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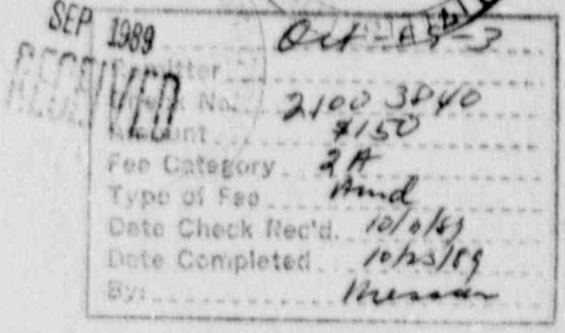
HOMESTAKE MINING COMPANY

P.O. BOX 98
GRANTS, NEW MEXICO
87020

RETURN ORIGINAL TO PDR, HQ.

September 1, 1989



Tracking No. 1184 3208 539

Mr. Ray Hall, Director
Uranium Recovery Field Office
U.S. Nuclear Regulatory Commission
730 Simms Street, Suite 100
Lakewood, Colorado 80225

Re: License No. SUA-1471

Dear Mr. Hall:

Homestake Mining Company of California (Homestake) takes this opportunity to request an amendment to their Radioactive Materials License SUA-1471. Along with this request, also please find a check for $150.00, pursuant to the NRC regulations, for your review of Homestake's proposal.

Homestake hereby requests an amendment to License Condition No. 19 concerning interim tailing stabilization and associated blown tailing/contaminated soil cleanup. The last half of Condition 19 has been completed and is proposed to be deleted. The correspondence referenced in the opening paragraph of condition 19 is no longer current and needs to be deleted and modified to reflect Homestake's current interim stabilization program.

Condition No. 19 is proposed to be modified to reflect the following:

"19. The licensee shall implement an interim stabilization program for all tailings not covered by standing water as specified in the submittal dated February 16, 1989 and the schematic dated August 22, 1989 illustrating the dust control program, with the following additional requirements:

a) An annual soil sampling and gamma survey program shall be performed to verify the effectiveness of stabilization measures used to control blowing of tailings.

b) The results of the annual soil sampling and gamma survey program shall be submitted for NRC review by October 1 for each year until the tailings are adequately [illegible] from further dispersal due to wind.

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c) Compliance shall be determined against a background value of 6 pCi/gm radium as previously determined."

In addition to the proposed revisions to Condition No. 19, Homestake also proposed to revise License Condition 10 by deleting the Condition references and replacing them with the specific procedures itemized below, which includes the recommended NRC revisions:

1) ALARA Radiation Protection Program
2) Quality Assurance Program for Radiological Monitoring
3) Mill Respiratory Protection Program
4) Occupational and Environmental Monitoring and Surveillance Program.
5) Emission Control (no revisions)
6) Mill Bio-Assay (no revisions)

This listing includes all of the procedures included in the current Condition 10 references.

We appreciate your consideration of this amendment request.

