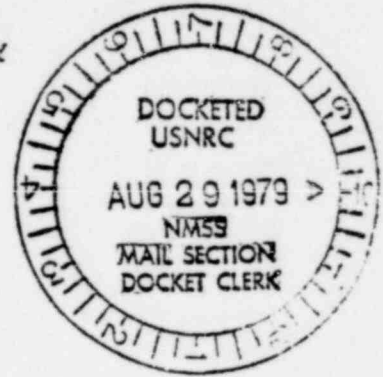


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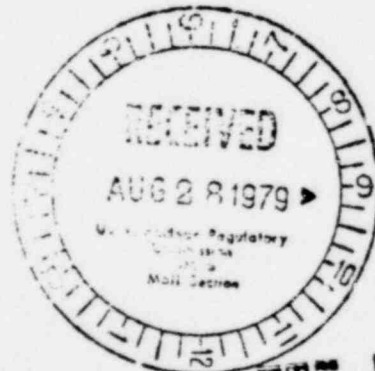
FINAL EXECUTIVE LICENSING REVIEW SUMMARY



For Evaluation of the
 Application and Environmental Report
 For a Radioactive Materials License
 Submitted by the Cotter Corporation
 For a Uranium Mill at Canon City,
 Colorado

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August 17, 1979



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FINAL EXECUTIVE LICENSING REVIEW SUMMARY

1.0 Introduction

This final executive summary provides information about the review of an environmental report (ER) and radioactive materials license application for uranium milling at Canon City, Colorado, submitted by Cotter Corporation, 9305 West Alameda Parkway, Lakewood, Colorado 80226.

The review process and result are described. Comments received on the April draft executive summary prepared by the Colorado Department of Health (the Department) are addressed. A copy of the license is included.

This Final Executive Licensing Review Summary (FELRS) is divided as follows:

1. Introduction
2. Brief description of the applicant's project
3. Summary of evaluations conducted by local, state and federal agencies
4. Description of issues; response to public comment
5. The Department's license decision
6. Criteria for decision
7. License authorizations and conditions
8. Brief description of documents submitted; references

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A review assessment is not an environmental impact statement. Reasons and conclusions, not specifications and calculations, are included. A detailed description of the applicant's project is contained in the documents described in section 8 of this summary. Copies of these documents may be viewed at the Colorado Department of Health Radiation and Hazardous Wastes Control Division (4210 East 11th Avenue, Denver), at the Canon City Public Library (516 Macon Avenue), at the Pueblo Regional Library (100 East Agriendo), and at the Denver Public Library (1357 Broadway).

2.0 Brief description of the applicant's project

The Cotter Corporation has operated a uranium mill in Canon City since 1957. The Department has licensed the mill since 1968 when Colorado became an "agreement state" under the auspices of the U.S. Atomic Energy Commission (AEC), now the U.S. Nuclear Regulatory Commission (NRC).

The Cotter Corporation has constructed an expanded facility on the existing Canon City site, adjacent to the old mill structures. The mill building construction is complete but the new facility may not process uranium ore until the Department approves Cotter's request for a radioactive materials license, submitted October 25, 1977.

The applicant has proposed to use the new facility for processing uranium ore obtained from the Schwartzwalder Mine near Golden, Colorado and from mines in western Colorado. The "old" mill facility will be used to reprocess the accumulated tailings from the past twenty-two years. Molybdenum and vanadium along with other metals will be produced as by-products of the uranium milling.

All tailings generated from both facilities will be deposited in a new 200-acre impoundment system currently under construction. On February 28, 1979, the Department, with NRC and the U.S. Environmental Protection Agency (EPA) concurrence, granted Cotter's request for exemption from pre-licensing construction prohibition for the tailings impoundment, pursuant to RH 3.8.7.2 of the Colorado Rules and Regulations Pertaining to Radiation Control.

The new portion of the mill facility is rated by the applicant at 1500 tons of uranium ore per day. According to the applicant, approximately 60,000,000 pounds of "uranium" is expected to be produced during the new facility's twenty year life span. The 60,000,000 pounds of "yellow cake" should contain approximately 93% U₃O₈ equivalent which, after further processing and enrichment, will be used as fuel for nuclear powered electric generating plants.

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3.0 Summary of evaluations conducted by local, state and federal agencies

Many of the agencies listed below participated in numerous meetings held with the applicant to resolve issues and obtain additional information. A number of site visits were made during the past 2 years, particularly by staff members from the State Departments of Health and Natural Resources. Written correspondence concerning the reviews conducted by all of the above agencies is on file for public review at the Department of Health, Radiation and Hazardous Wastes Control Division, and at the Canon City, Pueblo, and Denver Public Libraries.

3.1 The Fremont County Board of Commissioners examined the application for a Certificate of Designation of the tailings impoundment as a solid waste disposal site and facility.

3.2 The Upper Arkansas Area Council of Governments examined the project regarding effects on services, housing, roads and the area economy.

3.3 The Air Pollution Control Division (Department of Health) evaluated applications and issued all necessary preliminary permits relating to air pollution from mill construction and operation and from tailings impoundment construction.

3.4 The Chemistry Section (Laboratory Division, Department of Health) reviewed ER chapters addressing chemical processes and hazardous materials. Particular attention was given to the safe handling and transportation of hazardous material.

3.5 The Radiation Section (Radiation and Hazardous Wastes Control Division, Department of Health) evaluated the radiological impacts on people and the human environment during and after mill operation. The applicant's proposal for final reclamation, decommissioning, and stabilization of the tailings was carefully studied. Attention was also given to in-plant radiation protection and monitoring. Requirements for the radiological monitoring of air, water, soil, plants, animals and man were established by Radiation Control staff.

3.6 The Solid Waste Management Section (Radiation and Hazardous Wastes Control Division, Department of Health) worked with Fremont County in review of Cotter's application for a Certificate of Designation. The safe handling of hazardous material was also reviewed.

3.7 The Water Quality Control Division (Department of Health) analyzed the project's impact on ground and surface waters, a major issue. Seepage problems with the old tailings impoundments have been evaluated along with the applicant's corrective measures. The potential for contamination of ground and surface waters by the new impoundment system received thorough scrutiny.

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3.8 The Department of Highways commented on the portions of the E addressing transportation of uranium ore, uranium product and other chemicals. The Department also evaluated the impact of increased highway traffic due to mill construction, operation, and the influx of new employees and their families.

3.9 The Department of Law reviewed the legal aspects of the applicant's project and was particularly active in evaluating the preclicensing construction exemption request, reclamation surety, and long-term care surety. Proper notice and conduct of hearing was determined by the Department of Law.

3.10 The Department of Local Affairs evaluated the project's effect on city and county services such as schools, law enforcement, sewage treatment, water supplies, and transportation.

3.11 The Colorado Geological Survey (Department of Natural Resources) devoted a great deal of time to evaluating the geological, hydrological, and seismic aspects of the project. Extensive review and comments concerning the old and new tailings impoundment systems have been made. Seismicity studies were made by the applicant's consultant to determine the impoundment system's stability during earthquakes. Additional analyses were done by the applicant and received by the Survey.

3.12 The Division of Water Resources (Department of Natural Resources) evaluated and approved the design of the new tailings impoundment dam. Working with the applicant's engineering consultants, the Division made a site visit, and reviewed a number of design changes.

3.13 The Division of Wildlife (Department of Natural Resources) studied and commented on those portions of the ER addressing the mill effects on local flora and fauna.

3.14 The Office of the State Archaeologist studied the project's effect on archaeological sites and reviewed the archaeological survey submitted by the applicant.

3.15 The State Historical Society studied the project's effect on historical sites and evaluated the results of the site survey submitted by the applicant.

3.16 The U.S. Environmental Protection Agency studied and commented extensively on the project from a wide perspective involving air and water quality, geology, hydrology, radiological health, and solid and hazardous waste control. EPA devoted considerable time to evaluating the applicant's project. EPA also conducted a review of the proposed milling facility under the "Prevention of Significant Deterioration Regulations" adopted to implement the 1977 amendments to the Clean Air Act and has issued a permit to Colter for the facility.

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3.17 The U.S. Nuclear Regulatory Commission prepared a detailed written environmental assessment of the project at the request of the Department. Specific areas which the Department asked the NRC to address were:

1. Adequacy of impoundment liners
2. Radiation dose calculations to individuals in the general population
3. Environmental monitoring programs
4. Reclamation plans
5. Geohydrology

Using its computerized Uranium Dispersion and Dosimetry (UDAD) model, the NRC made calculations of the off-site radiation dose from mill operation to an individual in the general population. Although located in Washington, D.C., NRC licensing staff made a number of visits to the Department of Health and Canon City to assist in the review as requested by the Department. Following the May 2, 1979, public meeting the NRC arranged for additional field sampling to determine the impacts of using the contaminated groundwater in Lincoln Park for irrigation.

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4.0 Description of issues; response to public comment

The April 1979 draft executive summary described major issues concerning the application. This section of the FELRS presents the technical consensus of the reviewing agencies as confirmed to the Department following inclusion of public comment. The section also responds directly to issues and concerns raised by the public.

For each topic, the Department's final view is outlined briefly. Pertinent comments are then addressed, with similar comments from individuals grouped together and sometimes rephrased for clarity. Individual commenters should be able to find each of their questions addressed. For each topic, the license conditions of particular relevance are listed.

4.1 Existing seepage by way of shallow or deeper aquifers to Lincoln Park and potentially to the Arkansas River.

4.1.1 Much of the public controversy surrounding the Cotter application traces to concern for seepage of tailings pond liquids to groundwater from existing operations.

A potential problem was reported to the Department's Water Quality Control Division in 1968. The Department, while having no direct regulatory authority over limited-use private wells, sampled private water wells in the Canon City area. Elevated levels of several contaminants were confirmed. The Division responded to one well owner in an August 13, 1968 letter that "We do not recommend the use of shallow dug wells as a domestic water supply since the shallow waters are easily contaminated".

After further sampling and discussion in 1969 and 1970, Cotter agreed in 1971 to line with plastic or cease to use the majority of its effluent ponds. On-site observation wells showed improvement in ground water quality until 1974, when a Radiation Control Section inspector recognized evidence of increasing contamination. After a series of discussions, over several years, Cotter agreed to dig several interceptor trenches, to seal the Canon Wolf Park mine shaft, clean out the Sand Creek Dam reservoir, and to devise a comprehensive, long-term solution to the seepage problem.

The efficacy of interception pumping systems has not as yet been determined because until now there was not an adequate receptor pond. In February 1978 Cotter submitted a design report (8.2) which, as part of the proposed mill expansion, described a new impoundment to permanently isolate all tailings and associated liquids. An October 1978 report (8.3), which was requested and required by the Department, acknowledged impacts on aquifers and off-site wells by tailings liquids from past operations migrating with groundwaters.

At the Department's request, monitoring was expanded in fall 1978 and again in 1979. The off-site monitoring program will continue until the problem has been resolved.

Additional off-site control measures may also be required by the Department if contamination levels do not decrease rapidly enough.

The Department's position is that although palliative measures such

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as the interceptor trenches have been used, there appears to be only one permanent solution to the problem. This solution consists of ultimately moving all tailings from the defective ponds to a new lined pond engineered to current "state-of-the-art" specifications, as in the applicant's proposal, modified to include a number of significant improvements, suggested by state and federal reviewing agencies.

4.1.2 Public Comment

4.1.2.1 A large number of commenters asked about the nature and levels of contamination in Lincoln Park wells.

1. Commenters asked how many wells have been tested, how frequently, and by whom. One commenter asked who reviews the data and how often. Other comments asked how many wells show the presence of radioactivity or trace substances associated with tailings liquid.

Nearly one hundred private wells, special monitoring wells, and surface waters have been sampled over the past ten years. At least five Lincoln Park wells have been sampled several times each year by Cotter or the Department and sampled monthly by Cotter since September 1978. Approximately twenty private wells are being sampled monthly by Cotter beginning this year, with split and check sampling by the Department (A split sample is taken jointly to compare results; a check sample is taken independently). Data are summarized, sent to the Radiation Control Section, and reviewed by the Department upon receipt.

Depending upon the criterion applied, up to twenty wells may be showing traces of tailings-associated substances. About half of these show levels only slightly above average natural background levels. In the remaining wells, somewhat elevated levels of molybdenum, selenium and/or uranium are confirmed. Molybdenum is the best indicator of tailings-associated liquid, since it does not interact chemically or physically as much with the earth materials through which ground water migrates between the millsite and Lincoln Park. Uranium is primarily responsible for elevated total alpha and total beta radioactivity levels, where these are found (radium and thorium, which may also raise alpha and beta levels, but which are less soluble and are readily removed from solution en route, are not present in significant concentrations). Selenium is present in few wells.

2. Several commenters asked health-related questions about the impacted well water: What contaminant levels are acceptable? Are any wells condemned? Are drinking water standards exceeded? What are allowable uses of the waters at present toxic element and radioactivity levels? Will existing impaction levels cause disease? What is the degree and significance of any accumulation by crops or livestock watered from impacted wells?

Basic Department policy for radioactive materials licensees is that radiation levels be kept as low as is reasonably achievable (the ALARA philosophy). This means that just "meeting the standard" may not be enough. If reduction of radiation levels below the standard can be reasonably achieved, it must be done.

