPA REFERENCES
3. ACCESS ROADS SHALL REMAIN PASSABLE TO BPA VEHICLES DURING AND FOLLOWING CONSTRUCTION. FINAL GRADES FOLLOWING CONSTRUCTION SHALL BE PER GRADING PLAN.
4. CONTRACTOR SHALL COMPLY WITH ALL CONDITIONS OF THE BPA PERMIT FOR THE PROJECT.

DSGN	C ECKBERG
DR	C ECKBERG
CHK	A ROSSI
APVD	C KOSSIK

NO.	DATE	DESCRIPTION	APVR BY	N APVD
NO.	DATE	REVISION		

VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

CH2MHILL

RAVENSDALE SOIL REMEDIAL ACTION
PLUM CREEK LAND COMPANY

FIGURE 3
SITE PLAN FOR CONFIRMATION SAMPLING

SHEET	
DWG	3
DATE	NOV 4, 2008
PROJ	344933.SC.01

FILENAME: 334223 Site Plan F3 11-4-08.dgn PLOT DATE: 11/7/2008 PLOT TIME: 8:59:26 AM

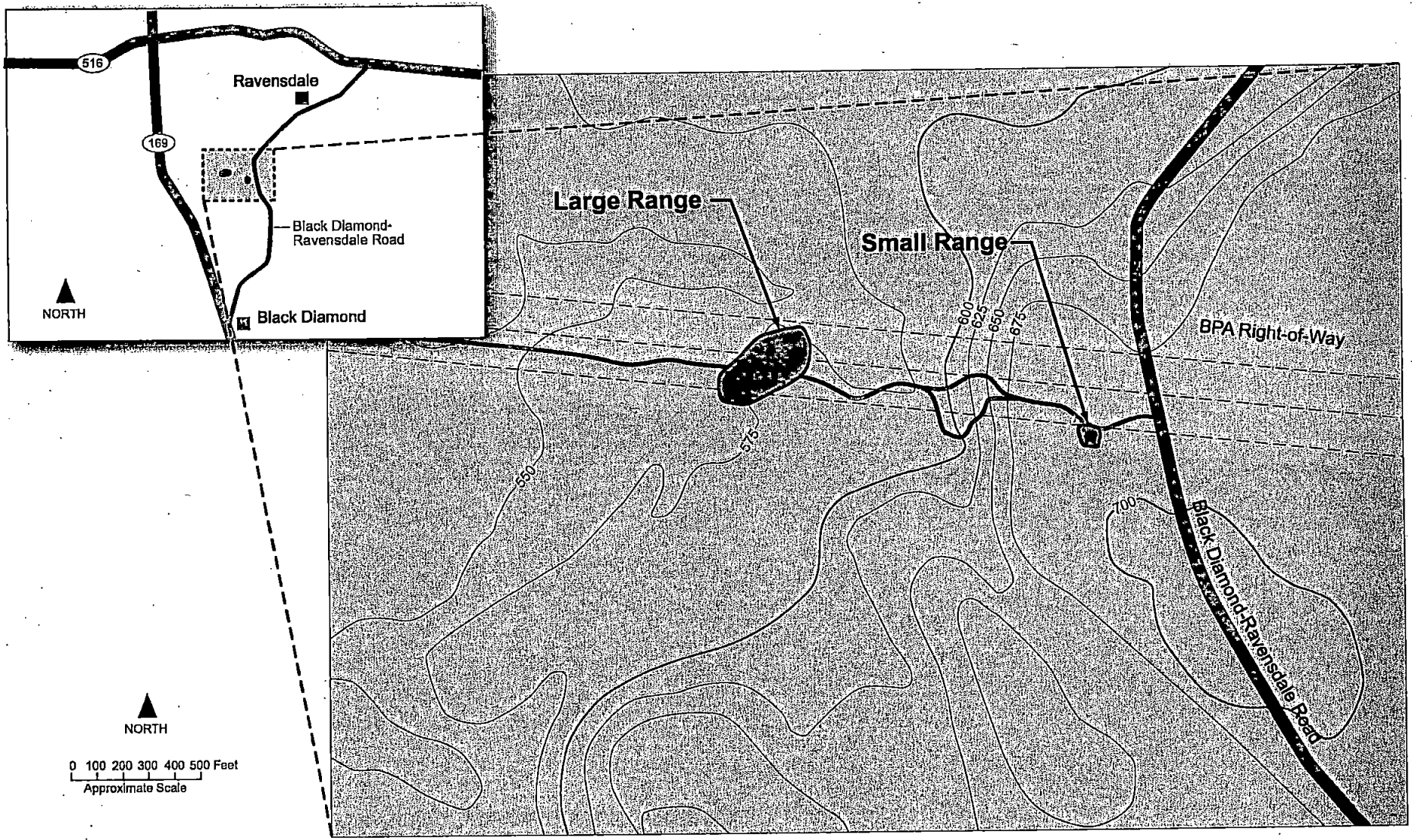


FIGURE 1 Vicinity Map
Ravensdale-Black Diamond
Unauthorized Target Shooting Area
September 2008