Very truly yours,

HOMESTAKE MINING COMPANY

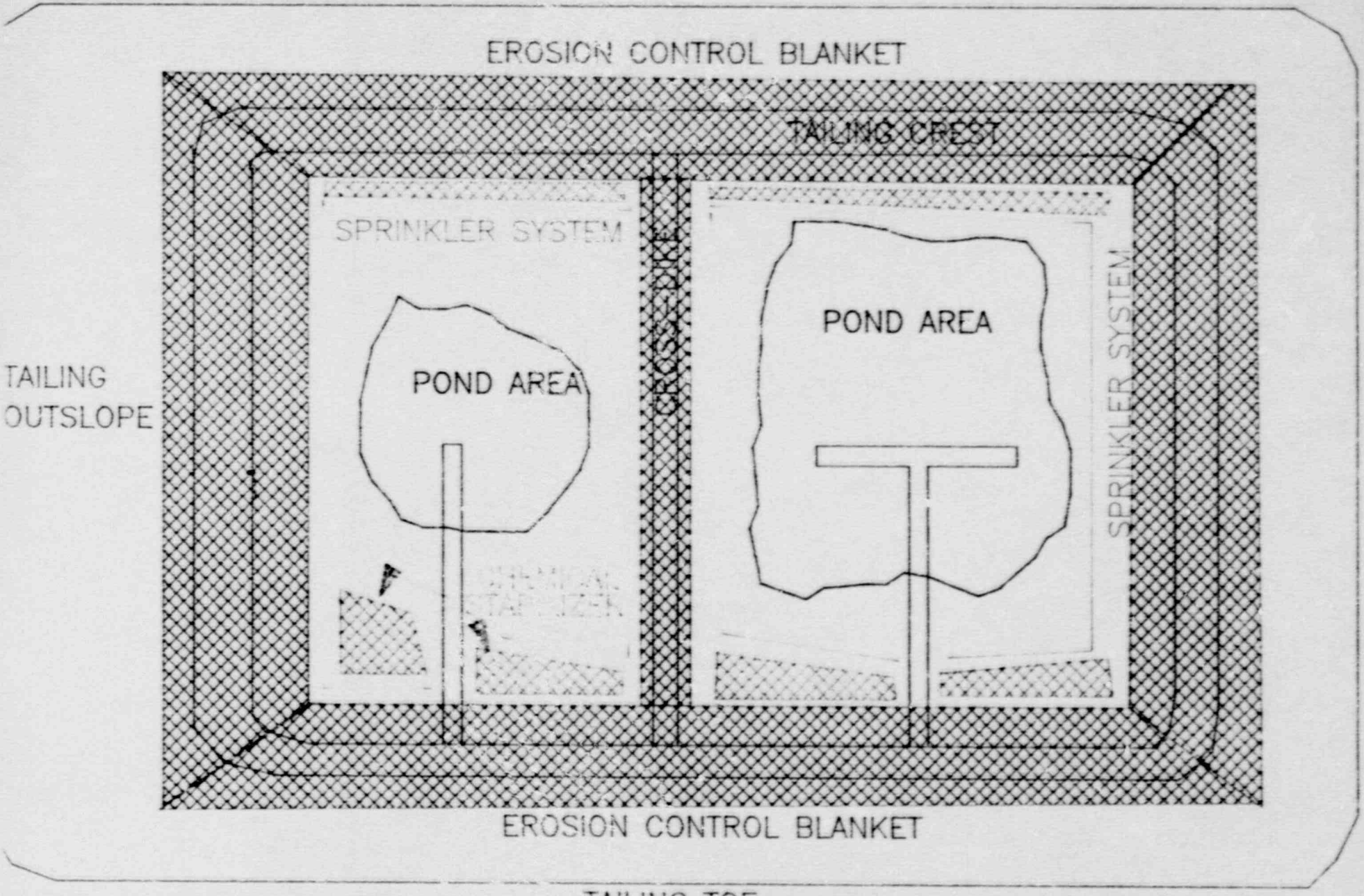
Edward E. Kennedy

Edward E. Kennedy
Director of Environmental Affairs

(EEK/bg)

w/2 procedures
cc: F.R. Craft
R.F. Farrell
D.B. Crouch

HOMESTAKE TAILINGS INTERIM STABILIZATION PROGRAM



8/22/89

Homestake Mining Company Grants Operation	Mill Respiratory Protection Program	December 15, 1986

Richard F. Farrell
Radiation Protection Administrator

Edward E. Kennedy
Director of Environmental Affairs

T.G. White
General Manager

Take Out:	Replace With:	Date:	RPA Signature Approval
Old Mill Respiratory Protection Program	New Mill Respiratory Protection Program	7-15-87	Richard F. Farrell
		December 13, 1988	Richard F. Farrell
Old 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18.	New 1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19.	12-5-88	Richard F. Farrell

HMC MILL RESPIRATORY PROTECTION PROGRAM

I. Introduction

Homestake Mining Company - Grants (HMC) has in place procedures for a formal respiratory protection program to comply with current regulations. In accordance with U.S. Nuclear Regulatory Commission (NRC) Radiation Protection Regulations (10CFR 20.103), companies are required, when application of engineering controls are impractical, to provide respiratory protection equipment to maintain intake of radioactive airborne particulates by individuals to as far below radiation limitations as reasonly achievable. Companies providing an adequate respiratory protection program are allowed to apply, as appropriate, credit in the determination of radioactive airborne particulate exposures to employees. U.S. Nuclear Regulatory Commission Regulatory Guide 8.15 and "Practices for Respiratory Protection", an American National Standard publication (ANSI Z88.2-1968), were used as guides for establishing this program. Under this HMC respiratory protection program, exposures to individuals wearing approved respiratory protection equipment while performing non-routine tasks can be calculated with respirator credit.

Homestake Mining Company will provide approved respiratory protection equipment. The equipment shall be used in accordance with the procedures set fourth in this manual, whenever conditions exist such that radioactive airborne particulate concentrations can potentially exceed NRC standards (10CFR 20.103). HMC Environmental Department will administer the respiratory protection program. Approved respiratory protection equipment is also available for use by any person at the facility at all times when requested for personal reasons.