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Specific Department regulations have been applied in two ways. First, Cotter was cited in December 1977 by the Radiation and Hazardous Wastes Control Division for contamination of off-site waters in excess of a regulatory limit (30 picoCuries per liter of radioactivity from a mixture of radionuclides whose levels and concentrations are not known) found in Appendix A, Note 2 of Colorado's Rules and Regulations Pertaining to Radiation Control. This limit pertains only to effluent releases and is not an ambient water quality standard. However, a December 7, 1977 letter from the Radiation Control Section did inform the Lincoln Park well owner most impacted that "Relative to personal consumption of the water, the house well exceeds the proposed primary public drinking water standards in levels of total alpha and total beta radiation. It is recommended that an alternative water source be used for drinking on the basis of these two parameters."

Second, the Department can compare concentrations of contaminants to Colorado's Drinking Water Standards. The state routinely monitors only public water supplies (wells with at least 15 service connections) because it has no jurisdiction over private wells. By these standards, radium is not to exceed 5 picoCuries per liter in drinking water. Although the EPA is presently considering developing them, no standards yet exist for molybdenum or uranium.

To conclude, Lincoln Park well waters are generally acceptable by current health protection standards, although efforts to control use are and have been called for. No wells have been "condemned." The Department advises against use of easily contaminated shallow dug wells for drinking water. Garden and lawn watering are considered acceptable. A University of Colorado study suggests that water irrigating legumes which are to be consumed by cattle not exceed 0.15 milligrams molybdenum per liter. This guide applies to cattle, not man, because of the bioaccumulative ability of legumes and the physiology of ruminant digestion. Horses and pigs do not appear to be affected at the levels encountered in Lincoln Park.

Any radioactive or other toxic substance may increase the risk of disease. Substances such as molybdenum, selenium, and uranium are potentially toxic, but not at the concentrations and with the dietary pathways found in Lincoln Park.

3. Several commenters asked what testing is proposed and how it will be specified in the license. One commenter asked whether thorium analysis would be included. Other commenters asked which wells are in the testing program and whether sampling would be continued after the existing tailings are moved into the new impoundment.

The Lincoln Park monitoring program is specified by license condition. Wells are as listed in the Cotter letter of March 30, 1979 (8.9), plus several additional stations requested by the Department. Testing includes dissolved molybdenum, uranium, radium, thorium, polonium and lead-210, electrical conductivity, bicarbonate, chloride, and sulfate. Temperature and water level are being measured. Radium and thorium have not been significantly present in the past, do not move readily with groundwater, and are thus not required in all sample analysis. The on-site monitoring program includes analysis for uranium, radium, thorium, polonium and lead. The sampling programs will continue in full unless and until the Department allows otherwise.

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4. One commenter asked why water levels and temperature haven't been routinely measured in the wells previously sampled. Another asked why a full monitoring program wasn't already in existence. Several persons suggested that an annual monitoring report be made available to the public.

Water level and temperature measurements are being required for on-site wells and in the Lincoln Park program. The measurements may be useful in understanding groundwater flows. The Department has been working with Cotter to achieve an adequate and reasonable monitoring program for several years. This program is now in effect and is based on our best current information and understanding of a very complex problem. Monitoring results will be summarized in an annual report to the Department, to be made available to the public, due no later than March 1st each year. An annual report for 1978 is also required by the Department.

5. Two commenters inquired about how much contaminated water and earth has flowed along Sand Creek and whether white residue below the Sand Creek dam indicated contamination.

Records of past transport of water and soil along the Sand Creek drainage are lacking. Recent soil samples taken by Los Alamos Scientific Laboratory scientists and earlier samples taken by the Department and Gotter do not indicate significant surface contamination along Sand Creek north of the Sand Creek dam. The white residues appear to be calcium and magnesium salts characteristic of alkaline soils which have been saturated with moisture and then dried by evaporation, leaving dissolved salts at the soil surface.

4.1.2.2 Another group of comments inquired about the Arkansas River.

1. Several commenters asked whether any millsite-originated radioactive or toxic contaminants have reached or will in the future reach the Arkansas River. One commenter questioned whether enough data exist to draw any firm conclusions.

The Department's Water Quality Control Division, based on (1) Lincoln Park data, (2) water well and spring data from between Lincoln Park and the river, and (3) Arkansas River stream quality data, has found no evidence of contamination having reached the Arkansas River from Cotter operations. When the control measures now started, which ultimately will remove all of the existing tailings as a source, are fully implemented, future contamination of groundwater would appear to be negligible.

Calculations have been made for the highly improbable event of direct overland transport of tailings to the river. Because of natural radioactivity levels slightly above average and because of the volume flow of the Arkansas River even at low flow rates, a maximum credible contribution to the river would not significantly affect downstream water users.

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2. Several commenters asked: What is the present rate of movement of contamination toward the Arkansas River? What about "temporary pooling" in old mine workings? Are irrigation ditches a pathway to the river? How are estimates of five years for present contamination to reach the river versus seven years to complete reprocessing of the existing tailings reconciled? *

The present rate of migration of tailings liquid from the millsite to Lincoln Park and beyond is not known exactly. Usually, groundwater flow rates are on the order of a few to a few hundred feet per year. Contamination attributed to tailings liquid was observed in an off-site water well ten years after the mill began depositing tailings, a rate of over five hundred feet per year. At the request of the Department's Water Quality Control Division and the staff of the Colorado Geological Survey, Cotter has been required to conduct and is still conducting extensive studies to learn more about groundwater flow rates and patterns between the Cotter millsite and Arkansas River.

Cotter's hydrological consultant believes recent data indicate that the contamination has ceased moving toward the river. The Department wants to see more data before accepting that conclusion.

Of particular interest is whether water has moved by a deep route, through the Canon Wolf Park mine into aquifers which supply some water wells in Lincoln Park. According to the Colorado Geological Survey, other mines are not involved. This question is under active investigation, with the company required to report by January 1, 1980. It should be noted that molybdenum concentrations have at times been higher in the Sand Creek Dam reservoir than in the Wolf Park mine, making it questionable that the mine is the source of the reservoir's contamination. Because irrigation contributes to rather than draws from shallow groundwater, irrigation ditches are not believed to carry contamination toward the river.

Cotter maintains that the existing ponds are no longer seeping to groundwater. The Department does not necessarily agree. If existing ponds are indeed not seeping, the existing off-site contamination can and will be dealt with separately. Whether seepage is continuing or not, the existing tailings will be dried considerably in place prior to either reprocessing or direct transfer to the new impoundment, thus lessening the source of tailings liquid available for seepage. Pumping from interceptor trenches will collect surface seepage.

In the Department's opinion and the opinion of all other reviewing agencies, seepage from the existing tailings pile and pond area during the reprocessing period of five to seven years will be small compared to past releases and will decrease to nearly zero as reprocessing continues.

3. One commenter asked if Cotter is in compliance with the Federal Water Pollution Control Act. Another asked if stream quality standards for radium will be exceeded in the Arkansas River due to millsite

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releases over the next twenty years or after milling ceases. Another commenter asked what impact on Frying Pan-Arkansas subprojects exceeding a radium standard would have.

Because Cotter does not discharge to any surface water, no National Pollution Discharge Elimination System (NPDES) permit has been required in the past. The Department does not believe any data show that molybdenum or other tailings liquid constituents have reached the Arkansas River. Radium does not remain in solution as readily as molybdenum, and is even more unlikely to have moved or to move in the future far from the Cotter millsite, even if seepage were to persist unabated. No significant seepage is expected to occur from the dewatered tailings isolated in the new lined impoundment. No radium standard is expected to be exceeded downstream because of millsite-originated contamination.

4.1.2.3 Several commenters asked what control program is in effect or is proposed for the existing groundwater contamination.

1. Many commenters asked what is presently being done and how adequate are these measures.

At present, lined Pond 2 holds water just down-drainage from the combined tailings Ponds 1 and 6. Interceptor trenches into bedrock collect shallow groundwater just below Ponds 1 and 3. Cotter maintains that these interceptors prevent seepage, but the Department believes that some tailings liquid may still be migrating vertically into underlying sandstone layers and aquifers. Seepage may be occurring from other ponds as well, although Cotter has completed removal of water from Pond 10 into the new impoundment.

A third interceptor trench collects shallow subsurface groundwater just south (upgradient) from the Sand Creek pond. The Sand Creek dam catches runoff and surface spring water. Water from both the pond and trench is now being pumped into the new impoundment.

It is expected that the existing ponds and pile will be removed before any contamination which might move by deeper, slower paths could further significantly contaminate aquifers off of the millsite.

2. Several commenters asked what cleanup will be required under the Cotter property and at and below the Sand Creek pond. One commenter asked about the costs of emptying and scraping the reservoir and when this will be done.

Cleanup measures will depend upon the relative success of control actions taken or planned and upon the information gained from geohydrological studies being conducted. Cotter has already agreed to drain, dredge, and decontaminate the Sand Creek pond area, regardless of cost. That should be completed this summer. The company is also committed to pumping out the Wolf Park Mine if it is demonstrated to constitute a public health hazard. The cost of such measures cannot be determined at this time.

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3. Several commenters asked what levels must be exceeded and how far the contamination must extend before cleanup will be required north of the Sand Creek pond and dam. Other commenters phrased the question as how much greater must the hazard be before Cotter will be required to pump aquifers and to immediately move the existing tailings to the new impoundment.* One commenter asked what license conditions will set these requirements.

Specific criteria for molybdenum and uranium have been included in the license which will require additional sampling and off-site controls. Cotter is being required to develop specific plans for further remedial action, if necessary, including pumping of contaminated aquifers with the withdrawn liquid being transferred to the new tailings impoundment.

The Department takes the position that groundwater pollution must be shown to be decreasing if old tailings reprocessing is to be allowed or continued and if Cotter is to avoid being required to cleanse contaminated aquifers. The Department's position applies both on and off the millsite. If levels remain below the thresholds specified and do decrease any potential public health hazard will also remain minimal.

4. One commenter asked what testing will be done after use of the new impoundment begins, in order to check whether contamination levels decrease and to assure no future contamination of the Arkansas River.

As stated previously, the special off-site monitoring program will continue until the Department authorizes otherwise. Cotter's routine on-site operational monitoring program, which includes the underdrains beneath the new impoundment and test wells, will continue for the life of the mill. Several stations will be sampled in perpetuity under the long-term monitoring and maintenance agreement which must be in effect before licensure.

5. Several commenters asked whether Cotter will be required to clean-up contamination even if the license to process ore is denied. Several commenters also asked about funds or insurance for future clean-up and what Cotter's legal liability for existing groundwater contamination might be.

With respect to existing off-site contamination, the Department will apply basically the same requirements regardless of licensing decisions. The form of the requirements may vary somewhat depending on the need. Millsite decommissioning, decontamination and reclamation are covered by a surety agreement. A fund for long-term care of the tailings disposal system is also established. The licensee is not required to establish a separate special fund or carry insurance to protect against damage to off-site properties. Any claim of liability against Cotter for damage to off-site property would be resolved under existing statutory and common law.

4.1.2.4 A final group of groundwater-related comments concerned efforts to gain more precise knowledge of the geology and groundwater hydrology near the mill site.

1. Several commenters asked when data will be available from the additional wells drilled to determine groundwater migration pathways. One commenter asked why they weren't drilled years previously.

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The Department and the Colorado Geological Survey requested that additional deep wells be drilled as early as 1977. Other wells had been requested previously. Cotter has in the past several years drilled many monitoring wells. They recently agreed to and began drilling several deep wells viewed by the Department and the Colorado Geological Survey as necessary to understand groundwater flows.

Initial data will be available this summer. Additional wells may be required based on analysis of the results. Data from this 1979 set of wells bears more on the assessment of existing off-site contamination and control measures than on licensure of the new impoundment and mill.

4. Several commenters inquired as to why Cotter should be allowed to continue to operate before the migration pathways and rates are determined, before differences between Cotter and state experts are resolved, and before data are complete and reviewed by outsiders.

The present contamination needs to be understood and alleviated, but does not pose a public health hazard by current regulatory standards or otherwise in the opinion of the Department. The Department feels that the new impoundment will reduce discharge of tailings liquids to essentially zero, leaving only the existing groundwater contamination to consider. With new seepage prevented, the existing groundwater contamination can and will be dealt with separately and reasonably using all information on groundwater pathways and rates available.

3. One commenter asked whether other plumes toward Lincoln Park exist. Another commenter asked whether a more comprehensive, even more extensive hydrological investigation should be conducted.

The Department's Water Quality and Radiation and Hazardous Wastes Control Divisions, the Colorado Geological Survey, the NRC, the EPA, and others, have over more than three years of review examined potential and probably pathways for groundwater contamination that may move away from the Cotter millsite. Conceivable routes have been examined and more data required were thought to be necessary. Several routes are still under study.

Evaluation of millsite and down-gradient geohydrology will continue as will monitoring of the Lincoln Park groundwater situation. The Department's position is that new, more comprehensive or more extensive investigations are not required at this time, but that as in the past the Department and experts from other agencies will continue to require additional information as reason and need arise.

