1. Lenway Mining and Development Corporation
1061 Grant Place
Boulder, Colorado

2. November 12, 1965

3. Initial

4. 10 CFR 20, 40

5. License No. SUA-774, Docket No. 40-7199

6. The following items of noncompliance were observed or otherwise noted:

10 CFR 20.201, "Surveys"

(b) in that, as of November 12, 1965, surveys were not adequate to show compliance with 10 CFR 20.202(a)(1). (See par. 25, page 7)

10 CFR 20.203, "Caution signs, labels, and signals"

(f)(4) in that, on November 12, 1965, 170 barrels, in each of which was stored from 12 to 24 pounds of natural uranium, were not labeled in the manner specified. (See par. 27, page 7)

7. None

8. No

GHS — G. H. Smith — 12/23/65
Initials — Inspector — Date

(original signed by Roger T. Huntley)
NOV 23 1965

Initials — Reviewer — Date

INITIAL INSPECTION

9. An unannounced, initial inspection of the subject licensed facility was conducted on November 12, 1965. Mr. P. W. Jacoe, Chief, Radiological Health Section, Colorado Department of Public Health, was notified of the pending inspection on November 3, 1965; however, the writer was not accompanied by a representative of the State Health Department during the inspection. Messrs. Earl G. Sweeney and Gordon Sweeney were contacted during the course of the subject inspection; unless otherwise noted, all references to Mr. Sweeney this report are to Mr. Earl G. Sweeney.

10. Mr. Sweeney stated that he sold the Marion Mill (formerly operated under the auspices of Source Material License No. SUA-724) to the Lenway Mining and Development Corporation, 1061 Grant Place, Boulder, Colorado, on July 23, 1964. Mr. Sweeney stated that 1061 Grant Place, Boulder, Colorado, is his home address and that he is Vice President and General Manager of the Lenway Mining and Development Corporation (the other officers of the subject corporation are listed in the licensee's June 23, 1964, application). Mr. Sweeney stated that the Lenway Mining and Development Corporation is a wholly-owned subsidiary of the Fred H. Lenway & Company, Inc., 100 California Street, San Francisco, California. Mr. Sweeney stated that he is Assistant Secretary-Treasurer of the Fred H. Lenway & Company, Inc. Mr. Sweeney stated that he is in charge of all Colorado operations of the subject corporation. Mr. Sweeney said that for approximately three months in early 1965, the Marion Mill was used to process molybdenum ore but that this activity was in no way connected with their processing of licensed material; the company is now processing the molybdenum ore at Idaho Springs, Colorado.

FACILITY

11. It was observed that the licensee's facility is as described in their applications dated November 8, 1962, and September 30, 1963, with the exception that the two sides of the mill property which face Sugar Loaf Mountain Road have been enclosed by a 6-foot, chain-link, fence. The only entrance into the property is controlled by a gate; Mr. Sweeney stated that this gate is locked when the facility is not occupied. It was observed that the two unfenced sides of the property are bounded by a steep mountain and that there is a sheer drop of approximately 20 feet from the mountain onto the property; it appears that

Mr. Sweeney's property was cut from the mountain, thus causing the sheer drop. Mr. Sweeney stated that the property was fenced in order to secure licensed material from unauthorized removal as prescribed by 10 CFR 20.207.

Process

12. Mr. Sweeney stated that the raw material is received from the Climax Molybdenum Company in barrels. The barrels are dumped into a hopper; from the hopper the material is sized and then fed into one of two electro-magnetic separators. The electro-magnetic separators remove the "blacks" which contain uranium, columbium oxide, and titanium. The non-magnetic materials are then fed to one of two, high-tension, electric separators where pyrite, topaz, tungsten, and tin are removed. Of the original 20 tons of material received per month, 4-1/2 tons per month are blacks; 10 tons per month are tin; and 1/2 ton per month is tungsten. The remaining 5 tons per month are stockpiled and are treated in a wet process once per year. The wet process consists of slurrying the material and running it across five Wilfley tables. The product from the wet process is dried and reprocessed through the aforementioned dry process. From the 60 tons of material that are run through the wet process per year, approximately 900 pounds of blacks are recovered. Mr. Sweeney stated that he has determined that at least 99% of the contained uranium in the material which is received from the Climax Molybdenum Company is removed during the process. The blacks are fed directly into barrels and these barrels are stored on a concrete pad which is immediately adjacent to the mill. This pad is secured against unauthorized entry in the manner described in paragraph 11.

