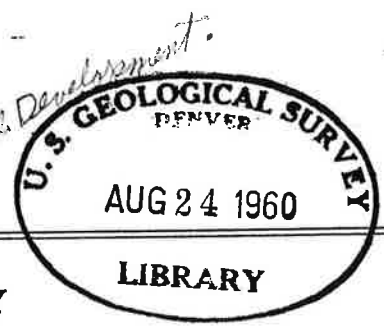


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(State) of Washington,  
ALBERT D. ROSELLINI, Governor

Department of Conservation *and Development*  
EARL COE, Director



DIVISION OF MINES AND GEOLOGY  
MARSHALL T. HUNTTING, Supervisor

Bulletin No. 37.

# INVENTORY OF WASHINGTON MINERALS

PART I

SECOND EDITION

## NONMETALLIC MINERALS

By  
GRANT M. VALENTINE

Revised by  
MARSHALL T. HUNTTING

Volume 1 - TEXT  
Volume 2 - MAPS



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- 8A. **Name:** Meadow Creek. **Loc:** SE $\frac{1}{4}$ SE $\frac{1}{4}$  sec. 35, (38-41E), near Meadow Creek. **Descr:** Andalusite crystals as much as 2 in. long comprise as much as 50 percent of the schist in an area 75 ft. wide and 300 ft. long, near a granite contact. **Value:** Warrants investigation. **Ref:** 135.
- 8B. **Name:** Mill Creek. **Loc:** Near center sec. 35, (37-40E), on a branch of Mill Creek. **Descr:** Andalusite crystals  $\frac{1}{8}$  in. to  $\frac{1}{4}$  in. long in schist at border of small granite stock. **Value:** Warrants investigation. **Ref:** 135.
- 8C. **Name:** Longshot. **Loc:** Secs. 7, 8, and 18, (36-41E), on ridge extending NE. from Longshot mine. **Descr:** Andalusite crystals  $\frac{1}{4}$  in. to 1 in. long make up as much as 50 percent of the schist in a band as much as several hundred ft. wide and  $1\frac{1}{2}$  mi. long. **Value:** Warrants investigation. **Ref:** 135.
- 8D. **Name:** Old Dominion. **Loc:** Sec. 4, (35-40E), on ridge above Old Dominion mine. **Descr:** Andalusite in schist near granite contact. **Value:** Warrants investigation. **Ref:** 135.

## PEND OREILLE COUNTY

9. **Name:** Lost Lake. **Loc:** NE. cor. sec. 15, (38-44E) and area W. of Lost Lake. **Descr:** Andalusite and sillimanite occur in hornfels and schist near borders of the Kaniksu granite. **Value:** Accessory

minerals; present in less than commercial quantity. **Ref:** 102, p. 57.

- 9A. **Name:** Huckleberry Mountain. **Loc:** SE $\frac{1}{4}$  sec. 30 (38-42E), near top of Huckleberry Mountain. **Descr:** Andalusite crystals as much as  $\frac{1}{2}$  in. long in schist. **Value:** Warrants investigation. **Ref:** 135.
- 9B. **Name:** Aladdin Mountain. **Loc:** On N. end of Aladdin Mountain extending from SE. cor. sec. 32 (37-41E) to SE $\frac{1}{4}$  sec. 33, (38-41E). **Descr:** Small andalusite crystals in schist. **Value:** Warrants investigation. **Ref:** 135.

## SPOKANE COUNTY

10. **Name:** Silver Hill. **Loc:** On Silver Hill in secs. 22 and 24, (24-43E); elevation 2,500 to 2,800 ft. **Descr:** Large andalusite crystals and sillimanite in graphitic mica schist and in dikes and veins of pegmatite, aplite, and quartz. **Value:** Quantity and quality below present commercial grade. **Ref:** 25, p. 295; 97, p. 181.

## SKAMANIA COUNTY

11. **Name:** Washougal River. **Loc:** At head of N. Fork Washougal River. **Descr:** Rock composed of 32 percent andalusite, 32 percent quartz, 27 percent muscovite, 2 percent dumortierite, 4 percent accessory minerals. **Value:** Unknown. **Ref:** 112, p. 106.