4. Several commenters asked questions about past coal mining near the millsite: What undocumented workings exist below the millsite? Is there an aquifer flowing at the 300 foot level? Should both the 300 and 1000 foot levels be monitored in the Wolf Park mine shaft? Was backfilling the Wolf Park mine shaft properly done? How far do the Nonac and Chandler mines extend under the millsite?

Coal mine records have been examined. Many Colorado workings are "undocumented" in the sense that extensive records are not preserved. For the Cotter millsite, past workings are reasonably well known. Data are presented in several reports pertaining to the application (8.1, 8.2, 8.5 and several letters).

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Geologists with state agencies agree that the Canon Wolf Park mine at 1000 feet down poses a negligible subsidence possibility. The mineshaft was carefully backfilled and sealed as witnessed by state and federal personnel. Well OW-11 monitors the 300 foot level aquifer at present and will be extended to include the bottom of the old Wolf Park mine workings.

The Nonac and Brooksidemines do not extend under present Cotter property and are remote both vertically and horizontally from the Canon Wolf Park mine. The Chandler Mine touches the eastern edge of the Cotter property.

5. Various commenters asked what federal assistance the state sought or used for sampling and evaluation, particularly from the EPA or NRC.

The EPA was asked to do thorium analyses on water samples. Reduction in laboratory capability at EPA's Las Vegas laboratory curtailed this agreement. The NRC staff contractors and consultants visited the Cotter mill-site, commented in detail on the license application and environmental reports, and provided an environmental assessment of the milling facility and tailings disposal system, including estimates of radiation exposure levels using a computer model. At state request, the NRC arranged for additional studies of the Lincoln Park water impacts by the Los Alamos Scientific Laboratory (see 3.16 and 3.17 above).

6. Several commenters requested that publication of the data from groundwater migration and other studies be a precondition to licensing. They asked whether the public has the right to review and comment on this new information before the licensing decision.

As stated previously, the additional studies relating to Lincoln Park groundwaters are (1) primarily to understand the migration of past contamination and (2) to a considerable extent open-ended, depending on the number of wells sufficient to obtain the desired information. The Department's position is that completion of the additional studies is not necessary before a licensing decision.

All Cotter environmental monitoring reports will be made available to the appropriate public libraries. Cotter is required to promptly report to the Department data sets and results of the new geohydrological studies. Department files are public records and therefore available to the public. Comments from the public will be carefully reviewed.

4.1.2.5 One commenter asked why the Department didn't file a complaint based on the Attorney-General's opinion offered April 5, 1978 regarding non-compliance with state pollution regulations.

The Department had already cited Cotter for non-compliance with Colorado's Rules and Regulations Pertaining to Radiation Control in 1977. Cotter initiated remedial measures and began planning a long-term solution to the problem of seepage of tailings liquid to groundwater---isolation in the new impoundment. The Department, in consultation with the Attorney-General's office, decided not to file a civil suit against Cotter at the time because it deemed the remedial action undertaken by Cotter to be a technically appropriate and legally sufficient response to its notice of noncompliance.

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4.1.3 License conditions bearing directly upon the topic of seepage to groundwater and contamination of off-site aquifers and water wells include 19, 21, 29, and 30.

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4.2 Tailings disposal

4.2.1 The new impoundment design and capability, and tailings management plans, comprised a second group of significant issues.

4.2.1.1 Dam design and construction was a major issue resolved through consultations between the applicant and the Division of Water Resources.

Of major concern was the potential for subsidence due to old mines beneath the mill and impoundment areas. Significant subsidence was found to be of extremely low probability due to the extreme depth of the mine workings. There are no workings within 300 feet of the surface. (There was a small pump room at the 300 foot level.)

The resistance of the dam to a probable maximum flood series was carefully evaluated by the Division of Water Resources and found to be adequate.

The Division of Water Resources and Colorado Geological Survey concur that the dam's seismic vulnerability is very low.

4.2.1.2 Tailings impoundment liner and dewatering procedures were complex and important issues. The design, application and function of the tailings impoundment liner is obviously a key element in avoiding future seepage problems. Intense evaluation of this system by the Department, Colorado Geological Survey, EPA and NRC comprised a major portion of the several years of these agencies' technical review and resulted in acceptance of Cotter's final revised design.

To further insure that seepage will be minimized, Cotter was required to propose a tailings dewatering and pH adjustment system. The dewatering concept calls for removing all of the free liquids from the tailings at the time of reclamation. These liquids will then be subjected to solar evaporation, thereby insuring relatively "dry" tailings free of gravitational water, reducing the long term challenge to the liner, and eliminating the potential for seepage. pH adjustment reduces the ability of tailings solution contaminants to penetrate the liners and migrate in soil. It also reduces evaporation and disposal problems.

4.2.1.3 Alternate tailings management plans evaluated by the applicant included mechanical dewatering in the mill circuit, incremental reclamation, and below-grade disposal.

The final dewatering system proposed by Cotter and accepted by the Department, the Colorado Geological Survey, EPA and NRC consists of dewatering after the tailings are placed into the impoundment system. The dewatering is accomplished by use of finger drains designed to collect the tailings solution.

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Mechanical dewatering in the mill circuit was considered by Cotter. The processing of a variety of ores precludes the mechanical dewatering circuit, which performs best on tailings of relatively uniform makeup and consistency. Space was not available for the large evaporation ponds that would be required.

Incremental reclamation was also considered by Cotter as unfeasible for moist, ponded tailings. Below-grade tailings disposal was not considered feasible because of the proximity to bedrock.

4.2.1.4 Tailings cover, when applied, will be a vital barrier that must prevent release of the tailings and of significant radiation to the environment. When completed, the cover forms the final seal which encapsulates the tailings.

The applicant has proposed a cover consisting of a two foot compacted clay cap covered by eight feet of earth and six inches of top soil. This is the currently accepted, best available technology. In evaluating the proposal, the Department, Colorado Geological Survey, EPA and NRC carefully examined Cotter's radon flux and dose calculations, depth of cover, engineering studies and field permeability tests. Cotter is committed to change this plan, as may be necessary to conform to the best available technology existing at the end of the mill's life to provide long term integrity to the residue's "encapsulation".

4.2.2 A number of comments related to tailings impoundment design and construction, particularly quality assurance during construction.

4.2.2.1 One commenter asked why the impoundment design was accepted by the state after being found "only marginally acceptable by NRC guidelines."

NRC's guidelines are performance objectives and must be adjusted to site conditions. NRC evaluates each design as a multiple-feature system of controls.

After several improvements suggested by the state and NRC were agreed to by Cotter, NRC's staff and consultants accepted the final impoundment concept. In particular, when dewatering and pH adjustment of tailings were agreed to, insistence on the previously desired minimum liner thickness of 36 inches became unnecessary. Eighteen inches of clay below the Hypalon and a minimum of twelve inches of soil above the Hypalon was found acceptable. State agency interest in dewatered tailings led to a superior system. The company's proposal for pH adjustment has additional advantages.

4.2.2.2 Several commenters asked whether the impoundment concept is truly "state-of-the-art". Others asked if present techniques are adequate to protect the public from tailings hazards over the long term. Several commenters asked whether new techniques such as asphaltizing and incremental reclamation were considered.

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"State-of-the-art" concept means that best available technology is being used. Isolation of dewatered, neutralized tailings behind a compacted earthen dam in a clay and plastic lined impoundment is current state-of-the-art for tailings disposal.

The system achieves three necessary objectives: (1) prevention of physical disturbance (transport over land by wind or water erosion), (2) prevention of leaching of tailings constituents to groundwater, and (3) limitation of direct gamma radiation to background and of radon release to less than two picoCuries per square meter per second from the tailings deposit.

Cotter has provided extra protection for the liner by installing underdrains to lessen hydrostatic pressure from below. Although the dam is constructed to withstand a probable maximum flood series, additional Division of Water Resources suggestions were incorporated into the impoundment design. Cotter is committed to conform final cover and reclamation to the best available technology at the cessation of mill use. In the interim, Cotter will be evaluating rip rap as a method of erosion control, and will benefit from Federal studies.

Incremental reclamation by trench burial was considered and rejected because of proximity to bedrock at the site. Asphaltizing or cementing are still experimental, unproven technologies and were not considered viable options.

4.2.2.3 Several commenters asked who does quality assurance for dam construction and liner installation, who certifies that specifications have been met, and how frequently state inspectors have visited the site. One commenter inquired whether, since the state approved the design of the impoundment and liner, it can be assumed to have been built to design specifications and free of imperfections.

W.A. Wahler and Associates, construction engineers, has an inspection staff of nine employees working on quality control. Five are assigned to Hypalon installation, three to earthwork, one is the supervisor.

Hovater-Way Engineers, lining consultants, wrote the quality control guidelines for Hypalon installation and makes periodic, documented audits at the site. Wahler developed the earthwork quality control guidelines and the stepwise procedures for approval of foundation, clay sublining, Hypalon, and cover placement. Hauser Laboratories makes independent strength tests of factory and as-installed Hypalon samples for Wahler.

Wahler's construction supervisor certifies that specifications have been met. The reputation of Wahler, a respected professional engineering firm, is very much at stake should dam construction or liner installation be faulty. This, and Cotter's insistence on getting it's money's worth from a very large investment, provide substantial motivation for adequate quality control.

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Wahler's monthly construction report is submitted promptly to the Health Department and Division of Water Resources and is reviewed by the Radiation Control and Hazardous Wastes Control Sections, the Division of Water Resources, and the Colorado Geological Survey. Health Department, Colorado Geological Survey, and Division of Water Resources staff have inspected the dam and liner at several week intervals since construction was authorized. According to Colorado Geological Survey staff, the Wahler quality control program is outstanding, with meticulous attention to detail for such a large undertaking. The Division of Water Resources staff is also very satisfied with the supervision and execution of the construction.

4.2.2.4 Several commenters asked about presumed design and construction shortcomings.

1. One commenter questioned whether the dam, located in the Sand Creek drainage, is susceptible to a 500-1000 year flood.

The dam is designed to contain a probable maximum flood series during operation (unlikely over hundreds or thousands of years) and will be provided with a spillway structure after reclamation to divert runoff to another drainage. Because the impoundment is near the head of a small drainage basin, and will be sloped toward the spillway, any conceivable flood is not expected to cause any significant tailings transport to the Sand Creek flood control dam, which is an additional barrier.

2. One commenter stated that since the subliner clay is not sized and contains debris, rocks will penetrate and puncture the Hypalon liner.

According to Hovater-Way Engineers, lining consultants to Cotter, the size of rocks which should be removed depends on the thickness and type of the lining material, kind of supporting subgrade, and depth of hydraulic head. During installation, protrusions from beneath the lining are checked by slitting the liner and patching after removal of any rocks. According to NRC's impoundment consultant, even should a small puncture occur, the subliner is in a sense self-sealing due to the adsorptive and geochemical qualities of the clay below.

3. One commenter asked if differential settling of the 18 inches of clay and Hypalon under the load pressure resulting from wet tailings over the micro and macro-faulted bedrock would damage the liner.

Reviewing agency experts do not believe that such settling is probable, based on the type of bedrock found.

4. Several commenters asked whether tailings will clog the finger drains above the liner and what will be done if this causes the dewatering drain system to fail. One commenter asked how much water removal is involved in dewatering.

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The drains are protected by gravel, a filter layer, then more gravel. Cotter is committed to pumping from a system of wells drilled into the tailings if the drain system should fail. The amount of water removed will depend on the input tailings slurry moisture content and on the degree of evaporation achieved over the mill life. Essentially all gravitational or "free" water will be removed, approximately 750 acre-feet.

5. One commenter asked whether the mills will be dismantled before or after dewatering and whether process water from dismantling the mills will interfere with dewatering.

The impoundment will be dewatered over the five or more years following cessation of mill operations. Initial efforts to decrease the tailings moisture content will be made at the same time as mill dismantling. Some water from mill decontamination may be added to the impoundment. A fixed percent moisture endpoint must be reached in the tailings, however much water must be removed and evaporated away to achieve it.

6. One commenter asked if the impoundment is being constructed with contaminated dirt.

Construction material for the impoundment originates from both on-site and off-site locations. Some on-site material containing slight but insignificant contamination may be used in the earth cover over the Hypalon, which after all will be in direct contact with tailings. Contaminated material is not allowed for dam or subliner construction under the Hypalon.

4.2.2.5 Several commenters directed attention to the tailings reclamation plans.

1. Three commenters asked how the integrity of the clay cap and cover will be monitored and maintained. One commenter asked how much radon will be released through the clay cap and earth cover due to holes and pores in the clay and channels from sage or pinyon root penetration. The commenter asked whether rewatering of the tailings by these channels will lead to groundwater seepage over the long term. The same commenter inquired which herbicides are to be used, if any, and with what side effects.

The long term surety agreement provides for maintenance as needed of the clay cap and cover. The cap and cover are designed to reduce radon emanation to less than two picoCuries per square meter per second from the tailings deposit. As stated above(4.2.1.4), Cotter's radon flux calculations, which include a factor to allow for porosity and also an uncertainty margin, were carefully checked by the Department and NRC. The long term surety agreement explicitly provides funding in perpetuity for control of deep-rooted plants, precluding extensive root channel penetration or rewatering. Only EPA approved herbicides will be used. Fencing and burrowing animal control are also provided for.

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2. Several commenters asked what dust control will be practiced during the five plus years planned for dewatering and what releases are expected from tailings exposed at that time to wind.