Inventory

13. Mr. Sweeney stated that he does not analyze the material as it is received from Climax Molybdenum Company for uranium content; however, Mr. Sweeney does analyze the barrels of blacks for uranium content. A review of Mr Sweeney's records showed that since August 1, 1964, he has produced 170 barrels of blacks; each barrel contains approximately 800 pounds of blacks; and, the quantity of U_3O_8 in each barrel varies from 2 to 3.9% by weight. The average quantity of U_3O_8 per barrel is approximately 3% by weight. In addition to the aforementioned 170 barrels of blacks there are 534 barrels of blacks which contain from 2 to 20% by weight U_3O_8, stored at the facility. These latter barrels

of blacks belong to Mr. Sweeney and are possessed under the auspices of Source Material License No. SUA-724. It should be noted that each of the aforementioned 170 barrels of blacks contains from 12 to 24 pounds of natural uranium. Mr. Sweeney stated that there have been no transfers of source material from his facility; however, Mr. Sweeney stated that the subject corporation is exploring possible sale and/or reprocessing of the material.

AIRBORNE RADIOACTIVE MATERIALS

Summary

14. The licensee's records of surveys for airborne radioactive material indicate that employees are not exposed to concentrations of airborne natural uranium in excess of the limits specified in 10 CFR 20. The licensee does not employ dust-collecting equipment and there has been no releases of airborne radioactive materials to the unrestricted area.

Employee Work Schedule

15. Mr. Sweeney said that he employs one full-time employee (his son, Gordon Sweeney) and two part-time employees. Mr. Sweeney stated that the full-time employee works eight hours per day, six days per week and that the two part-time employees work four hours per day, six days per week.

Maximum Permissible Concentration (MPC)

16. Mr. Sweeney stated that during the process of removing the blacks from the ore, the daughter products are not separated from the uranium. Therefore, the MPC, as listed in Note 4 to 10 CFR 20, Appendix B, would be applicable. Because the employees work a maximum of 48 hours in any seven consecutive days, the adjusted maximum permissible concentration would be 2.08×10^{-11} uc/ml, U natural, or 8.3×10^{-11} uc/ml, gross alpha activity.

Surveys

17. Mr. Sweeney stated that in January, 1964, surveys for airborne radioactive materials were conducted by Mr. Wayne Hanson, Radiological Safety Officer, University of Colorado, Boulder, Colorado. According to Mr. Sweeney, the process has remained unchanged since these samples were collected except that at the time of sample collection, the blacks contained 4% by weight U_3O_8, and that since the samples were collected, the blacks have contained less than 4% by weight U_3O_8. Mr. Sweeney stated that the samples were collected at the

discharge end of the magnetic separator, near the feed end of the magnetic separator, and in the plant office. Mr. Sweeney stated that the first two samples represent the maximum concentration of airborne radioactive materials which would be present in the facility. Mr. Sweeney stated that the samples were analyzed by Mr. Hanson at the University of Colorado by the gross alpha counting method and that the concentrations of radioactive material reported is the gross alpha activity. This was confirmed by Mr. Hanson on November 15, 1965.

Records

18. The results of the aforementioned survey for airborne radioactive materials were submitted to the Division of Materials Licensing as an attachment to a letter dated February 8, 1964, from the licensee. The maximum quantity of radioactive material noted in one of the samples was 4.95×10^{-11} uc/ml, gross alpha (the applicable MPC is 8.3×10^{-11} uc/ml, gross alpha).

Unrestricted Area

19. It was observed that there was no dust-collecting equipment in the facility and there were no visible exhausts from the facility. Mr. Sweeney stated that he does not release airborne radioactive materials to the unrestricted area.

Independent Measurements

20. On February 3, 1964, four air samples were collected in the subject facility by Mr. L. C. Rouse, Radiation Specialist, Region IV. These samples were analyzed for natural uranium content by the Analysis Branch, Health and Safety Division, ID. All samples were reported to contain less than 0.09×10^{-11} uc/ml, natural uranium. On February 7, 1963, a sample of blacks was collected and this was analyzed for natural uranium, radium-226, and thorium-230 content by the Analysis Branch, H&S, ID; the analyses results follow:

Natural Uranium	5×10^{-3} uc/gram
Radium-226	5.4×10^{-3} uc/gram
Thorium-230	5.2×10^{-3} uc/gram

5×10^{-3} uc/gm $\times$ 3 gm/uc = 15×10^{-3} gm/gram = ~1.5%

The aforementioned analyses results indicate that the blacks contain natural uranium in equilibrium with its daughter products.