II. Respiratory Protection Policies

Respiratory protection equipment use will be required in the yellowcake packaging area during yellowcake sample preparation, whenever it is necessary to conduct any kind of work with either the roaster or dryer hearth doors open, and during non-routine precipitation building maintenance that has the potential, due to the nature of the work, to cause increased exposure to airborne yellowcake dust. Respirator use many also be required at any other location in HMC's uranium mill facility as directed by any supervisor, or under the direction of the Radiation Protection Administrator (RPA). However, any individual, upon request, may use a respirator at any time in the mill. Respiratory protection credit, under this program, will be applied only to calculate those exposures received by individuals performing yellowcake packaging duties and non-routine work for which respirator use is required by HMC management, as stated below.

Only approved, or certified, respiratory protection equipment will be used. Certification or approval is granted by the National Institute for Occupational Safety and Health (NIOSH), the Mine Enforcement and Safety Administration (MESA), or the NRC.

Respiratory protection equipment use will be required by HMC during appropriate periods (Section II Paragraph I) to reduce individual exposures to radioactive airborne particulates. Radioactive airborne particulate exposures to individuals will be reduced in HMC's mill primarily by the development of engineering controls to reduce airborne particulates in the atmosphere. However, where accepted engineering control practices have not been developed, or when necessary by the nature of the work involved, employees may work in areas where elevated radioactive airborne particulate concentrations potentially exist for reasonable periods of time, if they are protected by the

appropriate respiratory protection equipment. Respirators may be used for personal exposure reduction by any individual at any time.

Non-routine maintenance work in the precipitation building, and work performed in other areas where elevated radioactive airborne particulate concentrations potentially can also exist (due to the nature of the work), must be approved by the Operations Superintendent and the RPA, or the Director of Environmental Affairs (DEA) before such work can begin. A list of those employees assigned to do the job must be approved by the RPA or his designee, or the DEA prior to work commencement. The RPA, his designee, or the DEA will inform the Operations Superintendent, through written approval, if the use of respiratory protection equipment is not required for any non-routine work which falls within the above cited reporting procedure. The health physics technician collecting the air sample for exposure calculation shall document whether or not the maintenance personnel are appropriately wearing their respiratory protection equipment on the individual's Time Study Report.

The use of respiratory protection equipment is required during the performance of yellowcake packaging duties. Positive pressure powered air respirators are continually maintained and stored in the Yellowcake Processing Building change room. Any operator assigned to package yellowcake must pick up a powered air respirator from the change room prior to starting packaging duties. It is the responsibility of the employee picking up the respirator to log the date and shift for which the respirator will be used, and to sign the log confirming this. Environmental Department personnel clean and maintain the above mentioned respirator daily (except holidays and weekends).

Any time non-routine work requiring the use of respiratory protection equipment is assigned, environmental department personnel will distribute respirators to those employees designated to perform the work and approved by

the RPA or DEA. The environmental technician at this time, will also check for proper respirator operability and fit, and also determine that proper respirator use procedures are followed.

All reasonable efforts will be made to issue positive pressure powered air respirators to individuals performing yellowcake packaging duties non-routine work for which respirator use is required. This is done to eliminate the necessity of conducting an irritant smoke fit test each time the respirator is donned during the performance of the work. The irritant smoke fit test is required with negative pressure respirators only in the event that respiratory credit is applied. Under this program, Homestake only applies respiratory credit to exposures received by individuals performing yellowcake packaging or non-routine work for which respiratory protection is required.

Respirators will be available at all times for those employees performing work with either the roaster or dryer doors open, and sample preparation duties. The use of respirators during the performance of those duties has been established as "normal operating procedures" by management and the RPA. Therefore, precipitation building operators will be allowed to perform routine work which requires respirator use without the approval of a supervisor. These operators will be responsible for following proper respirator procedures, and for checking for proper respirator operability and fit.

A person using a respirator may leave the area at any time for relief from respirator use in the event of equipment malfunction, physical or psychological distress, procedural or communication failure, significant deteriation of working condition, or any other reason that might require such relief.

Written procedures for respirator use are included in this manual (Section VIII). These procedures are to be followed by all HMC employees and all other persons, no matter what their propose is for being in the mill. All employees

and supervisors will become familiar with the correct procedure for respirator use.

III. Responsibilities

A. Employee Responsibility

1) The employee will use the provided respiratory protection equipment in accordance with instructions and training received.

2) The employee will report any malfunction of respiratory protection equipment to the supervisor.

3) The employee will inform the supervisor on any health problems that could be affected by the use of respiratory protection equipment.