The Department will require that Cotter use the best practicable water or chemical methods to control dust. Minimal releases will be expected, but estimates will need to be made closer to and prior to the time of dewatering.

4.2.2.6 One commenter asked how extensively alternate impoundment sites were considered.

The Department required Cotter to examine alternate sites, particularly to look at sites underlain by less fractured permeable bedrock and more remote from populated areas. Other environmentally suitable sites in the Canon City/Fremont County area were found but could not be obtained by the applicant. Use of an alternate site would necessitate transportation of tailings and would disturb a much larger area not presently impacted.

4.2.2.7 One commenter asked whether the Department was aware of the conclusions of the Interagency Review Group on Nuclear Waste Management report of March 1979.

The Department views the report's conclusions as useful but general. More pertinent is the recent NRC Generic Environmental Statement on Uranium Milling (8.13). Several provisions which were made a part of Colorado's Rules and Regulations Pertaining to Radiation Control in April 1978, were incorporated into the Generic Statement's recommendations.

4.2.2.8 One commenter asked whether the weight of the wet tailings might cause an earthquake pattern to begin in the region.

The risk of inducing an earthquake due to the ponded tailings is very small. Seismicity was specifically evaluated by the Colorado Geological Survey. No activity has been attributable to the present 2 million ton pile.

4.2.3 License conditions relevant to tailings management and disposal in the new impoundment are: 14, 16, 17 and 18.

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4.3 Removal of existing ponded tailings to the new impoundment and operation of the original mill for reprocessing tailings.

4.3.1 With respect to the existing tailings and mill, the Department has two concerns: (1) that the existing tailings ponds and piles ultimately be moved to the new impoundment and (2) that the old mill operate safely and be dismantled and decontaminated properly.

In moving the tailings, the applicant had two alternatives. The tailings could be first processed for economically recoverable uranium and other minerals, and then placed in the new impoundment, or they could be moved to the impoundment with no processing. In either alternative, the company's operating plan upon start-up of the expanded facility is to remove all of the contaminated areas and tailings ponds except 1 and 6. A pit will be dug in the west side of pond 1 to immediately drain water that now covers ponds 1 and 6. The company's consultants calculate that by thus reducing the hydraulic heads, the seepage will be reduced 35% immediately, 60% in two years, 95% in five years, and 100% in seven years with the reprocessing alternative. Without reprocessing, the seepage would be eliminated in five years or less. By using current interceptor trenches and pumping techniques, the seepage occurring during the additional years required by the reprocessing alternative would not appear to cause a significant additional impact.

Because the licensee applied for renewal in a timely manner under RH 3.16 of Colorado's Rules and Regulations Pertaining to Radiation Control, the old mill is allowed by law to continue processing ore during the environmental report and application review period. The mill is routinely inspected annually by the Radiation and Hazardous Wastes Control Division. Unless major new problems develop, the Department's position is that the old mill is suitable for use to reprocess tailings to produce a liquid concentrate.

4.3.2 Comments related to the old mill and tailings piles emphasized haste in disposal and mill safety questions.

4.3.2.1 Several commenters wondered whether immediate relocation, before or without reprocessing, has been adequately considered.

1. One commenter asked about the consequences of failure of the existing ponds during spring runoff before all tailings are reprocessed to the new impoundment. Other commenters asked if reprocessing and reclamation can be accelerated. One commenter asked if reprocessing would take longer than the stated seven years in any case. Another commenter asked why existing tailings cannot be reprocessed in the new mill facility.

Flood runoff in the existing pond area is not judged to be a major problem because the new impoundment diverts much of the upstream drainage. Runoff would be contained on-site and by the Sand Creek detention dam, and will have negligible impact (4.1.2.2). According to Cotter, reprocessing is

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difficult to accelerate (mill capacity is limited) and will not likely be delayed (the tailings are already homogeneous in size and readily processable). The tailings are alkaline and must be reprocessed in an alkaline mill circuit, thus cannot be reprocessed through the newer acid circuit mill.

2. Several commenters asked if immediate relocation of the existing tailings would alleviate the Lincoln Park contamination. A related comment asked what impact removing ponds 1 and 6 immediately would have on groundwater migration. One commenter asked how further use of ponds 1 and 6 can be justified, that is, whether use of unlined ponds is "state-of-the-art."

The Department, Colorado Geological Survey, and NRC agree that, with continuing measures to intercept shallow groundwater and with the slower rate of deeper migration, if it is occurring, the advantage to Lincoln Park of transferring the existing tailings to the new impoundment without reprocessing is small. (see 4.3.1)

As stated previously, the present seepage from ponds 1 and 6 is also thought to be relatively minor. As outlined above in 4.3.1, ponds 1 and 6 will be partially drained even before reprocessing begins and new deposition will cease in the old tailings pile. Such use would not be state-of-the-art and will not be authorized under the amended license.

4.3.2.2 Several questions were raised about the original mill.

1. One commenter wondered if the old mill should be closed down and dismantled immediately. Several commenters asked whether serious violations of safety codes, fire regulations, or building codes exist. Other commenters asked if occupational radiological exposure limits are routinely exceeded.

The old mill shows the wear and tear of two decades of use but has been maintained in working condition. The federal Mine Safety and Health Administration (MSHA) inspected the mill in January and February 1979, and made a special visit again in late spring. Their reports indicate that no major violations were found, and that all previous violations have been corrected.

Under Colorado's Rules and Regulations Pertaining to Radiation Control (RH 4.23 "Notification of Incidents" and RH 4.24 "Reports of Overexposures and Excessive Levels and Concentrations"), licensees are required to inform the Department within specified times if occupational exposure limits are exceeded. Cotter's overexposure reports, which average perhaps one or two per year, show no pattern which may be called routine and are not atypical for a conventional uranium milling operation.

The Department evaluates each overexposure circumstance and seeks improvement in operations to prevent recurrence. The licensee must report details of the work and sampling circumstances to the Department. Although actual employee exposure may be much less because respirators or other equipment were in use, no credit is given for such equipment in evaluating necessary remedies.

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2. Several commenters inquired what abatement procedures will be added to the old mill to guarantee it can function for reprocessing within the provisions of regulations. Another commenter asked if any licensed mill must be upgraded to state-of-the-art at times of license renewal.

Perhaps the single greatest abatement of emissions will occur because Cotter will eliminate the yellowcake drier from the old facility upon start-up of the new facility. This is a mill circuit change. Generally, it is the environmental control technology which is upgraded, not the mill circuit. The new impoundment to receive all tailings is considered to be state-of-the-art environmental control. Only adjustments necessary to meet current standards would be required.

3. One commenter asked what specifics will guide decommissioning of the old mill.

Cotter must submit to the Department detailed plans for decommissioning, decontamination, and reclamation of the old mill before dismantling is to begin. Decommissioning the whole mill site is covered by a surety agreement between Cotter and the State which provides over \$10,000,000 if Cotter should fail to properly reclaim the millsite, and tailings impoundment in accordance with state and federal guidelines and requirements.

4.3.2.3 Several commenters asked if residues from outside Colorado will be reprocessed in the old mill.

Upon license renewal, use of the original mill facility is limited to processing of tailings and wastes derived from that facility (see also 4.7.2.3). To process other residues in either facility Cotter must apply for a separate license amendment and demonstrate that neither the mill environment nor the mill circuit will be significantly impacted to the detriment of primary uses or requirements.

4.3.3 License conditions relevant to removal of existing ponded tailings and reprocessing are: 18.A. and 21.A.

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4.4 Authorization to operate the new mill

4.4.1 Cotter, with an aging mill and with tailings control needs, decided in the mid-1970's to design and construct a new milling facility. Alternate mill sites and alternate mill process technologies were evaluated. The only significant option, that of producing a wet final product, was beyond the company's control (that is, the two firms which further process Cotter's product could not accept a wet raw feed material). Construction of the new mill was for all practical purposes complete by mid 1978.

4.4.2 Several comments addressed the issue of alternative mill sites and circuits.

4.4.2.1 One commenter asked whether the new mill will be considered an expansion under the present license or will it receive a new license.

Cotter applied for renewal of existing license Colo. 369-01S and or amendment to include the newly constructed facility and new impoundment. The Department, which determines how licensing will occur, agreed that one license for the whole millsite was preferable. Within the structure of an amendment to the existing license, the old and new mills, old and new tailings, and off-site monitoring and control will all be regulated by appropriate license conditions.

4.4.2.2 A group of related comments all bear upon the suitability of the present location for the expanded facility. One commenter asked whether a mill would be allowed at the present site if the application were wholly new with no operating mill already on-site. A second commenter stated that "Location of a mill so close to a population center does not meet NRC guidelines" and similarly, a location so close to a major water supply would be precluded. Several commenters did not see logic in authorizing the expanded mill if the new mill cannot reprocess the old tailings and would not be allowed at the location under NRC new mill guidelines.

First, the NRC guidelines are performance objectives, not regulations. Second, the guideline recommending location of uranium mills and tailings away from populated areas is intended for land use control, to minimize conflict between the need to keep uranium mill tailings isolated and free from disturbance for long times and the need for land onto which a community can expand. Any mill, wherever located, must meet strict regulatory standards for control of air and water emissions, control of occupational and public radiation exposure, mill safety and accident prevention, and so on. The new and old mill operations are being licensed because it appears that stipulations to protect public health and safety will be met.

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Further to the question of distance from a populated area, the appropriate public health criterion is that no individual member of the general public at or beyond the millsite boundary shall receive from uranium fuel cycle facilities more than 25 millirems per year above average natural background (which is 150-250 millirems). NRC calculations indicate that the Cotter mills may possibly exceed this limit at one location. If the facilities, as measured during operation, cannot meet the standard, effluent controls must be improved, throughput reduced, or other means devised to satisfy the Department that the required control is being achieved. The NRC and EPA have not recommended denial of the license request as reviewed.

With respect to the Arkansas River, impact on the river will be zero with negligible discharge to groundwater expected from the new impoundment.

4.4.2.3 Several commenters asked what real analysis of alternative mill sites occurred. One commenter stated that if Cotter agreed in writing to assume all financial risks of having proceeded with mill construction, the state should defer or deny licensing the new mill until alternatives are more fully assessed.

Alternative mill sites were considered in conjunction with alternative tailings disposal sites (4.2.2.6). The Department is satisfied that Cotter has adequately examined alternative mill sites, within the context of the transition period timing of Cotter's application (in relation to new NRC guidelines and new Colorado regulations).

4.4.2.4 Several commenters asked about alternative mill circuit processes such as nitric or hydrochloric acid leach and removal of radium and thorium in the mill circuit.

Cotter considered alternative mill circuit engineering before choosing the sulfuric acid leach method. The Department focused on environmental controls for the chosen process, rather than on metallurgical or economic arguments. Mill removal of radium and thorium is still an experimental approach, according to the NRC Generic Environmental Impact Statement on Uranium Milling (8.13), and may pose very serious radiation hazards to workers in the mill areas where concentration occurs. Two other alternatives, belt dewatering and asphaltizing of tailings were not considered to be feasible or desirable at this time, as discussed in 4.2.1.3 and 4.2.2.2.

4.4.2.5 One commenter asked whether authorization for the new mill should be deferred until complete data and an "outside review" of groundwater contamination has occurred.

As stated previously, the groundwater situation is being dealt with in any case and does not bear directly on the licensing of the new impoundment, which is designed for zero discharge. The new mill, which must be operated to meet strict public health standards, will not be impacting groundwaters.

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4.4.2.6 One commenter inquired whether the EPA has ever concurred with licensure in any respect but in the pre-licensing construction exemption for the new impoundment.

EPA provided valuable comments on the applicant's environmental reports and received Cotter's responses. The EPA is as concerned as other reviewing agencies to see the existing tailings removed as a source of groundwater contamination. The EPA has no official authority to approve or disapprove the license application, but has provided technical review and made recommendations as requested by the Department.

4.4.3 License conditions related to the new mill facility authorization and operation are: 14, 15, 22, 23, 24, 25 and 26.

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4.5 Environmental data-gathering and inspections

4.5.1 Extensive environmental data have been submitted by Cotter and gathered independently by the Department and others. Monitoring programs for air, water, soil and biota are specified in reports and correspondence in great detail. Routine inspections follow established protocols. All areas of interest are addressed.

While the Department has requested or sought to obtain considerable additional information, greater emphasis will be placed in the future on summarizing and interpreting data already being collected. To this end, the Department will require Cotter to prepare monthly and quarterly working summaries of some data sets and to prepare a printed annual report of much of the monitoring data.

4.5.2 The comments received on data-gathering and inspection were miscellaneous and are answered only in part below. The commenters should contact the Radiation Control Section if more specific replies are desired.

4.5.2.1 One commenter asked if currently available information is complete enough to make a licensing decision under RH 3.8.8 of Colorado's Rules and Regulations Pertaining to Radiation Control.

RH 3.8.8.1 requires information "to assist the Department in the evaluation of the short-term and long-range environmental impact of the project and activity so that the Department may weigh environmental, economic, technical, and other benefits against environmental costs, while considering available alternatives." Cotter provided voluminous information in its environmental and design reports and has provided numerous other submissions. Where data have been available, they have been provided. Geohydrological studies are continuing but do not need to be completed before a licensing decision. More than adequate information is available for license decision making.