## ASBESTIFORM MATERIALS

Asbestos minerals of commerce are fibrous members of the serpentine and amphibole groups. Chrysotile ( $H_2Mg_3Si_2O_9$ ), a member of the serpentine group, is the important asbestos mineral of commerce. Fibrous varieties of tremolite ( $CaMg_3Si_4O_{12}$ ), actinolite [ $Ca(Mg,Fe)_3(SiO_3)_4$ ], crocidolite ( $NaFeSi_2O_6 \cdot FeSiO_3$ ), anthophyllite [ $(Mg,Fe)SiO_3$ ], and amosite, an iron-rich anthophyllite, are members of the amphibole group used commercially. Paligoroskite or "mountain leather," an unusual variety of sepiolite (actinolite?) which occurs in thin flexible sheets made of interlaced fibers, has not been used commercially but recently has received consideration as a possible asbestos substitute (reference 160).

The use of asbestos depends upon the length, fineness, flexibility, tensile strength, and spinnability of fiber, and on its resistance to heat and acid. Chrysotile ranks high in all characteristics except acid resistance. Tremolite is resistant to acids but lacks strength and flexibility of fiber. Fibers of crocidolite have high tensile strength but low heat resistance. Anthophyllite occurs in long coarse and usually brittle fibers of low

tensile strength but high heat and acid resistance. Fibers of amosite are flexible but usually have less tensile strength than chrysotile. Acids have little effect on amosite and it is more heat resistant than crocidolite. Asbestos is used in brake linings, clutch facings, fire resistant textiles, high temperature insulation, paper millboard, pipe covering, cement, yarn, packing, roofing gaskets, acid filters, and is ground for asbestos flour.

Commercial deposits of chrysotile asbestos are not known in Washington, but favorable rock types occur in several areas. Several amphibole asbestos deposits are of a size and purity to warrant investigation.

Prices of chrysotile asbestos in June 1956 ranged from \$28.00 per ton for refuse or shorts to \$1,725 per ton for no. 1 crude f. o. b. mines Quebec, Canada. Prices of amphibole asbestos in 1946 ranged from \$18.50 to \$35.00 per ton for shorts and \$75.00 to \$83.00 per ton for shiny stock fiber f. o. b. mines Vermont.

If known, the variety of asbestos is specified in the following descriptions of occurrences.

## OCCURRENCES

## WHATCOM COUNTY

1. **Name:** Skyline Ridge. **Loc:** Asbestos is reported on Skyline Ridge between Mount Shuksan and Twin Lakes. Details unknown. **Ref:** 135.

On page 9 in volume 2 is plate 2, the map showing the occurrences of asbestiform materials, numbered to correspond with the numbers of the occurrences listed below.

2. **Name:** Twin Sisters. **Loc:** NE $\frac{1}{4}$ SW $\frac{1}{4}$  sec. 36, (37-6E). **Descr:** Veinlets of cross-fiber serpentine asbestos less than  $\frac{1}{4}$  in. thick. **Value:** Commercial quantity not obvious. **Ref:** 135.

## SKAGIT COUNTY

3. **Name:** Oyster Creek. **Loc:** Irregular zone extends from near mouth of Oyster Creek to vicinity of Samish Lake. **Descr:** Schists lying just S. of boundary of Chuckanut formation are reported to contain amphibole asbestos. **Value:** Not known. **Ref:** 48, p. 15; 143.
4. **Name:** Burlington. **Loc:** Hill just N. of Burlington in N $\frac{1}{2}$  sec. 32, (35-4E). **Descr:** Somewhat fibrous soapstone-actinolite mixture developed in shear zones cutting greenstone. **Value:** Asbestos-Talc Products Co. mined this material. It was ground, mixed with imported asbestos, and used in special cements. **Ref:** 10, p. 267; 11, p. 207; 149, p. 7.
5. **Name:** Scott. **Loc:** W $\frac{1}{2}$ E $\frac{1}{2}$  sec. 27, (36-5E). **Descr:** Amphibole asbestos having fine white silky fibers up to 3 in. long, which are particularly flexible and strong for this kind of asbestos. **Value:** Possibly commercial; occurrence small. **Ref:** 48, p. 15.
6. **Name:** Lyman. **Loc:** Near Hamilton, across Skagit River from Lyman. **Descr:** Said to be long fibered and of good quality. **Value:** A small amount has been shipped. **Ref:** 37, p. 362; 39, p. 135; 40, p. 383; 48, p. 15; 119, p. 117.