4) The employee will use the respiratory protection equipment, in such a way, as to guard against damage to the equipment.

5) The employee will not disassemble or in any way alter, the respiratory protection equipment.

6) The employee will use only the respiratory protection equipment, as provided by HMC, for which he/she has been trained to operate and can obtain a satisfactory fit.

7) The employee will shave facial hair in a manner which will insure proper respirator fit.

8) The employee will return all used respirators to the respirator distribution point upon job completion, or at the end of the shift, which ever occurs first.

B. Supervisor Responsibility

1) Supervisors will insure that respiratory protection equipment is provided when such equipment is necessary to protect the health of the employee (where radioactive airborne particulate concentrations

are potentially elevated above 10 CFR 20, Appendix B, Table 1, Column 1).

2) Supervisors will enforce the use of respiratory protection equipment in situations that require its use.

3) Supervisors will, at the time of respirator distribution, determine respirator operability and respirator fit when such respiratory protection equipment will be used during the performance of duties which have been established as "normal operating procedures" or when respirators are used for personal preference.

4) Supervisors will notify the Operations Superintendent and RPA, or their designees, whenever it will be necessary during the course of non-routine work for an employee to use respiratory protection equipment.

5) Supervisors will notify the Operations Superintendent and RPA, or their designees of any employee who, because of known medical reasons, may be restricted from using respiratory protection equipment.

C. Respirator Maintenance Person (Environmental Department Technician)

1) The Respirator Maintenance Person will maintain respiratory protection equipment.

2) The Respirator Maintenance Person will collect, clean and sanitize respirators after each use.

3) The Respirator Maintenance Person will keep adequate supplies of clean respirators available for use around the mill (see Section IV).

4) The Respirator Maintenance Person will check to determine that respirators are being returned.

D. Environmental Department Responsibility

1) Environmental Department Personnel will make random inspections to evaluate the respirator use program (log inspection).

2) Environmental Department Personnel will conduct air sampling and other surveys sufficient to identify the hazard.

3) Environmental Department Personnel will provide respiratory protection equipment for employees assigned to yellowcake packaging or non-routine work for which respirator use is required, insure that respirators are operating properly, and check for proper respiratory fit.* This information is recorded by Environmental Department Personnel on workers Time Study Report.

4) Environmental Department Personnel will insure employees, assigned to non-routine work for which respiratory protection is required, are properly operating such equipment and record this information on the individual's time study report.

5) The Environmental Department Personnel will determine employees' exposures and area radioactive airborne particulate concentrations.

6) Environmental Department Personnel will apply the appropriate respirator credit to employee exposures.

7) Environmental Department Personnel shall conduct a Bioassay Program, as appropriate to evaluate individual exposures and to assess the respiratory protection program.

8) Environmental Department Personnel shall maintain records sufficient to permit periodic evaluation of the efficiency of the respiratory protection program.

*Note: Powered Air Purifying Respirators are used if possible when respiratory protection is required for non-routine work. An irritant smoke test, to insure proper

fit is not required to enable the application of respiratory protection credit to exposure calculation when this type of positive pressure respiratory equipment is used. If negative pressure air filtrating respirators are issued for non-routine yellowcake packaging work which requires respiratory protection, Environmental Department Personnel will administer an irritant smoke test to insure proper fit each time the respirator is donned.

E. Safety Department Responsibility

1) The Environmental/Safety Department will test all employees for proper fitting of respiratory protection equipment during the routine annual HMC training program.

2) The Safety Department shall schedule health physicals for employees at least annually. The Physical Form will address the ability of this individual to work under all expected or potential work conditions.

IV. Respirator Distribution / Half-mask Negative Pressure Respirators

The following is an outline of procedures used for respiratory protection equipment distribution in the mill area. Included in the outline are references to areas and apparatus used for respirator distribution.

1) All respirators are tagged with an I.D. Number and packaged in a heat sealed plastic bag.

2) A respirator distribution and maintenance center is located in the mill area, where the respirator maintenance person has control over respirator distribution. The distribution center has the proper facilities for cleaning, maintaining and storing respirators (See Section IX).

3) Respirators are distributed to several mill locations where they are stored near working areas which have the highest potential for requiring respiratory protection, facilitating ready access for their use. Below are listed the distribution locations:

   1. Yellowcake Processing Bldg.
   2. Crusher - Sample Splitting Bldg.
   3. Maintenance Shop
   4. Metallurgical Lab
   5. Distribution Center

4) HMT supervisors will control the issuance of respiratory protection equipment under the direction of the RPA. The supervisors will issue respirators to employees assigned to do work in conditions that are designated as requiring the use of respirators, as defined in this manual (See Section II). They will also issue a respirator to any employee upon that employee's request.

