



UNITED STATES
NUCLEAR REGULATORY COMMISSION
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WM-22

Mr. Albert J. Hazle, Director
Radiation and Hazardous Wastes
Control Division
4210 East 11th Avenue
Denver, Colorado 80220

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Dear Mr. Hazle:

The purpose of this letter is to summarize and make recommendations based on the results of soil, vegetation, surface water, and well water samples collected in June and October of 1979 by the Los Alamos Scientific Laboratory (LASL) in the Lincoln Park area of Canon City. Sampling data and sampling locations within the Lincoln Park area are provided in the attached June, August, and December 1979 LASL reports.

Sampling and analysis were performed for metals of uranium, molybdenum and selenium, the sulphate and chloride anions, and pH. Our following recommendations with regard to potability, livestock watering, and irrigation for the indicated locations within Lincoln Park have been based on a comparison of contaminant concentrations with standards and recommended levels, including the Environmental Protection Agency (EPA) "Minimum Acute Toxicity Effluents" (MATE) limits and "Ambient Level Goals" (ALG's). These values are defined in the August 23, 1979 report which also list the values in Tables 2 and 3. Though not directly applicable, these values are the best available and will be used to put the data in perspective.

The area of concern is shown in the map on page 3 of the June 26, 1979 LASL report and is located within approximately 1 1/2 miles (north to northeast) of the Cotter Corporation's Mill Site.

The following discussion will focus on those results which are of most concern and provide recommendations based on these results.

I. RESULTS OF GROUNDWATER ANALYSIS

Surface and groundwaters in the Lincoln Park area were sampled in June and October of 1979 at the locations listed in Table 1 of both the August 23 and December 18 reports. Samples which are considered representative of background were obtained both upstream and downstream in the Arkansas River. Results of this sampling indicate that the zone of contamination extends from the Cotter Mill to and including the southwestern edge of Lincoln Park.

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A. Uranium (U)

Comparing the data from the June sampling to that from the October sampling it can be seen that all locations within Lincoln Park which were sampled both in June and October, showed a marked decrease in uranium concentration. For example, the highest values measured in Lincoln Park, at the Bosco Field, dropped from 2160 parts per billion (ppb) to 720 parts per billion (ppb). However, of the 9 locations in Lincoln Park sampled in October, all locations exceeded the background levels of 3 to 4 ppb measured in the Arkansas River in June and the ALG of 3 ppb based on health effects. Only four residential locations: Bosco Field, Peterson, Ransom House, and Bosco House exceed the ALG based on ecological effects, and of those four only Bosco Field exceeds the MATE, based on ecological effects.

Based on the above, the uranium content of Lincoln Park groundwaters is elevated with respect to Arkansas River water and has been shown at specific locations to exceed values below which ecological and health effects are not expected.

B. Molybdenum (Mo)

As was the case for uranium, molybdenum concentrations in October samples show a marked decrease from June samples. Molybdenum values in Lincoln Park groundwaters, which ranged from 0.08 to 24 ppm in June, ranged from 0.02 to 5.2 ppm in October. However, of the 9 locations in Lincoln Park sampled in October, six exceed the background levels of 0.08 ppm measured in the Arkansas River in June, and the ALG of 0.07 ppm based on health effects. All nine exceeded the 0.01 ppm irrigation standard, and the the ALG of 0.01 ppm for irrigation based on ecological effects.

As was the case for uranium, based on the above, the molybdenum content of Lincoln Park groundwaters is elevated with respect to Arkansas River water and has been shown to exceed at specific locations, values below which ecological and health effects are not expected.

As was also true for uranium, the highest values of molybdenum were seen at Bosco Field, Peterson, Ransom House and Bosco House, with lower values at Ransom Field and Calhoun, and even lower values at Merlino, Silengo and Salardino.