4.5.2.2 One commenter asked if data in the various environmental reports submitted by Cotter in support of the license application are adequate in quality.

1. Specifically, the commenter asked if the state or NRC has audited the quality of past monitoring and ER data.

Past Cotter monitoring data has been reviewed during annual inspections by the Department. Split samples have been taken and compared. A complete audit has not been made and would be very difficult to make. Recent Los Alamos Scientific Laboratory sampling confirms previous data.

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2. The same commenter asked why the Nalco and Wahler reports are regarded as so different in quality and wondered which is right. The commenter cited uranium air data and gamma levels exceeding standards (Nalco II-10-1) but disregarded by NRC and asked if more recent data had been gathered. The commenter cited lack of natural and epidemiological baseline data and a lack of statistical analysis in the Nalco and Wahler reports.

The Department recognized and called attention to several shortcomings in the Nalco ER. The water data are much more valuable than are the air data. The NRC simply did not feel the air data were reliable enough to use in computer models or to draw conclusions from. Other acceptable air data were then obtained.

Because a mill has operated since 1957 at the site and background data were not taken before then, baseline data are simply unavailable. Comparisons to other data sets must be relied upon instead. Better quality data have been obtained recently and have been subjected to extensive statistical analyses. The Department is presently attempting to get further epidemiological data for the area.

4.5.2.3 Several commenters asked the following questions concerning inspections: What is Department policy on inspections? On announced versus unannounced visits? On when to proceed with enforcement action? What independent data-gathering is done by the Department? What cross-checking of Cotter data is done? How often? What methods give the best cross-check? Does the Department calibrate all instruments before going on inspections? What were the results of the one unannounced inspection of Cotter's mill in 1974?

Routine inspections of uranium mills are scheduled every 12 to 18 months. The inspector looks first to aspects of the operation which present the greatest hazard or which have shown the greatest past problems. Calibrated measuring instruments and sampling pumps are used.

Violations of regulations are cited as items of non-compliance and corrective action procedures must be specified within twenty days. Recommendations are made for improvement of aspects of the mill operation which are in compliance but need attention. Repeated or serious violations are subject to legal enforcement action.

Unannounced inspections are used selectively, with a specific purpose. For a site like Cotter's, with a security gate and perimeter, unannounced inspections have less value and generally reveal the same problem areas as are found in routine inspections. A few unannounced inspections are conducted.

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Independent sampling is included in each routine inspection. The Canon City area has had several other visits each year. Samples are sometimes split with Cotter to check agreement of results. The new monitoring requirements placed upon Cotter will also mean more split and independent sampling by the Department and other concerned agencies.

Results of all inspections and sampling can be viewed in the compliance files of the Radiation and Hazardous Wastes Control Division.

4.5.2.4 Several commenters questioned the lack of information about airborne particulates and radon gas emissions.

1. One commenter asked why the meteorological monitoring equipment was off-line so long and how one possibly atypical year of meteorological data was adequate for the state review and NRC modeling.

A full year's on-site meteorological information was gathered and found adequate for the NRC's dose model calculations. Information for longer time periods was available from the Pueblo area and was also utilized by the NRC.

2. Another commenter asked what will be done to achieve and monitor dust control with the increase in open ore pile storage for the new mill.

Greater ore storage dust potential will require greater care and more extensive monitoring, as stated in proposed license conditions.

3. One commenter asked what measurements have been made of dust deposition on vegetation, in addition to that described in Nalco at II-9-4, and whether a multidirectional monitoring program for dusts on vegetation will be established.

Cotter is required to sample airborne particulates and radon gas as part of routine operational monitoring to demonstrate compliance with regulatory standards for the mill environment and at the site boundary. Independent air sampling has and will be done by the Department.

Vegetation sampling will be conducted three times annually during the grazing season (April, July, October). Analysis will include uranium, radium-226, and lead-210. Locations will be at the south, east and west site boundaries, at the nearest residence, and at a control site.

4.5.2.5 One commenter asked why Cotter has been allowed to do such inadequate soil sampling, what sampling has been done by the Department, and what soil sampling has been done in the Sand Creek bed.

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The Department has soils data from Cotter and its own sampling for several locations in past years. Records of the soil sampling which has been conducted are available at the Radiation and Hazardous Wastes Control Division. An extensive sampling grid has been established by Cotter to provide more adequate baseline monitoring soils data. Recent samples by the Department and the Los Alamos Scientific Laboratory indicate background levels of uranium in the Sand Creek bed.

4.5.2.6 Several commenters stated that accumulation by way of the human food chain from irrigation with contaminated well water or by airborne dusts on gardens or grazing land has received little attention. Miscellaneous questions included: Will thorium-230 accumulate significantly? What are the concentration factors of significant radionuclides and trace metals? Will these substances enter the food chain? To what extent? Will area gardens be contaminated by airborne dust? What animal sampling was actually done? Do data from two rabbits (Nalco report) tell anything?

Bioaccumulation by vegetation from irrigation water depends on which crops are actually being watered. By and large, local well water is not used to irrigate gardens, lawns or pastures. Where well water is used, the acreage involved is small.

Pollutants contained in water are not taken up by biota equally. Many are discriminated against. For others, specific bioaccumulation pathways exist. As explained previously, molybdenum accumulated from alfalfa and other legumes may cause problems in cattle at high enough levels. Significant molybdenum accumulation by man is unlikely, however, at the levels found in Lincoln Park well water.

Because the most likely pathway of radioactivity to humans, from forage to beef cattle, involves limited, seasonal irrigation, because usage of well water on gardens is limited, and because usage of garden vegetables by humans is limited, the food chain contribution is minimal from well water radioactivity.

Airborne, ground-deposited particulates will result in slight radioactive contamination of grasses and vegetables. The NRC included vegetation and meat pathways in its estimates of individual doses from atmospheric transport. Environmental transfer coefficients are listed in Revision 1 of NRC's environmental assessment (3.14).

Occupants of the nearest residences were assumed to ingest beef from animals grazed in the immediate millsite vicinity and to ingest vegetables grown at their own residences. For the nearest residence in the prevailing downwind direction, the highest dose predicted is to bone--a total of 23 millirem per year, which includes contributions of 13 millirem per year from eating vegetables and 6 millirem per year from eating beef. This is about ten percent of background.

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These model calculations use assumptions which tend to overestimate doses, providing a margin of safety. Operational off-site monitoring will provide the necessary data to evaluate actual deposition and to improve dose estimates. Transfer to humans by way of dietary food chains, which involve airborne contamination to garden plants or forage, is expected to be very small.

Animal sampling will be permitted only with specific justification of the purpose. A small sample from an animal population provides indicator data of minimal value.

4.5.2.7 One commenter asked why the Department can't provide clear reports to residents in standard form when well water or other samples are taken for analysis.

The Department expects that Cotter's annual monitoring report will provide residents an overview of significant trends in the data. Specific data can be requested from the Radiation and Hazardous Wastes Control Division. The Division will send sampling results to individuals whose wells or property are visited with an interpretation of the results. Part of the problem stems from the long time frame (2-6 months) during which various analyses are completed on any given sample. The Department recently hired a health physicist to conduct this sampling and reporting program but other programmatic demands have prevented this desired effort.

4.5.3 License conditions which specify directly or by reference monitoring, record-keeping, and reporting requirements are as follows: 16, 17, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31 and 34.

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4.6 Public health hazards and risk/benefit analysis

4.6.1 Radiological hazard evaluations were made for both in-plant and off-site environments. In December 1980, the EPA's requirement to limit general population exposure from nuclear fuel cycle facilities will go into effect. This limit will be 25 millirem to any organ of any off-site individual per year and must be met by the Cotter mill facility. Off-site dose calculations, based upon theoretical and conservative evaluations (which may not be realistic for actual mill operation) indicate the mill may exceed the 25 millirem limit at one presently inhabited location. If this limit is exceeded, during actual operation (as confirmed by actual off-site measurements), Cotter will be required to reduce the mill emissions accordingly. If the emissions cannot be reduced to the required level, by additional control measures, the mill production rate will have to be reduced in order to insure compliance.

The EPA standard is responsive to recent Congressional action. Congressional hearings and media publicity have generated renewed interest in low level radiation risks. The forthcoming report to the National Academy of Sciences Committee on the Biological Effects of Ionizing Radiation (BEIR) will address this topic in updating two previous reports. Preliminary conclusions are that present standards seem adequate for most radiation types.

The Department compared the routine and accidental releases of contaminants from the Cotter facility to levels and limits for similar facilities. In particular, Cotter was required to evaluate alternate drier stack technologies for uranium releases. Cotter is in the process of acquiring additional land to the north and west of the millsite to preclude closer encroachment of residential development.

4.6.2 Public comment concentrated on radiation exposure risks. Comment concerning possible accidents was also received.

4.6.2.1 Several commenters inquired about the medical implications of the present facility.

1. Commenters asked whether there is a recognized danger from low level radiation in general, whether scientific reassessment and a downward revision of standards is currently underway, and if research information on low level radiation is lacking.

The basic assumption of radiation protection is that all radiation exposures may cause detrimental effects. National and state policy is to keep radiation levels as low as is reasonably achievable (ALARA).

Only in certain animal studies have large enough populations been observed to evaluate genetic and other effects at low doses. Incidental human exposures, such as at Hiroshima and Nagasaki, for radium workers, and for uranium miners, yield data from which conclusions about low doses are at best speculative.

Radiation is probably the most researched environmental insult known.

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The BEIR committee has reviewed recent studies and found no basis for changing most present standards.

2. One commenter asked if a radiation hazard of any kind due to low level radiation exists in Canon City and whether a low level radiation danger exists due to the present Cotter mill. The commenter wondered if the new mill will add to any danger. Another commenter asked how the Department can issue a license allowing any increase in radiation to occur.

For a population the size of Canon City or even Fremont County, few if any incidences of disease can be theoretically attributed to natural background radiation dose equivalents of 150-250 millirem per year. Natural radiation dwarfs and obscures any contribution of airborne or waterborne Cotter mill emissions which might add radiation levels in the Canon City area.

As explained in 4.6.1 above, the Cotter milling facility must not exceed 25 millirem per year to any resident. This is 1/6th to 1/8th of natural background. This value would most likely be exceeded only at the nearest residence to the site boundary, if at all, and can be expected to decrease to near zero within a few kilometers. Since the prevailing downwind direction is to the east away from Canon City, little if any population exposure increment above background is expected.

A significant, demonstrable impact on public health and safety is necessary before the Department can consider delaying or denying licensure.

4.6.2.2 Several comments were directed specifically to the EPA 25 millirem per year criterion.

1. Several comments raised a general question about the adequacy of the standard itself: Why does it include only uranium-238, thorium-230 and radium-226 from ore dust and tailings but not include radon and its progeny?

The EPA provided the best standard which could be developed and defended based on available technical data. Adequate studies have been lacking for radon and its progeny. EPA will revise the standard to be more inclusive when a more sound technical basis is achieved. As it is, the 25 millirem per year standard is regarded by many radiation protection experts as highly restrictive and conservative, and possibly even impossible to measure.

2. Several commenters asked whether the NRC assessment of off-site doses compared to the 25 millirem standard includes past airborne contamination, contamination which may have moved to Lincoln Park via the Sand Creek drainage, an additional contribution from tailings reprocessing, and contributions from continued operation of the old mill until reprocessing is authorized.

The NRC evaluated all aspects of the expanded milling facility, including ore piles and all tailings and the use of the old mill for reprocessing. By comparison with those from on-site sources, radioactivity levels associated with off-site sources are small and were not included.

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In NRC's assessment, occupants of individual off-site residences were assumed to ingest beef from animals grazed in the immediate site vicinity and to ingest vegetables grown at their own residences. Additional evaluation of the more indirect dietary pathways is being done by NRC, at state request.

3. Several commenters wondered how the Department can license the mill complex when projections indicate possible noncompliance with the EPA standard. One commenter asked why Cotter Corporation isn't required to alter or adjust their operation before startup rather than after operations have begun.

The NRC numbers are only calculations based on simple assumptions in a mathematical model and are highly susceptible to variation in the quality of the data available. Requiring engineering changes based on calculations which can have a several-fold uncertainty is not justified. Actual site boundary and off-site measurements will provide a far better indication of compliance or noncompliance with the EPA standard.

4. One commenter asked who will confirm the off-site measurements and what agency will enforce the decision if mill production must be reduced.

The Department will continue to measure off-site radioactivity levels and will enforce compliance with conditions of licensure. The assistance of NRC and EPA may be requested.

4.6.2.3 Several commenters dwelt upon the meaning of epidemiological data for Fremont County.

1. Commenters asked what epidemiological studies have been conducted to determine radiation risk and effect. Related questions included: Why are Fremont County cancer mortality rates twice the Colorado average? Is age adjustment really an adequate explanation? What is the Department's explanation of the case of possible human mutation? Will the Department conduct additional epidemiological studies (an age-corrected study of past and continuing cancer deaths by kind of cancer)?

The Department's epidemiologist has made retrospective analyses of cancer mortality data for Fremont County and, after adjustment for population age structure, has found no significant difference in levels or trends from the Colorado average. Population age adjustment is an appropriate and necessary practice in the review of morbidity and mortality statistics.