5) In order for respirator credit to be applied to an employee's exposure, the employee must undergo an irritant smoke fit test. This test requires that the employee be exposed to an irritant while wearing respiratory protection equipment to ensure a good, tight fit. Environmental Department Personnel will conduct the irritant fit test and shall record the appropriate information on the individuals Time Study Report. The irritant smoke fit test is required each time the respirator is donned during the performance of the task for which the respirator was issued. This shall be recorded on the individual exposure sheet. Urine samples are collected from employees who perform work that has the potential to over expose them to yellowcake dust without the application of respirator credit. An acceptable

urine concentration level will enable the RPA to evaluate the effectiveness of the respiratory protection program.

NOTE: The irritant smoke fit test is not required for positive pressure air purifying respirators

6) Employees return used respirators to the nearest mill respirator storage location at the end of each shift, or upon completion of the job requiring respirator use.

7) The respirator maintenance person collects used respirators as appropriate, dependent upon use. The clean and ready-for-use respirator supply is then replenished by the respirator maintenance person. All used respirators are then cleaned, disinfected, inspected for operational order, and packaged in heat sealed plastic bags by the respirator maintenance person before they are reissued to any employee or mill respirator storage location.

IV.1 Respirator Distribution/Air Powered Positive Pressure Respirators

1. All reasonable efforts are made to issue positive pressure powered air respirators to individuals performing yellowcake packaging or non-routine work for which respirator use is required.
2. Powered air respirators are stored and maintained in the Respirator Distribution Center.
3. This type of respirator is used primarily for Yellowcake packing or non-routine work for which respiratory protection is required.
4. Powered air respirators used during yellowcake packaging are cleaned and maintained daily.
5. Employees performing yellowcake packaging duties are required to log the date and time of respirator use, and sign a log.

6. The Operations Superintendent and the RPA, or their Designees, approve all non-routine work requiring respiratory protection and then notify the Environmental Department Personnel to distribute respiratory protection to the appropriate individuals.

7. Environmental Department personnel will, at the time of powered air respiratory distribution, determine respirator operability and insure that the individual using the respirator understands how to use it. A fit is not required for the positive pressure air powered respirator.

8. When the non-routine work has been completed, Environmental Department personnel are notified so that the powered air respirator can be returned to the laboratory.

9. Environmental Department personnel will clean the powered air respirator after each use and insure that they are properly maintained.

V. Respiratory Protection Equipment

HMC primarily uses Norton Safety Products half mask respirators in it's respiratory protection program (Norton 7500 series Dual Cartridge Respirators). In this model there are two sizes which will fit approximately 90% of all employees. They are as follows:

Size	Color	Model No.
Large	Green	7500-30
Medium	Black	7500-30M

The cartridge (Model No. 7500-8 MSHA approved No. TC-21-152, used with the half mask respirator, is designed to protect against dust, fumes and mists having a time-weighted average less then 0.05 milligram per cubic meter and against radionuclides. The protection factor (PF) for the Norton 7500 series half mask

respirator is 10; therefore, respirator credit is applied according to the following formula: Total radioactive airborne particulate exposure x 0.10 = Radioactive airborne particulate exposure with respirator credit applied.

The 3M model 9920 (MSHA approved no. TC-21C-202) is another type of respirator that is often used in Homestake's respiratory protection program. The respirator is designed to protect against the same hazards as the Norton respirator referenced above.

*See Enclosure 2 for descriptions of other respiratory protection equipment available for use by HMC employees.

VI. Respirator Fitting

Every employee is trained and is given fitting instructions and properly fitted with a respirator before using one for health protection. The fitting instructions include demonstrations on how the respirator should be worn, how to adjust it, and how to determine if it fits properly. The initial fitting to determine proper respirator size for individuals is performed during HMC's routine training programs for regular employees and new hires. Instructions for employee's determination of proper fit under work conditions are also given during the training programs. The fitting process involves trying the three respirator sizes and, by the negative pressure method, determining which size fits best. After the negative pressure test has been performed, employees test the size mask that best fits by wearing the respirator under Realistic Test Conditions (Enclosure 1).

To employ respirator credit in an individual's exposure, employees must test respirators under supervision by the Realistic Conditions Test method before use in actual working conditions unless a positive pressure powered air respirator is utilized.

