Assessment of the Wahl Extraction Area Sand and Gravel Conveyor on Large Mammal Movements

Fred Hill Materials
Wahl Extraction Area
Jefferson County, Washington

March 14, 2003

Submitted to:
Team 4 Engineering
Suite A, Box 2
5823 N.E. Minder Rd.
Poulsbo, WA 98370

Prepared by:
Greg Schroer
Resources Northwest Consultants
PO Box 675
Kirkland, WA 98083

TABLE OF CONTENTS

Maps

1.0 INTRODUCTION

Fred Hill Materials, Inc. (FHM) proposes to develop a 1.25 mile conveyor belt structure (conveyor) that would move sand and gravel from the proposed Wahl Extraction Area (at T27N, R1W, Section 1) to an existing sand and gravel extraction, storage, and processing site located at the Shine Pit (T28N, R1E, Section 31 & 32, and T27N, R1E, Section 5). The proposed conveyor may affect the movements of large mammal wildlife species known to exist in the project area. This assessment was conducted to ascertain the details of the proposed project and its potential effects on those species. For this assessment, the Shine Pit, the proposed Wahl Extraction Area, and the proposed connecting conveyor were all considered to be part of the "project area."

2.0 SITE DESCRIPTION

The project area is centered between Port Ludlow, Washington, and the northern tip of Dabob Bay, in eastern Jefferson County, Washington. The project area is within 72, 000 acres of forest lands owned by the Pope Resources Company and managed as the Hood Canal Tree Farm for long-term growth and yield of wood products. Graveled forestry service roads extend throughout the project area and surrounding lands.

2.1 Vegetation

The lands in and surrounding the project area are primarily dominated by coniferous forests consisting of Douglas fir (*Pseudotsuga menziesii*) and western hemlock (*Tsuga heterophylla*). Western red cedar (*Thuja plicata*) and red alder (*Alnus rubra*) are also present. Most of these forests were first logged in 1930, and wildfires also burned through the area in approximately 1939. Since that time, portions of the second growth forests, that naturally reseeded in the 1930's, have been periodically logged using clearcut silvicultural techniques, and those clearcut areas have been subsequently planted with coniferous seedlings. Currently, the project area and the surrounding lands primarily consist of second and third growth coniferous timber stands (20-70 yrs old) interspersed with clearcuts that have an abundance of shrub and herbaceous plants along with recently planted coniferous seedlings.

2.2 Wildlife

Past surveys of large mammals in or near the project area appear to be limited to deer hunter check stations, although other substantial information has been gathered through observations by FHM personel and local residents. Black-tailed deer (*Odocoileus hemionus*), black bear (*Ursus americanus*), and cougar (*Felis concolor*) are the only large mammal wildlife species known to currently inhabit the project area, and whose movements may be affected by the proposed conveyor. Black-tailed deer are a common resident species in the project area, as confirmed by hunter success rates, frequent observations by the FHM staff, and observations made as part of this assessment. These deer are present throughout the year with no known migration patterns through the area. Black bear also are present, but they are believed to

be uncommon. Cougar may occasionally pass through the project area, although they too are believed to be uncommon, primarily due to the residential development, roads, and other human presence on private lands surrounding the project area.

Historically Roosevelt elk (*Cervus elaphus Roosevelti*) most likely inhabited the project area, although none are known to exist there today. However, some small herds of Roosevelt elk are known to exist at least 4 miles north and west of the project area, and there is a possibility that those populations could expand into the project area in future decades.

Many other wildlife species also inhabit the project area, however; black tailed deer, black bear, cougar and Roosevelt elk are the only large mammals known to currently inhabit the area or potentially will inhabit the area in the foreseeable future.

3.0 PROPOSED PROJECT

The proposed conveyor would extend approximately 1.25 miles along a generally northeast/southwest alignment between the proposed Wahl Extraction Area and the Shine Pit. A gravel forestry service road would parallel a majority of this conveyor route, and that road would be closed to public access except for seasonal use by hunters. The proposed Wahl Extraction Area encompasses approximately 156 acres, and the 1.25 mile conveyor/maintenance road easement consists of approximately 9 acres.

The preliminary conveyor design consists of a 48 inch wide metal channel-frame structure with rollers that support the belt carrying the sand and gravel. The belt would be pulled along these rollers by electric motors, and the belt would return along the bottom portion of the structure. This structure would be approximately 5 feet high, and if the structure is covered, the total structure height would increase to approximately 7 feet.

The conveyor structure would be supported approximately 2 feet above the ground with metal leg supports spaced every 20 feet along the conveyor. The metal leg supports would be anchored into concrete footings. This design is similar to that currently used for a portable conveyor at the Shine Pit. Figure 1 includes a cross-sectional drawing of the proposed conveyor between the Wahl extraction area and the Shine gravel pit. Electrical lines or conduits that run the length of the conveyor would be either buried, or if they are attached to the structure, they would not drop below the level of the return belt. Therefore, the minimum clearance between the ground and the return belt, which is the lowest point of the conveyor structure, would be approximately 2 feet.

