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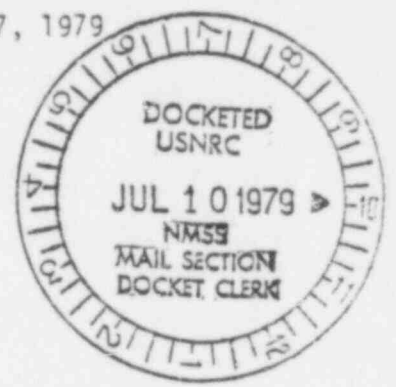
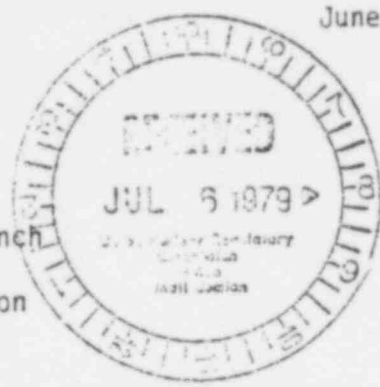
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IN REPLY  
REFER TO:  
MAIL STOP:

H-8-79-221  
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June 27, 1979

Dr. Ray Cooperstein  
New Facilities Section  
Uranium Recovery Licensing Branch  
Division of Waste Management  
US Nuclear Regulatory Commission  
Washington, D.C. 20555



SUBJECT: REPORT OF ANALYSIS-SAMPLES FROM CANON CITY, CO.

Dear Dr. Cooperstein:

Sampling site numbers are keyed to a trip report from Mr. David Dressen to Mr. Ross Scarano (H12-79-263) dated 26 June 1979 (attached). Two 500 ml water samples were collected in acid washed polyethylene containers at each water site. After a field pH was taken, one sample was acidified to less than pH1 with 5 ml conc. HNO<sub>3</sub>. The acidified sample is used for trace metal analysis (U, Mo, Se), and the neutral sample for anion analysis (Cl, SO<sub>4</sub><sup>-</sup>).

Soil samples were collected using a shovel and trowel from two depths (15cm and 45cm). The extremely rocky nature of the shallow soils prevented deeper collection for the second sample in each set; however, the 45cm sample is below the first soil horizon in each case. Soils were dried overnight at 60°C, and ground in a teflon lined Shatterbox grinder to -100 mesh before analysis.

Vegetation samples were cut or picked in the field to represent above ground foilage and fruits only. These were placed in plastic bags and sealed in the field. In the laboratory, these samples were oven dried overnight at 60°C and ground in a teflon lined Shatterbox grinder.

Uranium analyses were done on both soils and waters using the Delayed Neutron Assay technique (1,2). The soils are standardized against National Bureau of Standards (NBS) Standard Reference Material (SRM) 1633, and the waters against NBS SRM 950a. Quality assurance analyses of Canadian Centre of Mining and Energy Technology (CANMET). Radiometric Reference Material DH-1 (41 ppm U) and NBS 950a showed excellent agreement with the certified values (see Table I and II).

Water content was determined by the standard method of overnight drying at 110°C and measurement by difference in sample weight (3).

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**FEE EXEMPT**

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TO: Dr. Cooperstein

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DATE: June 27, 1979

Anion analyses are done directly on the water samples by Ion chromatography (4). The soil and vegetation anions are first extracted into a carbonate - bicarbonate buffer solution and then determined by ion chromatography (4). These data are reported as ppm in the original soil or vegetation sample. Quality assurance analyses of EPA Quality Control Water Samples for Mineral Analysis are shown for  $\text{SO}_4^{2-}$  (certified value = 12 ppm) and  $\text{Cl}^-$  (certified values = 28.1 ppm) in Table I.

Molybdenum analyses were done directly on the water samples and on acid dissolved aliquots of the soils and vegetations by flameless atomic absorption spectrophotometry (5). Quality assurance analyses of United States Geological Survey Geochemical Exploration Reference Sample GXR-5 are shown in Table II.

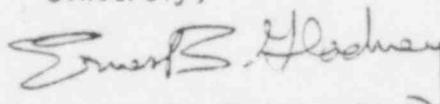
These data are in good agreement with the published concentrations (6). There is not available QA material for Mo determinations in water.

Selenium analyses are not yet complete and will be reported shortly. They are being done by both atomic absorption and neutron activation.

All water analyses are collected in Table I, the soils in Table II, and vegetations in Table III. If I may answer any questions regarding these data, my telephone number is (505) 667-7134 or FTS 843-7134.

As you stated in our recent telephone conversation, one of the prime objectives of this study was to investigate the source of the U in the ground water. The hydrogeochemistry of the Lincoln Park area is complicated by the presence of numerous coal mines, which may release U, Mo, and Se to the ground water. In my professional opinion, the elements measured to date do not permit an unambiguous assessment of the impact of the Cotter Mill tailings pile on the ground waters of Lincoln Park. Measurements of Pb isotope mixing ratios similar to the study by Curtis and Gancarz (LAUR-78-2147) would permit a much more reliable assessment of the tailings pile impact, and I strongly urge its consideration.

Sincerely,



Ernest S. Gladney, Ph.D.  
Section Leader, Analytical  
Chemistry  
Group H-8, MS 490  
Environmental Surveillance

ESG:vh

xc: Mr. Ross Scarano, NRC, w/enc.  
Mr. Kenneth Weaver, Colorado Dept. Health, w/enc.  
Mr. Niles Fixman, Cotter Corp., w/enc.

Enc.: H12-79-263  
Literature Cited  
Tables I-III

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