VII. Training

All employees who may wear respirators at HMC's mill are trained in the selection and use of the respiratory protection equipment available. Respirator training is performed during HMC's routine training program for employees and new hires. The respirator training program is conducted by the Environmental/Safety Department and includes instructions and discussions on the following subjects:

1) The nature of respiratory hazards in uranium milling.
2) The proper type of respiratory protection equipment for use in uranium milling.
3) Why engineering controls of air contaminants in some cases is not immediately possible.
4) Capabilities and limitations of the respiratory protection equipment used by HMC.
5) The proper methods of using and testing for fit of the available respiratory protection equipment.
6) How to recognize and cope with emergency situations.

During respirator training, every employee is provided the opportunity to:

1) Handle a respirator
2) Have a respirator size fitted to him/her by competent personnel.
3) Test a respirator's face piece to face seal.
4) Wear a respirator in normal atmosphere.

VIII Operating Procedures for Respiratory Protection Equipment

This section outlines the safe method for using the respirators available at the mill. The Norton Air-Purifying Half Mask Respirator is the primary type of respirator provided to HMC employees. See Enclosure 3 for descriptions of

operating procedures for other respiratory protection equipment available for HMC employees.

Using and Air Purifying Half Mask Respirator

General

This type of respirator can be used for protection against low concentrations of toxic vapors, gases and particulates, including radionuclides. It has a protection factor of 10: however, the proper canister must be selected for protection against radioactive airborne particulate contaminants. It is important, therefore, for the user of this type of half mask respirator to be aware of the type of canister (model No-7500-8 radionuclide cartridge) to protect him/her from respiratory hazards present in milling operations.

Note: Any respirator user may leave a work area at any time for short term relief from respirator use. Such relief may be required in the event of respirator malfunction, physical distress, deterioration of working conditions, or any other relevant condition.

Limitations

This type of respirator does not supply oxygen and, consequently, is not for use in atmosphere that is oxygen deficient or immediately hazardous to life or health. When using a respirator, employees must leave an area immediately if dust can be detected inside the mask or if the cartridge filters clog.

Wearing the Mask

1) Choose a size of mask that fits well.
2) Hold the mask so that the narrow nose cup points up.
3) Grasp both lower straps and hood behind the neck.

4) Grasp both upper straps and hook behind the head. The top straps must be above the ears for proper fit.

5) Adjust straps so the fit is snug, but comfortable.

6) Check for leaks by covering the filter elements with the palms of hands and inhaling gently. If the mask is pulled toward the face and remains that way with no leakage for 10 seconds, the fit is good.

7) Follow the conditions identified on Enclosure 1 for the Realistic Conditions Test.

Enclosure No. 1

RESPIRATOR FIT TESTS

1) Negative Pressure Test. Close off the inlet opening of the canister or cartridge(s) by covering with the palm of the hand(s) inhale gently so that the facepiece collapses slightly, and hold your breath for ten seconds. If the facepiece remains in its slightly collasped condition and no inward leakage of air is detected, the tightness of the respirator is probably satisfactory.

2) Realistic Conditions Test. An irritant smoke is discharged into the atmosphere around the respirator being tested for fit. If the person wearing the respirator can remain in this test atmosphere without detecting the odor of the irritant smoke, he has a good fit. If he detects the odor, he should retreat to fresh air, readjust the facepiece, and then repeat the test. If leakage is still noted, it can be concluded that this particular respirator will not protect the wearer. The wearer should not continue to tighten the headband straps until they are uncomfortably tight, simply to achieve a gastight face fit. It is important for the employee to keep his/her eyes closed during this test.

Enclosure No. 2

Other Respiratory Protection Equipment Available for use by HMC Employees

The MSA Powered Air Purifying Respirator and the MSA Comfo II Respirator are two other respiratory protection devices that are available for use at HMC's mill. The MSA Comfo II Respirator is a duel cartridge half-mask respirator and will fit many people whose facial features are too small to be properly fitted with a Norton Half-mask Respirator (medium 7500-30M). The MSA Comfo II Respirator is, therefore, provided by HMC for use in the mill to provide respiratory protection to those employees who do not receive the proper protection from the Norton Respiratory Protection Equipment.

The MSA Powered Air Purifying Respirator will offer a higher degree of protection than the dual cartridge half-mask respirators routinely used in the mill. Therefore, the MSA Powered Air Purifying Respirator is provided by HMC for use in non-routine work that has potential for unusually high radioactive airborne particulate concentrations; i.e., work inside the vanadium and yellowcake dryer and the vanadium roaster quench tank area.