LIQUID WASTE

21. Mr. Sweeney said that because of an extreme lack of water in the mill area, all liquids

generated during the wet process are retained in a tailings pond. Mr. Sweeney stated that because the mill process removes approximately 99% of the contained uranium and because the daughter products remain with the natural uranium during the mill process, he is sure that the tailings liquid contains essentially no radioactive materials. A tour of the tailings pond showed that the bank appeared to be structurally sound and there was no visible evidence of a release of tailings.

EXTERNAL RADIATION

22. Mr. Sweeney produced an external radiation survey which was conducted in 1963. The results of this survey were combined with a time study of the mill personnel in such a manner that an employee's time-weighted exposure to external radiation was determined. The results of the aforementioned time-weighted exposure calculation were transmitted to the Division of Materials Licensing as an attachment to the licensee's letter of September 30, 1963. A review of the survey record showed that the maximum reported external radiation level was 10 mr/hr in the barrel storage area. The time-weighted exposure calculation revealed that an employee could receive from between 390 mr per quarter to 590 mr per quarter, dependent upon whether the dry process was being used exclusively or whether the wet and dry processes were being run simultaneously.

23. It was observed that Mr. Sweeney possessed the following portable external radiation survey instruments:

a) An Atomic Research Corporation "Bismatron"; range - 0 to 200,000 cpm. (Mr. Sweeney stated that he possesses a calibration curve whereby he can convert cpm to mr/hr.)

b) A Detectron Company, Model DG-2, Geiger Counter; range - 0 to 20 mr/hr.

Mr. Sweeney said that he uses a small radium source to calibrate the instruments.

Independent Measurements

24. The writer used a Frieseke Hoepfner, Model FH-40T gamma, which was calibrated by the Dow Chemical Company, Rocky Flats Division, on October 15, 1965, to obtain the following external radiation readings:

Location	mr/hr beta + gamma
Walking between stored barrels of blacks.	2 to 7
At contact with a barrel of blacks containing 20% by weight U_3O_8	25 to 50
At contact with fence surrounding facility (max. reading)	~ 0.5

PERSONNEL MONITORING

25. Mr. Sweeney stated that he does not provide personnel monitoring devices to his employees. Mr. Sweeney was informed that Section 20.202(a)(1) requires that employees who are likely to receive greater than 25% of the limit specified in 10 CFR 20.101(a) (312 mr/qtr.) are to wear personnel monitoring devices. It should be noted that Mr. Sweeney's time-weighted exposure calculations (see par. 22) indicated that employees would be exposed to from 390 mr to 590 mr per quarter. Mr. Sweeney stated that because he had rearranged the barrels of blacks in the storage area and because the contained uranium in the unprocessed material was less than it had been at the time of the survey, he considered that the survey was inadequate. Mr. Sweeney was informed that failure to conduct surveys adequate to show compliance with 10 CFR 20.202(a)(1) constituted violation of 10 CFR 20.201(b). Mr. Sweeney stated that he would conduct another survey of his facility and that if it was again determined that employees would be exposed to greater than 312 mr/qtr., he would initiate a film badge program. Mr. Sweeney stated that he considered that the survey was inadequate for the entire period that the facility had been operated under the auspices of Source Material License No. SUA-774 (July 23, 1964, to the present).

POSTING AND LABELING

26. It was observed that the entrance to the mill compound was conspicuously posted in accordance with the requirements of 10 CFR 20.203(e)(2). These signs were also posted in numerous places around the barrel storage area. The barrel storage area was also posted in accordance with the requirements of 10 CFR 20.203(b).

27. It was observed that the barrels in which the blacks were stored were stenciled with the radiation caution symbol and the wording, "Caution - Radioactive Materials". However, it was observed that the barrels were not labeled with the quantity and kind of radioactive materials which were stored therein; Mr. Sweeney was informed that this was a violation of 10 CFR 20.203(f)(4). It should be noted that the barrels are used exclusively for storage and each barrel contains more than 3.3 pounds of natural uranium (paragraph 13). Mr. Sweeney stated that he would label the barrels in accordance with the provisions of 10 CFR 20.203(f)(4).

PERSONNEL INSTRUCTIONS

28. Mr. Sweeney stated that the mill employees had been instructed in the proper techniques

for handling radioactive materials. It was observed that a "Notice to Employees", which outlined procedures for handling uranium, was posted on a bulletin board in the plant office. Form AEC-3 was posted in the plant office. It was observed that Mr. Sweeney possessed copies of 10 CFR 20 and 40, and the subject license and he stated that these were available to any mill employee upon request.

DISCUSSION WITH MANAGEMENT

29. The discrepancies noted during the course of the inspection were discussed with Mr. Sweeney at the conclusion of the inspection. His proposed actions to correct the deficiencies are contained in paragraphs 25 and 27 of this report.