II. RESULTS OF SOIL SAMPLING IN LINCOLN PARK

Uranium and Molybdenum

Four soil samples were collected (see Table 2 of the December 18th Report from LASL) in order to determine the natural background concentrations of uranium and molybdenum in the Lincoln Park area. Analysis of these samples indicate that native soils in this area contain concentrations of uranium between 3 and 6 parts per million and concentrations of molybdenum between 2 and 5 ppm. Of the nine locations sampled in the Lincoln Park area in October, those sampling stations which exhibited concentrations significantly greater than these background values included the Bosco Field, Ransom Garden, and Sand Creek Drainage between the Bosco and McKellar fields behind a stock pond dam. The location of these soils appear to be in the vicinity of the groundwater stations which show elevated levels of both uranium and molybdenum. In addition the McKellar Pasture, which was not sampled in October, showed a uranium concentration in June significantly greater than the background values measured in October. Soils at Bosco Field and Ransom Garden which have been irrigated with groundwater show the highest levels of U and Mo measured in Lincoln Park.

None of the soil samples exceeded the MATE values for either health or ecological effects. One sample in Sand Creek Drainage between the Bosco and McKellar Fields exceeded the ALG for uranium based on ecological effects and two samples in the Bosco field exceed the ALG for molybdenum based on health effects.

III. RESULTS OF VEGETATION SAMPLING

Uranium and Molybdenum

With the possible exception of the Peterson Lawn, all of the stations showing significantly high (two times background) elevations of uranium and molybdenum in vegetation, Sand Creek Drainage between stations 37 and 38, the Ransom Garden and Bosco Field near the well, were in close proximity to locations previously identified as having groundwater and soils contaminated with molybdenum and

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uranium. The Peterson Lawn shows high concentrations of uranium and molybdenum in grass; however, no extensive contamination was found in the soil. At the Bosco Field location, there is evidence that the three grass types and Kochia were elevated in uranium and molybdenum as well as the underlying soils. Vegetation samples, which were greater than two times the highest background and also within or exceeding the toxic levels of 5-20 ppm of molybdenum (see Table 4 of August report) for grazing animals, were found at Peterson Lawn, Ransom Garden, Bosco Field and Sand Creek Drainage between stations 37 and 38.

In addition, Cu:Mo ratios less than two in forage can cause molybdenosis symptoms in grazing animals. At a number of Lincoln Park locations Cu:Mo ratios were less than two. All these locations have forage which has Mo concentrations elevated to such an extent that molybdenosis might occur if sufficient quantities of this vegetation were consumed by grazing animals.

Again there may be some correlation between high levels in these vegetation (grass) samples and elevated levels (of uranium and molybdenum) in well water used for irrigation. As concluded by LASL, "it appears that those sites irrigated with contaminated water generally have elevated U and Mo soil concentrations and also elevated levels of these contaminants in the vegetation. In cases such as the Peterson Lawn, high concentrations in the vegetation would not have been expected from the low soil concentrations. Thus, the hazard posed by using contaminated irrigation water can not be assessed by looking only for accumulation in soils."

IV. RECOMMENDATIONS AND CONCLUSIONS

A. Use of Well Water Sampled in Lincoln Park Area

Based on the measured contaminant levels in well water samples and due to the ready availability of water from other sources we feel, it is prudent not to use wells in the affected area of Lincoln Park for potable water, irrigation, or livestock water. We further recommend continued monitoring of these wells until U and Mo levels return to approximately background levels or fall below the standards and recommended levels in the LASL reports.

B. Vegetation Consumption and Grazing

We recommend that vegetation for human consumption should not be grown and that cattle should not be grazed in those areas of Lincoln Park where there are levels of contaminants in soils or vegetation significantly above background, as defined in the LASL reports, or where well water is used for irrigation. We further recommend that the above restrictions continue until soil and vegetation sampling show that U and Mo levels have returned to approximately background or have fallen below the standards and recommended levels in the LASL reports.

If you have any questions please contact Dr. Roy Person of my staff.

Sincerely,

Ross A. Scarano, Chief
Uranium Recovery Licensing Branch
Division of Waste Management

Attachments:
June, August, and December 1979 LASL reports.