In many instances road crossings, stream crossings, and some topographic variation will require the conveyor to be substantially greater than 2 feet above ground. Where these types of clearances generally do not exist, underpasses also will be developed so that large wildlife species can more freely move under the conveyor. At a minimum, FHM would develop and maintain areas with at least a 4 foot clearance every 300 feet (± 100 feet) along the entire length of the conveyor (clearance refers to the distance between the ground and the lowest portion of the conveyor structure, not including the leg supports). And to provide even more assurance of easy passage, those clearances would be increased to at least 6 feet at least every 900 feet (± 100 feet) along the conveyor route. Therefore, large mammal passageways with 4-6 feet of clearance will be developed and maintained at least every 300 feet (± 100 feet) along the entire

conveyor. Map 1 shows the proposed locations of those large mammal passageways (identified as "wildlife crossings" in Map 1).

At each of these underpasses, the 4 or 6 foot clearance would be maintained for the entire width of the conveyor structure (i.e., 48 inches). This clearance also would be maintained for at least 6 feet of the 20 foot spacing between the conveyor leg supports. Also, if these clearances are made by excavating, then the slopes extending perpendicular to the conveyor will be no more than 3 Horizontal:1 Vertical (33%) to allow easy access by large mammals, and to reduce erosion potential. Excavated underpasses also will be designed and constructed to have natural drainage so that water will not pool in those underpasses. Each of the underpass excavations also will be planted with herbaceous plants (i.e., grasses) within the first year of construction to reduce erosion potential. All clearance specifications stated here will be annually maintained by FHM to ensure these passageways are available for wildlife use each year.

The conveyor generally will be run during daylight hours five days a week, although in some instances the conveyor may be run at night and on weekends. The noise produced along this conveyor would be approximately 50 dBA at approximately 50 feet, or similar to that of a refrigerator (or quieter than a normal conversation). The electric motors that drive the belts will be located at each of the transfer points located along the conveyor, and those motors will be enclosed within weather-tight structures which will make the motor noise almost imperceptible at a distance of approximately 200 feet.

4.0 EFFECTS ASSESSMENT

4.1 Obstructions

Some studies have been conducted to determine the effects of overland pipelines on wildlife movements, particularly the work conducted to determine the effects of the Trans-Alaska Pipeline on caribou (*Rangifer tarandus granti*), moose (*Alces alces*), and dall sheep (*Ovis dalli dalli*) movements (Child 1973, Child and Lent 1973, Hinman 1974, Van Ballenberghe 1978, Cameron et al. 1979, Cameron and Whitten 1982). Although those studies are of interest, the structures and the effects of those structures on large mammal movements are not directly comparable with the situation assessed for this report.

A more relevant assessment conducted by Greenwood and Dalton (1984) assessed the effects of a coal conveyor on migratory patterns of mule deer (*Odocoileus hemionus*) in Utah. That project was more of a "survey" of an existing situation with limited passage options rather than a designed research project that provided many replicated passage options all with similar availability to deer. Additionally, that assessment involved mule deer, which are much larger than the black-tailed deer of the FHM project area, and the migratory patterns of those particular mule deer are substantially different than the movement patterns of the resident black-tailed deer found in the FHM project area. The conclusions of Greenwood and Dalton's research are mixed and cannot be taken outright as guidance for assessing other overland conveyor projects; however, their research does make clear that mule deer will pass under conveyors using gaps of only 50 to 130 cm (19.7 to 51 inches).

The ingrained migratory behavior and seasonal requirements of the mule deer, in the Greenwood and Dalton assessment, created a strong desire for those deer to move beyond that particular coal conveyor obstacle. Their ability to pass that obstacle shows the importance of those particular seasonal movement patterns; population movement patterns that were probably developed over hundreds of years. There also

are many other examples of deer moving through very small gaps in obstacles (or jumping over them) when needed. For example, Falk et al. (1978) reported that white-tailed deer (*Odocoileus virginianus*) crawled under highway fence gaps of only 23 cm (9 inches).

In another study, Chervick (1991) evaluated the passage of mule deer and Rocky Mountain elk (*Cervus elaphus nelsoni*) under a single-wide coal conveyor in northwestern Colorado. The conveyor was 5.6 feet-wide, with a metal covering, and support legs 20 feet apart. The conveyor emitted consistent noise levels of 64 dBA at one meter, 59 dBA at six meters, and 55 dBA at 12 meters. Vegetation beneath the beltline was removed through weed spraying operations, which also helped to eliminate barriers to migrating wildlife (Chervick 1991). Chervick did not find much evidence of animal passage through any of the conveyor gaps until the second year after construction when native shrubs and grasses reestablished in the conveyor right-of-way.

Chervick found that adult female and immature deer and elk passed under that 5 foot-wide conveyor where it provided 2.5 to 3.0 foot ground clearance (Chervick 1991). Little evidence of mule deer drag marks were found on the ground where they passed through those clearances; although drag marks were common where female and immature elk passed through the gaps. No adult bull elk and buck deer passed through the 2.5 to 3.0 foot gaps during the entire study; rather, those adult males only used constructed underpasses with clearances ranging from 5 to 41 feet.