Regarding the mutation case mentioned, radiation injury in which cause and effect can be directly inferred does not occur at exposures so near to natural background levels as those from ore dusts and tailings. Skeletal deformity is possibly hereditary, from occupational exposure to gene-breaking substances during pregnancy, or due to some other environmental factor.

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The Department intends to seek more comprehensive epidemiological data around the Cotter uranium millsite. Existing data for Fremont County are limited because the relatively small hospitals in Canon City and Florence have not yet funded a local abstractor in the Colorado Cancer Registry system. Through efforts of the Department's Executive Director, staff, and key state legislators, the cancer registry budget for the fiscal year beginning July 1, 1979 has nearly doubled and the registry will be able to assist hospitals not yet having their own abstractor.

2. Two commenters asked how the Grand Junction leukemia study (Colorado Disease Summary, February 24, 1979) relates to Canon City and whether there is any change in the conclusion that in Grand Junction no significant correlation exists between living in a house overlying tailings and cancer incidence.

An NRC grant has funded the disease incidence studies in Grand Junction, which is a completely different situation from Canon City. In Canon City, the Cotter tailings have been and will be permanently isolated on the mill-site. In Grand Junction, loss of control of tailings from an old AEC mill-site led to use of tailings under and around structures.

The studies have shown increased leukemia in Mesa County, but no association of leukemia incidence with tailings. Of 44 cases only 2 were involved with structures underlain by tailings. The two victims had lived in the structures only 1 and 4 years respectively; induction times for leukemia are usually longer. No excess incidence of lung cancer was identified.

3. One commenter asked how the Department explains news media statements about the inadequacy of epidemiological studies and knowledge in the Denver area regarding Rocky Flats.

The Department's concern about the lack of epidemiological data was to quell speculative uses of limited data and was not to raise alarm. Expansion of the Central Cancer Registry will provide better data, necessary before more scientifically sound conclusions can be drawn regarding Rocky Flats or the Cotter mill.

4. One commenter asked whether the license decision should be deferred until new epidemiological and health effects studies are complete.

As stated previously, a significant impact, demonstrated or probable, on public health and safety must be involved before license deferral or denial is warranted. Additional analysis of the new cancer registry data will be made; however, the Department's position is that no justification exists for delaying licensure to await results which may likely be of marginal value.

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4.6.2.4 A number of commenters were concerned with catastrophic accident potentials. Commenter questions included: What evaluation of catastrophic accidents has been made? What releases would occur from a fire in the new mill? What liabilities does the Department incur in the event of an accident at the Cotter facility? In the event of a flood?

Cotter evaluated possible accident circumstances in the ER and in several later submissions. Releases from catastrophic fires or floods were estimated. The mill facilities are engineered to prevent and contain fires, reagent spills, and reagent vapor releases. Accident prevention and response measures are already in existence for the old mill and are required by license condition.

4.6.2.5 Several commenters concentrated on transportation accident potentials.

1. One commenter asked if ore transport, calculated to have an accident frequency of once per 22.2 years, presents a severe hazard because at least one accident will occur during the life of the new mill.

A finite accident risk does exist, but one not out of the ordinary for the trucking industry. Any ore spilled presents little greater hazard than any other rock naturally high in uranium. Past Department experience with such accidents indicates that they pose little or no hazard to the public or the environment.

2. Another commenter asked who will respond to a railroad yellowcake accident that occurs en route to the Kerr-McGee plant and included several related questions: What if the accident occurs near a water course which is a water supply? What remedial action will be taken? What if the accident occurs in a densely populated area?

The carrier is liable for initial response and final cleanup. However, Cotter is required to provide technical assistance in accident situations. Regulatory agencies will be involved from the start to see that public health and safety is not threatened and that remedial action is adequate. Appendix B of Cotter's License Application Summary and Safety Review (3.12) contains Cotter's transportation accident response guide.

3. One commenter inquired if transport of residues for reprocessing at Cotter from outside Colorado will increase the transportation accident risk and whether provisions for medical indemnity exist for such accidents.

Reprocessing of out-of-state residues will only be allowed under separate, special license amendment after thorough environmental review, including reviews of any special transportation accident potentials. The license contains no special provisions for "medical indemnity" to persons adversely affected by transportation accidents. Such indemnity would have to be sought against Cotter and/or the carriers through statutory and common law remedies.

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4.6.2.6 One commenter inquired about what scientific risk versus benefit or cost versus gain analyses have been made. The commenter asked if any quantitative risk assessment has been made, using a Delphi technique to pool expert opinion where information is deficient and cannot reasonably be obtained. Whether a risk assessment had been made for Canon City residents only was also asked. The commenter wondered if the uncertainty of risk estimates has been substantively addressed, even if procedural requirements are met, or stated by the commenter another way: "On the basis of available data, can the Department reasonably assure the citizens of Canon City regarding their health and safety?"

The NRC environmental assessment provides a basis for examining the radiological impact in relation to the EPA fuel cycle standards. Other impacts such as floods, in-plant fires, earthquakes, subsidence, and off-site groundwater contamination were also thoroughly evaluated by the various agencies.

Quantitative risk assessment, of the mathematical sort used by the technology assessment and risk modeling community, was not formally applied during the review.

The Department's position is that adequate information was available to evaluate the "short-term and long-term environmental impact of the project" and to "weigh environmental, economic, technical, and other benefits against environmental costs", as prescribed in RH 3.8.8.1 of Colorado's Rules and Regulations Pertaining to Radiation Control.

4.6.3 License condition pertinent to this section is 22.I.

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4.7 Procedural and other miscellaneous issues and concerns

4.7.1 The major procedural issue which has been raised is compliance by Cotter with the prelicensing construction restrictions introduced into Colorado's Rules and Regulations Pertaining to Radiation Control in April of 1978 to limit major construction of licensed facilities prior to license approval. Cotter's mill construction was about half completed in April of 1978 and the company contended they were not bound by the regulation and therefore should not be required to cease construction.

The purpose of this regulation is to assure that no facility requiring licensing is constructed without approval or probable approval of the license by the Department. Cotter had already expended approximately \$20,000,000 in mill construction as of April 1978, when the new Colorado Rules and Regulations became effective. By the time correspondence was exchanged and legal consultations occurred concerning the new mill's status under the regulations, it was essentially completed. The Colorado Attorney General's Office did not recommend seeking any injunctive action because (a) it was arguable whether the prohibition could be applied to a facility for which construction had begun prior to its effective date and (b) the facility could not be operated without the approval of a license in any event.

Construction of the new impoundment was only in the site preparation phase during early 1978. Due to major unresolved issues with the tailings impoundment liner system, Cotter was ordered to halt its construction. These issues were resolved in February 1979 and Cotter was granted an exemption in accordance with the Regulations to complete construction of the impoundment. The Department, NRC and EPA felt construction should be completed prior to spring snow melt to avoid serious erosion or other problems during construction.

Financial surety for millsite cleanup at the end of operations and for long-term monitoring and maintenance were complex but vital issues. Under the Colorado Rules and Regulations Pertaining to Radiation Control, the applicant must provide these sureties prior to license approval. The necessary surety agreements have been established in cooperation with the Attorney General's Office and State Treasurer's Office. A financial surety is established for decontamination, decommissioning and reclamation of the mill site and final stabilization of the tailings pile. The long-term care surety will provide for annual monitoring and maintenance of the tailings area in perpetuity.

4.7.2 A variety of procedural and miscellaneous comments are grouped below for response.

4.7.2.1 The question of whether completion of the new mill without a prelicensing construction exemption is sufficient violation of Department regulations to justify license denial was raised repeatedly. Commenters asked for details on why impoundment construction was halted but completion of the new mill was allowed. They asked what construction occurred between April 1978 and February 1979. One commenter asked why NRC guidelines, requiring review to be complete before construction begins, were not followed. Another commenter suggested Cotter has by reason of its preemptive action on construction made itself liable for greater costs. One commenter asked about a letter from Governor Lamm, suggesting that prelicensing construction may be grounds for license denial.

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To amplify the discussion of 4.7.1, a prelicensing construction prohibition guideline compatible with NRC guidance was incorporated into the April 1978 revision of Colorado's radiation control regulations as RH 3.8.7. Cotter raised legal and procedural questions about how the provisions of RH 3.8.7 should be applied to the Canon City mill expansion. By the time these issues were resolved between Cotter and the Department, in consultation with the Department of Law and NRC, construction of the new mill was essentially complete.

Cotter has stated in writing that no pressure toward licensure would be placed upon the Department because of prior mill completion and that Cotter accepts full responsibility for any economic consequences to itself from the situation. During the nearly two years of thorough review by the Department, with concomitant delays to Cotter, Cotter has not pressured the Department because of the idle mill.

Construction of the new impoundment was only beginning in the summer of 1978, so that the Department was able to invoke the provisions of RH 3.8.7. The letter of Governor Lamm simply explained, based on representations to him by the Department, the existing situation, regulatory provisions, and possible action.

4.7.2.2 Several commenters asked about the financial surety agreements: Are they already in place? Does long-term care consider geologic time frames and include vegetation control? Is cleanup of off-site contamination provided for? What is the obligation of Cotter to third parties after decommissioning? Who will have ultimate ownership and responsibility for the site?

Both financial surety agreements are complete. Cotter's decommissioning and reclamation bond is over \$10,000,000. Interest, above inflation, from the long-term care fund will provide in perpetuity annual monitoring and maintenance money of over \$7,000 per year. Provision is made for air, water, soil and vegetation sampling, repair of erosion damage, fence and road maintenance, vegetation and rodent control, and labor costs. Stabilization over geologic time frames is one of the design criteria for the tailings disposal and reclamation requirements.

Cleanup of off-site contamination is provided for by license conditions. Great change, in the direction of significant improvement or amelioration of the problems, can be expected by the time final millsite decommissioning plans are set. As stated previously, Cotter will be required to conform to state-of-the-art at the time of millsite decommissioning and reclamation. Liability of Cotter for damages resulting from the condition or use of the property after decommissioning would be determined by statutory and common law; and transfer of ownership of the property would also transfer some, but not necessarily all, legal liability to subsequent owners.

The permanent tailings disposal site will most likely pass to federal

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4.7.2.3 A number of commenters expressed concern that Cotter's impoundment might become a "radioactive wastes dump", receiving material shipped in from other states or from Denver's radium sites.

Cotter and the Department have no intention of allowing the tailings impoundment to receive anything but residues generated by their milling operation and the small amounts of waste from Cotter's own operations at Canon City, at the Schwartzwalder mine, or at the licensed Whitewater ore buying station. For Cotter to reprocess other residues, a specific license amendment and extensive evaluation are required. Other waste disposal is neither intended nor being considered for licensure at this time.

4.7.2.4 Several miscellaneous comments can be grouped under the heading "What is necessary to cause the license decision to be denied?".

RH 3.9 of Colorado's Rules and Regulations Pertaining to Radiation Control contains general requirements for the issuance of specific licenses. The applicant must be qualified and the facilities adequate. Issuance of a license must not be found to be inimical to the public health and safety. Financial surety agreements must be in place. Applicable special requirements of the regulations must be met. Finally, the Department must conclude, on the basis of the information filed and the evaluation made, that the action called for is issuance of the proposed license with any appropriate conditions to protect environmental values (RH 3.9.6).

If the determination is made that these provisions are met, a license containing stipulations necessary and sufficient to protect public health and safety and environmental values must be issued. Conversely, if these provisions cannot be or are not being met, the license must be denied.

1. Several commenters asked about the time frame for a license decision and if all questions must be answered beforehand. Other commenters asked if the license decision shouldn't be postponed until groundwater and epidemiological questions are answered.

Other than the requirement for in the State Administrative Procedure Act, to act on a license application "promptly" (C.R.S. 1973-24-4-104(8)), no time limit is placed on review of the ER and application. If longer than one year is required, the Department must inform the applicant why (RH 3.8.9). All questions will generally be answered or determined to be not relevant or low in significance. The groundwater and epidemiological studies are ancillary, with the anticipated results not required before making a licensing decision.

2. A group of commenters asked why the license decision shouldn't be postponed until an "outside assessment" is done. The group proposed that a citizen oversight committee be formed to do audits, inspection and monitoring and that the committee be included as a license condition.

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The over two-year multi-agency review of the Cotter ER, application and other submissions has been one long, continuous outside review, with various agency experts and consultants scrutinizing company proposals in detail. Government is funded by the taxpayer to perform such reviews with a critical professional eye, thereby providing the general public reasonable assurance that when licensed the project will proceed in a safe manner.

The Department's position is that a citizen oversight or monitoring committee might receive further consideration, depending on the roles envisioned. Citizen groups and individuals devoted considerable volunteer time to commenting on the Cotter project proposals. The Department does not plan to include such a committee in any license condition, since the license specifies what Cotter is required to do, not what will be done by the Department or by outside entities.

3. One commenter expressed chagrin that petitions such as one in 1977 and another in 1979 are viewed as having little relevance to the licensing decision. The commenter asked what effect a community election would have. Other commenters stated that in view of the degree of community controversy, licensing should not proceed. Several commenters inquired how moral and value judgements enter the decision process.