1. Respiratory Protection Equipment

Comfo II Respirator

The MSA Comfo II Respirator is a dual cartridge half-mask respirator. Type H Ultra Filter Cartridge (Approval No. TC 21C-134) is the type of cartridge to be used with the MSA half-mask respirator at HMC's mill. The cartridge specifications are identical to those of the Norton Cartridge (model No. 7500-8; see section V).

Powered Air Purifying Respirator

The MSA Powered Air Purifying Respirator is approved for protection against dust, fumes, and mists having a time-weighted average less than 0.05 mg/m^3, and radionuclides. The Powered Air Purifying Respirator can be used with any of three MSA facepieces. The Comfo II Half-mask Facepiece is used with the Powered Air Purifying Respirator at the HMC mill. The protection factor (PF) for the MSA Powered Air Purifying Respirator is 1000 when used with the Comfo II Half-mask facepiece. Therefore, respirator credit is applied according to the following formula:

Total radioactive airborne particulate exposure x $\frac{1}{1000}$ = radioactive airborne particulate exposure with respirator credit applied

2. Operating Procedures

Comfo II Respirator

The MSA Comfo II Respirator has identical operating procedures as does the Norton 7500 Series Dual Cartridge Half-mask Respirator primarily used in the HMC mill. See Section VIII for half-mask respirator operating procedures.

Powered Air Purifying Respirator

The MSA Powered Air Purifying Respirator is used according to the following procedures:

1. Mount Powered Respirator on waist to desired location with belt provided.
2. Turn on unit before donning facepiece to remove any dust from inside facepiece or breathing tube. A fit test is not required for this kind of respirator.
3. Fit respirator on nose bridge, making sure that you are able to breathe thru the nose, then placing bottom of facepiece into contact with the chin. Position headbands with longest headband above the ears and the

shortest headband below the ears and adjust to comfortable wearing position by moving slides either way.

4. When the facepiece is properly fitted, air should not blow into the eyes and all air should escape through the exhalation valves.
5. At the end of four continuous hours of operation, the battery module should be replaced with a fully charged replacement unit. NOTE: the discharged battery module should be placed on charge immediately so it will have a minimum of 16 hours of re-charge for the next days use.
6. Replace filters after 4 hours or when the air flow falls below a level where breathing becomes difficult.

Homestake Mining Company Grants Operation	ALARA-Radiation Protection	October 7, 1986

Richard F. Farrell
Radiation Protection Administrator

Edward E. Kennedy
Director of Environmental Affairs

John M. Parker
General Manager

Take Out:	Replace With:	Date:	RPA Signature Approval
1-8	1-8	12-15-86	Richard F. Farrell
		12-18-87	Richard F. Farrell
Old Pg 6,7	New Pg 6,7	1-10-89	Richard F. Farrell

HOMESTAKE MINING COMPANY-GRANTS OPERATION

ALARA - Radiation Protection Program

Homestake Mining Company (Homestake) has in place at the Grants Operation design criteria, operating procedures, and administrative practices which assure that occupational exposure to radioactive materials in Homestake's uranium mill are maintained as-low-as-reasonably-achievable (ALARA). Paragraph 20.1(c) of the 10 CFR Part 20 states that licensees should make every reasonable effort to keep radioactive material to unrestricted areas, as far below the limits specified in Part 20 as is reasonably achievable. Homestake's ALARA Programs, discussed in detail in this document, was adopted by management to follow the employee exposure and environmental affairs corporate policy (see attachment) as well as satisfy the requirements of 10 CFR Part 20. Regulatory Guide 8.31, containing information relevant to ensuring ALARA practices are followed at uranium mills, was used as a reference for developing Homestake's program.

The major purpose of Homestake's occupational radiation protection program at the Grants Operation is to maintain radiation exposure ALARA for all employees, contractors, and visitors. In addition, some of the same controls and practices that keep occupational exposure to radioactive materials ALARA also tend to keep releases of these materials from the mill to the Environmental ALARA. The implementation and effectiveness of the program is the responsibility of all Homestake employees working at the mill. The individual responsibilities for operating the ALARA program, shared by management,

the Radiation Protection Administrator (RPA) and all mill workers, are discussed in following paragraphs.

