Memorandum

To: Laura Vaugeois, Karl Wegmann
From: Patrick Pringle
Subject: Raging River WAU
August 12, 2003

I have completed a review of the mass wasting assessment of the Raging River watershed. This assessment, comprising a report and map, was prepared by Jack Powell in August, 1999. Powell delineated 4 Mass Wasting MapUnits (MWMUs) having high to moderate hazard. Powell also noted 119 landslides based on his own reconnaissance of aerial photographs and some limited field work. The 119 landslides he identified were noted on the map as site locations, but were not delineated.

Methodology

I evaluated Powell's hazard map with stereoscopic examination of 2001 aerial photographs for the entire watershed. I then compared his mapped hazard areas with a map delineating certain potentially hazardous areas based on the landform model SLPSTAB. I reviewed existing geologic mapping for the area and discussed the geology both with Jack Powell, who authored the report, and with Tim Walsh, who has studied the geology of that area in detail. For my analysis of the Raging River WAU hazard assessment, I delineated map areas where a) landslides from the geologic map database had no corresponding MWMU, and b) areas where features such as the inner gorges and bedrock hollows depicted in the SLPSTAB model did not coincide with MWMUs.

Results

I identified only one small "shallow rapid" landslide (into a Class 4 stream; SW1/4 NW1/4 Sec. 23, T 23N, R 7E) that had occurred after Powell's mapping. I also identified a landform that has the geomorphic characteristics of a deep-seated landslide but is not mapped as such. This feature, visible on aerial photographs as a hummocky area with ponds downslope of an amphitheater-shaped scarp, is in the NE1/4 Sec 7 and NW1/4 Sec 8, T23N, R7E. The feature is mapped as glacial drift, and its hummocks could represent morainal topography, however I suggest it be noted as a possible landslide deposit.

It should be noted that landslide hazard mapping is particularly important in this area owing to the complicated geology. For example, in the Raging River basin and nearby, the bedrock is penetrated by sills and cut by ancient and active faults that have severly sheared the rock locally. This suggests there will be areas where rock quality is poor and the rock may be densely cut by discontinuities (fractures). Furthermore, the hydrologic aspects of the such rock units are also complex.

Assessment of Hazard Map

1. <u>Did the author adequately identify the majority of landslides in the basin?</u>

Yes, the author's assessment of the geology and mapping is very thorough.

2. a) <u>Do the mass wasting units delineated by the author reflect the reasonable assumptions based on a review of the geology and landslides in the basin.</u> Yes, very well.

However, a comparison of the mapped areas with those delineated in SLPSTAB as *inner gorges* and *bedrock hollows* suggests some of the delineated inner gorge areas could be extended slightly farther up slope. I transferred these areas to the MWMU base map. Examples are in T23N, R7E, sections 8, 9, 21, 22, 23, and others.

Also, some inner gorges and bedrock hollows were indicated by the SLPSTAB model where no mass wasting units were shown. Examples of these are in T24N R7E, sections 25, 26, and 36; in T23N R8E sections 19 and 30; T 23N R7E, sections 8, 12, 19, and 23.

Lastly, some of the cartographic delineations or "polygons" for the MWMUs appear to be offset to the northwest from where they should be. This could have been a registration error in the transfer of information to the GIS system.

2. b) Are the hazard ratings assigned to the Mass Wasting Map Units reinforced by the distribution of landslides as shown in the Landslide Inventory for the WAU?

Yes.

2. c) Are there landforms that seem to have a large number of landslides, but no associated Mass Wasting Map Unit?

No.

2. d) Does the text describing the Mass Wasting Map Units do an adequate job in presenting the landform / geology information that a forester using this map would need to identify the features on the ground?

The text does an excellent job of presenting this information.

3. Is the Mass Wasting Assessment adequate and should Forest Practices Division send it out for final external peer review?

As soon as the MWMU unit cartographic offets and suggested revisions of section 2 are reviewed and rectified, this is ready for external review.

References

Anderson, C. A., 1965, Surficial geology of the Fall City area, Washington: University of Washington Master of Science thesis, 70 p., 1 plate.

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Tabor, R. W.; Frizzell, V. A., Jr.; Booth, D. B.; Waitt, R. B.; Whetten, J. T.; Zartman, R. E., 1993, Geologic map of the Skykomish River 30- by 60-minute quadrangle, Washington: U.S. Geological Survey Miscellaneous Investigations Series Map I-1963, 1 sheet, scale 1:100,000, with 42 p. text.

Vine, J. D., 1969, Geology and coal resources of the Cumberland, Hobart, and Maple Valley quadrangles, King County, Washington: U.S. Geological Survey Professional Paper 624, 67 p., 4 plates.