The Colorado General Assembly, to which the citizens of the Canon City area elect representatives, has designated the Colorado Department of Health as the radiation control agency of the state and charged it with the sole responsibility for issuing licenses pertaining to radioactive materials pursuant to regulations promulgated by the Department. The state's radiation control act expressly states that no other agency or branch of the state shall have such power or authority. (C.R.S. 1973, 25-11-103.) The current rules and regulations pertaining to radiation control, including licensing of radioactive materials, were promulgated in accordance with the radiation control statute and the State Administrative Procedure Act (C.R.S. 1973, 24-4-101, et seq) and became effective April 1, 1978.

Citizen petitions and community elections are not part of the licensing procedure as established by statute and regulation. Citizen participation has been provided for in this license application consideration by means of opportunity for public hearing and an additional public comment period. The Department's position is that the ER and license application review is a technical evaluation of scientific and engineering information and compliance with regulations and envisioned license conditions. To the extent public input has addressed these issues, it has been considered in the Department's decision.

4.7.2.5 A large number of commenters asked whether Colorado law and policies provide adequate radiation control.

1. One commenter wondered if present radiation control regulations are viewed by the Department as adequate. The commenter asked what impact future changes (tightening) might have. Several commenters asked if the Department had adequate mill licensing staff and if the Department is capable of "enthusiastically applying its power."

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Colorado revised its regulations governing uranium mills in April 1978, ahead of the publication of NRC guidance. Colorado's provisions have anticipated all major changes presently being instituted by NRC. The Department openly solicits suggestions for improvement ("tightening", or for greater self-consistency) of its regulatory framework.

The Department will be seeking additional staff to meet the increasing workload from four major new uranium milling applications, from renewals and amendments, and from regulatory inspections, investigations and enforcement actions. Staff increases are, however, subject to legislative budgetary approval. The Department attempts to apply its authority fairly, as prescribed by law, in a way most likely to protect public health and safety.

2. One commenter asked if a point by point decision process was followed. One commenter asked if the concerns of the Department's October 23, 1978 letter to Cotter were addressed. Other commenters asked how internal disagreements among agency experts were resolved and if Department staff are antagonistic to concerned citizens.

The Department's May 1978 Uranium Mill Licensing Guide (8.15) outlines the step-by-step process and timetable for review of a uranium mill ER and license application. Over the months following the October 1978 letter, Cotter provided considerable additional information, including their responses to agency comments on January 11, 1979. Alternate viewpoints were reconciled either in meetings, or by telephone for relatively minor disagreements. The Department staff welcomes informed comment on any licensed or proposed project and tries to be responsive, so far as workload permits, to all citizen inquiries.

4.7.2.6 Several commenters asked what precedents for other mills will be set if Cotter is licensed as proposed. Another commenter asked what relationship impacts from the Cotter project have relative to the proposed Cyprus Mines project and others in the Canon City area. The commenter asked what authority the Department has to consider cumulative impacts of several mills in a licensing review.

Cotter's site circumstances, with an existing mill licensed formerly by the AEC and with a mix of tailings ponds and piles, differ from those described in any new mill application that Colorado is presently evaluating. The degree and type of long-term care surety negotiated with Cotter may set a high standard for other mills, as does insistence by the Department that tailings generally be dewatered.

Certain regional impacts, such as to transportation networks and to community job structures, may well become cross-related when the Cyprus project is reviewed. If the Department feels that assessment of cumulative effects is appropriate to make the determinations required by RH 3.9.6 (see section 4.7.2.4 above), such effects will be considered.

4.7.2.7 One commenter asked what influence cost to Cotter had in Department consideration of mill siting and tailings management alternatives.

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STATE OF COLORADO
COLORADO DEPARTMENT OF HEALTH
RADIOACTIVE MATERIALS LICENSELicense Number Colo. 369-01S

(Amendment No. 11)

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17. G. The licensee shall immediately upon discovery notify the Director, Radiation and Hazardous Wastes Control Division, Colorado Department of Health, 4210 East 11th Avenue, Denver, Colorado (telephone 303-320-8333) by telephone and telegraph of any failure or imminent threat of failure in an earth dam retention system which results or may result in a release of radioactive material into unrestricted areas. This requirement is in addition to the requirements of Part IV, State of Colorado Rules and Regulations Pertaining to Radiation Control.
18. A. The old tailings piles and ponds shall be completely removed by January 1, 1987 unless otherwise authorized by the Department and their sites decontaminated and reclaimed in accordance with references 10, 11, and 17 listed in Condition 9. A.
- B. The new tailings impoundment shall be dewatered and reclaimed in accordance with references 11, 12, 13, and 17 listed in Condition 9. A. If the finger drain system fails to expeditiously remove all gravitational water at the completion of mill operation, then the well system shall be used.
- C. The final tailings reclamation shall be in accordance with all applicable state and federal regulations and standards in effect at that time. Adjustments to the reclamation plan to meet applicable requirements may be required of the licensee as a result of the first two years of the post-reclamation monitoring program.
- D. Upon reclamation and decommissioning of the site and termination of the operating provisions of the license, the licensee shall be subject to restrictions including but not limited to the following:
- (1) The holder of the possessory interest will not permit tailings material to remain exposed or be released to the surrounding area.
 - (2) The holder of the possessory interest will prohibit the erection of any structures for occupancy by man or animals.
 - (3) Subdivision of the covered surface is prohibited.
 - (4) No private roads, trails, or rights-of-way may be established across the covered surface.
 - (5) Permanent fencing to preclude entry of people or grazing or browsing animals shall be maintained. Warning signs will be maintained.
19. A. The licensee shall report, in writing, to the Department no later than January 1, 1980 and in its annual monitoring report for 1979, on the routes of present and potential off-site groundwater impaction. If groundwater migration rates and routes are not yet resolved, additional measures to obtain necessary and sufficient information shall be proposed in the report, including specific schedules for implementation.

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19. B. The licensee shall construct, no later than October 1, 1979, a trench to bedrock immediately north of the Sand Creek detention dam, or an alternative monitoring and control system at that location, subject to prior Department approval in writing. Any cause for delay shall be reported immediately and explained to the Department. The trench or wells shall be sampled monthly as part of the off-site monitoring program specified in Condition 30.
- C. (1) The licensee shall continuously pump accumulated liquids from the interceptor trenches immediately below ponds 1, 2, and 3 to the new impoundment. Breakdown repair delay shall be no greater than seventy-two (72) hours, unless otherwise specifically authorized by the Department in writing.
- (2) The licensee shall operate the pump(s) from the Sand Creek pond and the interceptor trench immediately south of the Sand Creek pond so long as contaminated water can be withdrawn. Breakdown repair delay shall be no greater than seventy-two (72) hours, unless otherwise specifically authorized by the Department in writing. Resumption of pumping shall occur within seventy-two (72) hours, unless otherwise specifically authorized by the Department in writing, of reappearance of contaminated water in either the pond or interceptor trench. Should the interceptor trench be damaged, a replacement shall be constructed, to bedrock, with prior approval of the Department.
- (3) The licensee shall have available on site at all times at least one standby or replacement pump for use or installation in case of breakdown and shall have sufficient and suitable pipe available at all times to repair lines carrying contaminated waters to the new impoundment as authorized in this amendment.
- (4) The licensee shall present to the Department by August 30, 1979 a detailed engineering evaluation of the proposed system for depositing waters into the impoundment and measures to mitigate impacts of use of the new impoundment for contaminated waters upon long-term use of the impoundment for tailings disposal.
- (5) The licensee shall maintain daily flow records at each pump-back station and shall sample the impoundment underdrain sump, interceptor trenches, and Sand Creek pond twice monthly, unless authorized to be less frequent by the Department in writing.

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19. D. The licensee, based upon sample data obtained after June 30, 1979, shall propose, no later than January 1, 1980, a set of additional control alternatives to eliminate impacts on off-site wells. Such controls shall be implemented as approved by the Department pursuant to the Department's written order.
- (1) In accord with the letter, Logan to Wahler, of June 5, 1979, if the molybdenum concentration at each of three or more off-site monitoring stations exceeds one (1) standard deviation of the mean of the three previous consecutive monthly samples for that station, additional sampling may be required by the Department.
- (2) If the molybdenum, uranium, or radium concentration at each of three or more off-site monitoring stations exceeds two (2) standard deviations of the mean of the previous three consecutive monthly samples, or exceeds 5 mg/l uranium, or exceeds 5 pCi/l radium, the Department may require one or more additional control measures and disposal of contaminated waters.
- E. The hazard, if any, from contaminated water in the Wolf Park coal mine shall be determined by the licensee and reported to the Department in writing by January 1, 1980. Based on hazard assessment, the licensee shall propose appropriate control measures, if necessary, and shall implement them, with prior written approval of and as required by the Department.
- F. The licensee's program to determine the route, extent, and control of off-site water contamination shall be subject to ongoing review and evaluation by the Department. The Department may order modifications in the monitoring or control measures. The complete program shall continue unless specifically authorized to be discontinued in any part by the Department.
20. Except for the primary crusher, which will be incorporated into the new mill circuit, use of the old mill facilities after 3 months from startup of the new mill shall be limited to liquid reprocessing of the existing tailings piles and associated materials at a rate not to exceed 500 tons per day. Product drying and packaging are prohibited in the old mill facility.
21. A. Continued reprocessing of the old tailings after March 1, 1980 is contingent upon the Department's acceptance of evidence submitted by the licensee that liquid effluents presently being released from all old tailings piles are significantly diminishing.

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21. B. Monitoring procedures and criteria for this condition shall be as proposed in reference 13 of Condition 9. A. and as follows:
- (1) Monthly data from all on-site and off-site water monitoring program stations shall be evaluated.
 - (2) Based upon the mean of three consecutive monthly samples, any off-site locations showing greater than one (1) standard deviation above the mean molybdenum water concentration; greater than two (2) standard deviations above the mean for uranium and radium water concentrations; greater than 5 mg/l uranium; or greater than 5 pCi/l radium shall be sampled at two week intervals until otherwise authorized by the Department.
 - (3) Monthly reports of this program shall be promptly submitted to the Colorado Department of Health.
 - (4) The Colorado Department of Health may at any time order additional sampling.
 - (5) The Colorado Department of Health may at any time order additional control measures or may order the expeditious removal of the remaining old tailings without further reprocessing. Control measures may include but not be limited to withdrawal or addition of water at selected stations.
22. A. The new mill shall be operated in accordance with references 10, 11, and 17 listed in Condition 9. A. at a rate not to exceed a maximum of 3,000,000 pounds of U_3O_8 per year. The licensee shall not operate the new mill beyond its capacity of 1500 tons of uranium ore processed per day on a yearly average nor shall the licensee make any substantive modifications in the operating procedure or process without evaluating the environmental and public health impact of such change and without receiving appropriate authorization by license amendment.
- B. The licensee is hereby exempt from the requirements of RM 4.11 for areas on the property provided all entrances to the property are conspicuously posted with the sign: Any Area or Container on This Property May Contain Radioactive Materials.
 - C. Written operating procedures shall be maintained for all process operations, both startup and ongoing for both mills, and shall incorporate operating instructions and appropriate safety precautions. The employee training program shall include detailed review of the operating procedures applicable to the employee's assignments. Records shall be maintained to demonstrate compliance with this condition.
 - D. For any work or maintenance for which there is no written operating procedure, a Radiation Work Permit describing the specific radiological controls for the work shall be prepared and approved by the Radiation Protection Officer prior to the start of the activities. A copy of these permits shall be maintained for inspection by the Department.

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22. E. Release of equipment and materials from the controlled areas shall be done only after documented decontamination meeting the requirements of the Department.
- F. Eating and smoking in controlled areas shall only be allowed in control rooms, offices, lunch areas or other areas as designated.
- G. The licensee shall conduct at least a 60 minute meeting for mill employees each quarter for the purpose of reviewing radiation protection topics and shall maintain records of employee attendance.
- H. Operations shall be immediately suspended in the affected areas of the mills if any of the emission control equipment for the ore feed or the yellowcake drying or drumming areas is inoperative.
- I. Operating procedures and parameters shall be modified or reduced by the licensee as necessary to insure compliance with EPA standards, or guidelines adopted by the Department, for exposure to individuals or populations off-site.
23. The following safety inspections and audits shall be performed by the licensee:
- A. Each shift supervisor shall conduct and document a daily visual surveillance of all mill areas to insure proper implementation of good radiation safety practices, including good clean-up practices to minimize surface buildup of radioactive particulates.
- B. Weekly inspections by or under the direction of the plant Radiation Protection Officer of process and storage areas and a report to the plant assistant manager on any items of noncompliance with operating procedures, license requirements, or safety practices, including housekeeping practices, affecting radiological safety.
- C. Quarterly plant inspection by the plant Radiation Protection Officer and audit of the weekly inspection reports of (A) above and audit of all monitoring data, both in-plant and environmental, resulting in an evaluation of the data and a written report to the assistant plant manager. The report shall recommend any necessary corrective actions and include an evaluation of the adequacy of the implementation of license requirements.
- D. A semiannual report shall be prepared by the plant Radiation Protection Officer for the assistant plant manager evaluating employee exposures, effluent releases and environmental data to determine (1) if there are any upward trends developing in personnel exposures for identifiable categories of workers, of types of operations or in effluent releases, (2) if exposures and effluents might be lowered under the concept of maintaining exposures and effluents as low as reasonably achievable, and (3) if equipment for exposure and effluent control is being properly used and maintained.