## SNOHOMISH COUNTY

7. **Name:** Clear Creek. **Loc:** Near headwaters of Clear Creek in sec. 3, (30-9E). **Descr:** Serpentine dike, 30 to 150 ft. wide, exposed to depth of 75 ft., contains talcose asbestos. **Value:** Further investigations warranted. **Ref:** 12, p. 52; 65, p. 18, 21.
8. **Name:** Bedal Creek. **Loc:** On Bedal Creek in sec. 35, (30-11E). **Descr:** Slip-fiber asbestos of low grade reportedly occurs as stringers and lenses, 1 in. or less in thickness, cutting quartz diorite, gneiss, and schist. **Value:** Not known. **Ref:** 96, p. 11.
9. **Name:** Florence Rae prospect. **Loc:** On Florence Rae property in sec. 27, (29-10E). **Descr:** Veins of cross-fiber asbestos,  $\frac{1}{4}$  in. or less thick, cutting through a body of peridotite. **Value:** Observed quantity below commercial grade. **Ref:** 135.
10. **Name:** Mackinaw prospect. **Loc:** At Mackinaw prospect in sec. 19, (29-11E). **Descr:** Small amount of slip-fiber asbestos in serpentine of nickel prospect. **Value:** Quantity small. **Ref:** 135.

## CHELAN COUNTY

11. **Name:** Stehekin River. **Loc:** In bed of a tributary to the Stehekin River, 5 mi. upstream from Lake Chelan. **Descr:** Reportedly a "ledge" of blue-white, long-fiber asbestos 5 to 25 ft. wide. **Value:** Unknown. **Ref:** 135.
12. **Name:** Williams Creek. **Loc:** On Williams (Raging) Creek, 9 mi. by trail from Chiwawa River road, a showing of asbestos is reported high on the

mountain. Another report states that asbestos is exposed in two tunnels, one at an altitude of 3,400 ft. and the other at 4,200 ft. **Descr:** Said to occur along hanging walls of veins of siliceous asbestiform material. Probably amphibole asbestos. **Value:** Unknown. **Ref:** 48, p. 14; 66, p. 50.

13. **Name:** Goose Creek. **Loc:** NW $\frac{1}{4}$  sec. 18, (27-17E), at Goose Creek camp ground. **Descr:** Anthophyllite in felty masses and veins in a ledge 50 ft. square on N. bank of Goose Creek. **Value:** Unknown. **Ref:** 135.
- 13A. **Name:** Deep Creek. **Loc:** Sec. 19, (27-18E), between Deep Creek and Goose Creek. **Descr:** Chrysotile asbestos reported. **Value:** Unknown. **Ref:** 135.
- 13B. **Name:** Nason Ridge. **Loc:** In road cut in S $\frac{1}{2}$ N $\frac{1}{2}$  sec. 32, (27-17E), on SE. slope of Nason Ridge. **Descr:** Anthophyllite in boulders as large as 10 ft. by 20 ft., not in place but probably have not traveled far. **Value:** Unknown. **Ref:** 135.
- 13C. **Name:** Trout Creek. **Loc:** Near center sec. 6, (24-16E), at intersection of Trout Creek and Jack Creek trails. **Descr:** Chrysotile reported. **Value:** Unknown. **Ref:** 135.
- 13D. **Name:** Trout Lake. **Loc:** Sec. 19, (24-16E), near Trout Lake. **Descr:** Anthophyllite in serpentine. Chrysotile reported nearby. **Value:** Unknown. **Ref:** 135.
- 13E. **Name:** Mill Creek. **Loc:** SE $\frac{1}{4}$  sec. 30, (24-18E). **Descr:** Anthophyllite in serpentine. **Value:** Unknown. **Ref:** 135.
14. **Name:** Chumstick Mountain. **Loc:** On Chumstick Mountain in sec. 27, (15-19E). **Descr:** Anthophyllite occurs as a vein less than 1 ft. wide in biotite gneiss. **Value:** Exposed by shallow pit. Insufficient quantity for commercial development. **Ref:** 66, p. 49; 96, p. 11.
15. **Name:** Swakané Canyon (may be same as Chumstick Mountain occurrence). **Loc:** In Swakane Canyon on property of Rafter and Bousquet Logging Co. **Descr:** Short-fiber anthophyllite. **Value:** Quantity and quality not known. **Ref:** 66, p. 50.
16. **Name:** Burch Mountain. **Loc:** Reported on W. slope Burch Mountain. **Descr:** Said to be in three "ledges" from 1 to 11 in. wide and of good fiber. **Value:** Unknown. **Ref:** 66, p. 50.
17. **Name:** Icicle Creek. **Loc:** Said to occur on Icicle Creek near Leavenworth. **Descr:** Unknown. **Value:** No production reported, but some development work done. **Ref:** 48, p. 14; 66, p. 50.
18. **Name:** Ingalls Creek. **Loc:** Reported on high ridge N. of Ingalls Creek a few miles from its mouth. **Descr:** Said to be of long fiber. **Value:** Unknown. **Ref:** 66, p. 50.

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