The single-wide conveyor of the Wahl project is similar in design to the single conveyors studied by Greenwood and Dalton (1984) and Chervick (1991), although the 2 foot clearance of the Wahl conveyor is less than the 2.5 foot minimum clearance noted in the Chervick study. The low minimum clearance of the Wahl conveyor is expected to obstruct the passage of adult male deer and all adult elk. Adult female deer could potentially pass through the 2 foot minimum clearance, although even that passage would be restrictive.

The low minimum clearance of the Wahl conveyor is a particular concern when deer or elk are fleeing from imminent or perceived danger, such as hunters, domestic dog packs, motor vehicles or other human activity. In those instances, the deer or elk could become temporarily blocked along the conveyor and may be forced to push through small openings.

To alleviate concerns regarding the 2 foot clearance for large mammal movements, FHM has integrated features into the conveyor design that would allow movement for large mammals, including Roosevelt elk if they reestablish in the project area. The 4 to 6 foot clearances developed and annually maintained every 300 feet (± 100 feet) along the conveyor route will help ensure that all large mammals can readily pass under the conveyor whether during normal movement patterns or if attempting to escape from perceived danger.

Additionally, FHM and Olympic Resource Management will close the forestry service road paralleling the conveyor, as well as other nearby forestry service roads, to public access (except during seasonal hunting seasons). This restricted activity will minimize the number of disturbances to large mammals, hence minimize the number of events that force those animals to flee into the conveyor obstruction. By minimizing the number and level of disturbances, large mammals will then have more opportunities for methodically moving to and through the constructed underpasses that have adequate size and passage options.

4.2 Noise

The consistent low level "whir" noise of the conveyor rollers and belt and their consistent movement patterns will create a predictable environmental condition for the large mammals inhabiting the project area. Although the effects of the conveyor movements and noises on large mammals were not researched for this assessment, they are not expected to be a significant long-term impact to the large mammals in the project area or to their passage under the conveyor because of those mammal's ability to habituate to such consistent environmental patterns.

5.0 CONCLUSION

The proposed sand and gravel conveyor that would extend for approximately 1.25 miles between the proposed Wahl Extraction Area and the existing Shine Pit is not expected to result in significant or substantial long-term impacts to the movements of black-tailed deer, black bear, cougar, or Roosevelt elk. This conclusion is based on the assumption that the conveyor underpass features, as described in this document, would be integrated into the final project development.

On August 27, 2002, Greg Schirato, Wildlife Biologist with the Washington Department of Fish and Wildlife (WDFW), visited the project site and reviewed the proposed conveyor design as described in this document (including the 4-6 foot underpass features). Greg stated that such a design will be acceptable with the Washington Department of Fish and Wildlife for allowing passage of large mammals.

6.0 LITERATURE CITED

Cameron, R.D., K.R. Whitten, W.T. Smith, and D.D. Roby. 1979. Caribou distribution and group composition associated with construction of the Trans-Alaska Pipeline. Canadian Field Naturalist 93:155-162.

Cameron, R. D. and K. R. Whitten. 1982. Effects of the Trans-Alaska Pipeline on caribou movements. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration Project W-21-1 and W-21-2, Job No. 3.18R. 25 p.

Chervick, T.M. 1991. Big game animal crossing study along an overland coal conveyor structure in northwest Colorado. *In* Proceedings V: Issues and Technology in the Management of Impacted Wildlife. Thorne Ecological Institute.

Child, K. N. 1973. The reactions of barren-ground caribou (*Rangifer tarandus granti*) to simulated pipeline and pipeline crossing structures at Prudhoe Bay, Alaska. Compliance Report. Alaska Cooperative Wildlife Resource Unit, University of Alaska, Fairbanks. 51 p.

Child, K. N. and P.C. Lent. 1973. The reactions of reindeer to a pipeline simulation at Penny River, Alaska. Interim Report. Alaska Cooperative Wildlife Resource Unit, University of Alaska, Fairbanks. 29 p.

Dalton, L.B. 1985. Big game passage of large diameter overland conveyance systems. *In* Proceedings of Issues and Technology in the Management of Impacted Wildlife. Thorne Ecological Institute.

Falk, N.W., H.B. Graves, and E.D. Bellis. 1978. Highway right-of-way fences as deer deterrents. Journal of Wildlife Management. 42:646-650.

Greenwood, C.L. and Dalton, L.B. 1984. Mule Deer passage beneath an overland coal conveyor. Great Basin Naturalist. 44(3):499-504.

Hinman, R. 1974. The impact of oil development on wildlife populations in northern Alaska. Pages 156-164 in Proc. 54th Annual Conference of the Western Association of State Game and Fish Commissioners. Albuquerque, New Mexico.

Van Ballenberghe, V. 1978. Final report on the effects of the Trans-Alaska Pipeline on moose movements. Joint State/Federal Fish and Wildlife Team, Special Report No 23, Anchorage. 41 p.