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23. E. The results of sampling, analyses, surveys, and instrument calibrations, reports on inspections and audits, employee training records as well as any related reviews, investigations, and corrective actions shall be documented. All such documentation shall be maintained for a period of at least five years. Personnel exposure records shall be preserved indefinitely.
- F. The scrubber circuit(s) for the calciner/packaging system and the general fumes collection system shall be checked and control readings recorded at least once per shift to document that the scrubber systems are functioning properly.
- G. Workers in the calciner/packaging area shall shower and monitor themselves at the end of each shift. An alpha radiation survey meter shall be available at the exit of the change room. In addition, the licensee shall perform spot surveys for alpha contamination at least quarterly on workers leaving the plant. Alpha contamination on skin or clothes exceeding 1000 dpm/100 cm² shall require decontamination and an investigation by the plant Radiation Protection Officer as to the cause.
- H. The licensee shall conduct alpha contamination surveys of the control rooms, lunch rooms, change rooms, and offices at least weekly. If the surveys reveal contamination levels that exceed the appropriate values in the Colorado Regulations, the area shall be decontaminated immediately and an investigation made by the plant Radiation Protection Officer to determine the cause and corrective measures required to prevent recurrence.
- I. An annual audit report by an independent auditor shall be submitted to the Department which shall include conclusions and recommendations of a review of all audits and inspections as well as employee exposures (including bioassay data), effluent release data and environmental data to determine (1) if there are any upward trends developing in personnel exposures for identifiable categories of workers or types of operations or effluent releases, (2) if exposures and effluents might be lowered under the concept of as low as reasonably achievable, and (3) if equipment for effluent and exposure control is being properly used, maintained, and inspected.
- J. The licensee shall maintain a quality assurance program in accordance with the Nuclear Regulatory Guide 4.15 as revised.
24. The licensee shall comply with the following regarding bioassay:
- A. (1) Urinalysis for uranium shall be performed every two weeks for employees assigned to the ore crushing and yellowcake calcining/packaging operations, and all personnel involved in maintenance tasks in which yellowcake dust may be produced. Specimens shall be collected as close as is reasonably possible, after 48 hours and not more than after 96 hours of last exposure. The measurement sensitivity shall be 5 ug/l or less. A special urinalysis shall also be performed if there is any reason to suspect an inhalation exposure to yellowcake exceeding 40×10^{-10}

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uCi-hr/ml in a period of one work week. The licensee shall make a formal documented evaluation if bioassay measurements exceed any of the following criteria:

- (a) The urinary uranium concentration exceeds 30 ug/l for any three consecutive sampling periods.
- (b) The urinary uranium concentration for any measurement exceeds 30 ug/l.
- (c) Action levels based on bioassay measurements shall be in accordance with Tables 1 and 2 of NRC Regulatory Guide 8.22, "Bioassay at Uranium Mills" (July 1978). In addition, all bioassay results shall be evaluated by the Radiation Safety Officer and Corporate Medical Advisor.

24. A. (2) Urinalysis results exceeding 15 ug/l shall be reported to the Radiation Safety Officer within 20 days of specimen collection.

Urinalysis results exceeding 30 ug/l and in-vivo results exceeding 16 nCi shall be reported to the Radiation Safety Officer by telephone.

- (3) Prevention of specimen contamination shall be in accordance with Section C.6 of NRC Regulatory Guide 8.22 (July 1978).
 - (4) The licensee shall implement a documented quality control program for urine specimens that includes background samples, blanks, and spikes and also criteria for requiring repeat collection and analysis.
 - (5) A baseline urine sample shall be obtained from any new worker, who will be subject to urinalysis, prior to start of work.
- B. Annual in-vivo measurements are necessary for all workers (1) routinely exposed to airborne yellowcake or directly involved in maintenance tasks in which yellowcake dust may be produced, and (2) routinely exposed to airborne uranium ore dust. Baseline bioassays should be performed prior to initial assignments for such work. Bioassays should also be performed if there is any reason to suspect an inhalation exposure to yellowcake exceeding 40×10^{-10} uCi-h/ml in a period of one work week or to ore dust exceeding 520×10^{-10} uCi-h/ml in a period of one calendar quarter.

Baseline in-vivo measurements shall be performed on all new workers who will be subject to in-vivo counting the first time the in-vivo counter is available.

- C. The licensee shall make a formal documented evaluation if any in-vivo thorax measurement exceeds 16 nCi.

25. A. The licensee shall obtain and analyze a representative one-hour sample from the exhaust stack for the calcining/packaging equipment on a monthly frequency, collected during normal operation of this equipment, to determine uranium particulate releases. The exhaust stack for the general fume collection system and

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from the laboratory shall be sampled and analyzed in the same manner on a monthly basis. The crusher stacks shall be sampled quarterly and analyzed for uranium, thorium and radium. Sampling shall be by iso-kinetic, area-weighted sampling or equivalent techniques.

25. B. The flow rates of the process stacks identified in Condition 25. A. above shall be measured semiannually and whenever any process equipment changes are made that might significantly alter the flow rate.
- C. The licensee shall submit to the Colorado Department of Health within 60 days after January 1 of each year a report containing the following information:
- (1) Average and maximum (24-hour period) uranium, radium and thorium concentrations (uCi/cc) measured at each of the exhaust stacks identified in Condition 25. A. above for the 6-month period ending January 1 and July 1 of each year.
 - (2) Average uranium release rate (uCi/sec) and total quantity of uranium, radium and thorium released (mCi), identifying the flow rates used for each of the stacks to calculate the releases.
 - (3) Average concentrations and release rates through the calciner stack for radium-226 and thorium-230, which may be based upon representative analyses of the yellowcake product and application of the ratios of radium-226 and thorium-230 to uranium to the uranium concentrations and releases determined for (A) and (B) above.
 - (4) Such other information that may be appropriate to enable the Colorado Department of Health to estimate the maximum potential radiation doses to the public resulting from effluent releases.

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26. The licensee shall conduct an air sampling program to assess airborne radioactivity concentrations to which employees may be exposed as follows:
- A. A representative air sample shall be collected at least weekly at work stations in the calcining/packaging area to determine airborne uranium concentrations. The weekly samples shall be supplemented by worker breathing zone sampling at least monthly to determine the representativeness of the station air samples.
 - B. Monthly air samples, representative of potential employee exposure, shall be collected at other process and storage locations, as appropriate, to determine airborne uranium concentrations.
 - C. Monthly sampling at selected process areas shall be performed to determine radon daughter concentrations. If monthly values should exceed 25 percent of the applicable standards, the frequency of sampling at these locations shall be increased to weekly.
 - D. If the air sampling program reveals work locations where concentrations exceed 25 percent of the applicable standards, the licensee shall establish a program to determine time-weighted exposures of employees working at these locations and establish procedures required to maintain employee exposures as low as reasonably achievable. Time-weighted studies shall be done at least annually.
 - E. Special uranium particulate air sampling, supplementing the routine air sampling program, shall be conducted for cleanup and maintenance activities in the calcining/packaging area, and other process areas as appropriate.
 - F. In-plant airborne monitoring, committed to in the licensee's application and supplements, shall be performed under conditions typical of employee exposures. Along with results of airborne activity, a record of the state of operation of both process and effluent control equipment and ventilation conditions shall be kept.
 - G. The licensee shall keep records of the respirator maintenance fitting and training program.
27. A. Environmental air monitoring for particulates shall be as in reference 17 listed in Condition 9. A. with the following modifications: continuous for uranium, radium-226, thorium-230 and lead-210 at 4 property boundaries, at 3 nearest feasible residences, and at a control location. Radon 222 shall be measured at the same locations for one week per month. Methods and frequencies shall be as in Appendix A, ref. 17. Air monitoring results shall be reported quarterly to the Department.
- B. Soil samples shall be taken at nine month intervals proximate to the air sampling locations and shall be analyzed for natural uranium and radium-226.
 - C. Vegetation, forage, and crops shall be sampled three times during each growing season at three or more locations which have the highest predicted contaminant

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- concentrations.
27. D. Fauna will not be sampled without specific authorization from the Department.
E. A meteorological monitoring program shall be maintained on site.
28. The licensee shall conduct an annual survey of land use (grazing, residences, wells, etc.) in the area within two miles of the mill and a report of this survey shall be submitted to the Department by March 1, 1980 and annually thereafter. This report shall indicate any differences in land use from that described in the licensee's Environmental Report and supplements or the previous annual report.
29. The operational water monitoring program shall be as in reference 17 listed in Condition 9. A. with the following additional sites and requirements.
A. the under drain from the new impoundment
B. the trench adjacent to pond 1
C. the trench above the SCS reservoir
D. the new wells at OW-5 and north of the Sand Creek Reservoir
E. a deep well at the Wolf Park mine shaft
Total dissolved solids shall be measured on all on-site samples. Unless approved otherwise by the Department sites in this program shall be sampled monthly and reported monthly to the Department. This program shall include selenium.
30. A. (1) A new off-site monitoring program shall be implemented as described in the letter of March 30, 1979, Logan to Wahler, with the following additional sites and requirements:
(a) station 6
(b) station 36
(c) station 41
(d) one or more new deep monitor wells north of the Sand Creek Dam
(e) one or more new deep monitor wells south of the Sand Creek Dam
(f) the Arkansas River at Four Mile Bridge
(g) the Arkansas River at Grape Creek
(2) Radium-226, Thorium-230, Lead-210, and Polonium-210 analyses will also be done on all samples collected before January 1, 1980. The requirement for Radium-226, Thorium-230, Lead-210, and Polonium-210 analyses after January 1, 1980 will be determined by the Department. River samples shall be analyzed for molybdenum, uranium, and Radium-226 only.
(3) All samples for uranium and molybdenum analysis shall be filtered to remove suspended solids.

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20. A. (4) Station S-15 shall be sampled early in a runoff event due to rain or snow melt.
(5) The following screening criteria will be used to evaluate the extent of off-site raffinate migration. Well waters containing molybdenum levels above 0.3 mg/l or uranium levels above 0.08 mg/l will be further tested and evaluated for the presence of raffinates. Additional parameters may be required by the Department. Unless approved otherwise by the Department sites in this program shall be sampled monthly and available data reported monthly to the Department until there is substantial evidence that the off-site impact is decreasing. Thereafter the sampling frequency may be reduced upon approval by the Department.
31. A. The applicant shall establish a control program that shall include written procedures and instruction to control all environmental monitoring prescribed herein and shall provide for periodic management audits to determine the adequacy of implementation of these environmental controls. The applicant shall maintain sufficient records to furnish evidence of compliance with these environmental controls.
B. Records of all monitoring data will be maintained and statistically and graphically summarized in such manner that trends may be readily identified, and an annual report shall be submitted to the Department by March 1, 1980 and annually thereafter.
C. All radiation monitoring and sampling equipment shall be calibrated after repair, and unless otherwise authorized by the Department, at least semiannually or at the manufacturer's suggested interval, whichever is more frequent. Also, a check source shall be used to assure that radiation detection instruments are operating properly before each use.
32. A. Each sealed source containing radioactive material, other than Hydrogen 3, with a half-life greater than thirty days and in any form other than gas shall be tested for leakage and/or contamination at intervals not to exceed three years. In the absence of a certificate from a transferor indicating that a test has been made within six months prior to the transfer, a sealed source received from another person shall not be put into use until tested.
B. The test shall be capable of detecting the presence of 0.005 microcurie of radioactive material on the test sample. The test sample shall be taken from the sealed source or from the surfaces of the device in which the sealed source is permanently mounted or stored on which one might expect contamination to accumulate. Records of leak test results shall be kept in units of microcuries and maintained for inspection by the Department.

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32. C. If the test reveals the presence of 0.005 microcurie or more of removable contamination, the licensee shall immediately withdraw the sealed source from use and shall cause it to be decontaminated and repaired or to be disposed of in accordance with Department regulations. A report shall be filed within 5 days of the test with the Director, Radiation and Hazardous Wastes Control Division, Colorado Department of Health, 4210 East 11th Avenue, Denver, Colorado 80220, describing the equipment involved, the test results, and the corrective action taken.
- D. Tests for leakage and/or contamination shall be performed by the licensee or by other persons specifically authorized by the U.S. Nuclear Regulatory Commission or an Agreement State to perform such services.
33. Radioactive material shall be used by or under the supervision of Myles Fixman, William Badger, or Robert Maixner.
34. Prior to beginning operations authorized by this license, the licensee shall have obtained all applicable local state, and federal permits.
35. Upon receipt by the Department of a report of the Colorado Bureau of Investigation of its investigation of the licensee, the Department shall review and evaluate such report. If, after the licensee has had a reasonable opportunity for a conference, the Department has reasonable grounds to believe and determines that any person or persons should be removed or suspended from managerial, supervisory, or other responsibilities at the milling facilities, such person or persons shall be promptly removed or suspended by the licensee from such responsibilities. Such removal or suspension shall continue until the Department determines the public health and safety no longer require such removal or suspension. Any removal or suspension resulting hereunder shall create no presumption (for any purpose other than this license condition) of any guilt or wrongdoing on the part of any person or persons. As used herein "public health and safety" shall refer to both the health and safety of the public at large, as well as of employees of the licensee.

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Date AUGUST 17, 1972
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