Management is strongly committed to ensuring that the ALARA - radiation protection program is effectively operated. Management is responsible for developing, implementing, and inforcing rules, policies, and procedures necessary to maintain an effective program and ensure the health and safety of the workers. In addition an annual management audit will be conducted that reviews operational and radiation safety practices for maintaining exposures ALARA. It also evaluates competency of the radiation safety staff. The audit team will consist of 3 of the following Homestake management personnel: Corporate Environmental Manager, General Manager, Director of Environmental Affairs, Safety Director, Manager of Milling, Mine Superintendent, Personnel Manager. An audit report summarizing the following data shall be submitted to corporate management:

1. Employee exposure records (external and time-weighted calculations),
2. Bioassay results,
3. Inspection log entries and summary reports of daily, weekly and monthly inspections,
4. Documented training program activities,
5. Radiation safety meeting reports,
6. Radiological survey and sampling data,
7. Reports on overexposure of workers submitted to the NRC or Mine Safety and Health Administration (MSHA), and

8. Operating procedures that were reviewed during the time period of the audit.

The report shall discuss the following:

1. Trends in personnel exposures for identifiable categories of workers and types of operational activities,
2. Whether equipment for exposure control is properly used, maintained and inspected, and
3. Recommendations on ways to further reduce personnel exposures.

A training program is maintained by management which includes instruction in radiation safety and ALARA concepts for all uranium mill employees. Written or oral exams with questions directly relevant to the principles of radiation safety and health protection, shall be given to each worker. Homestake's Radiation Safety Program consists of the instruction and testing in at least the following categories:

1. Basic Radiological Health Protection
   a. Discussion of nuclear decay and the different types of radiation relevant to Homestake's Operation.
   b. How uranium and its daughter products enter and have impact on the body.
   c. The ALARA policy and the reasons for its implementation.

2. Radiation Protection Regulations

   a. Discussion of the regulatory authority of the NRC, EPA, MSHA and the State.

   b. Discussion of the principal regulations dealing with the health and environmental aspects of radiation protection and the listed standards for protection from excessive levels of radiation.

   c. Discussion of permissible radiation exposure levels.

3. Personal Hygiene.

   a. Discussion of the use and availability of protective clothing.

   b. The correct use of respiratory protection equipment; a discussion of the operation's Respiratory Protection Program.

   c. Eating, drinking and smoking restriction.

   d. Discussion of the proper methods for decontamination.

4. Homestake Protection Program

   a. Ventilation systems and effluent controls.

   b. Cleanliness of the work place.

   c. Standard Operating Procedures.

   d. Security and access control to designated areas.

5. Health and Environmental Protection Programs
    a. In-plant Radiological Monitoring.
    b. Environmental Radiological Monitoring.
    c. Respiratory Protection Program.
    d. Bioassay Program.
    e. Personnel Dosimetry Program.
    f. Contamination Detection Program.
6. Mill Emergency Procedures
    a. Discussion of possible emergency situations which may occur and the appropriate actions to be taken.

Visitors are also required by management to complete a short class in radiation safety and hazards within the mill. Management shall ensure that the RPA will be retrained on at least a bi-annual (2 year) basis. The RPA shall ensure that the operation's radiation technicians will also receive training in radiation health physics and radiological monitoring at least every two (2) years.

The RPA has responsibility for the technical adequacy of the ALARA program and has continuing responsibility for radiation monitoring and enforcement action. The RPA is assigned the following:

- Responsibility for the administration of the ALARA - Radiation Protection Program;
- Authority to enforce regulations and administrative policies that apply to the ALARA program;
- Input into planning for process or operating procedures changes to ensure that protection from radioactive materials is not adversely affected;

- o Authority to suspend operations should conditions warrant immediate emergency response.
- o Adequate resources to monitor the effectiveness of the ALARA program.
- o Briefings and training in radiation safety, including ALARA concepts for all uranium mill employees and when appropriate, for contractors and visitors

Homestake management feels that, under this program, sufficient authority is assigned to the RPA to ensure compliance with NRC's regulations and the license conditions pertaining to work radiation protection.

An ALARA program is only effective when all the workers comply with the rules of the program. Homestake recognizes this and requires all mill workers to adhere to all rules, notices, and operating procedures for radiation safety established by management and the RPA. In addition mill workers are expected to report equipment malfunctions or deviations from operating procedures which could increase employee exposure to radioactive materials. Finally, mill workers are encouraged by management to suggest ways to improve radiation safety in the mill.

The management of the ALARA program at Homestake's Uranium Mill is composed of the General Manager, Operations Superintendent and the Director of Environmental Affairs. The Radiation Protection Administrator reports to the Director of Environmental Affairs, but has

direct access to the Operations Supertendent and the General Manager. Production responsibilities are not held by the RPA or the Director of Environmental Affairs. A staff of technicians assist the RPA in operating the ALARA - Radiation Protection Program.

Homestake management has established written standard operating procedures for all activities that involve handling, processing, or storing radioactive materials. These procedures include information pertinent to ensure radiation safety practices are followed. Written standard procedures are also established for environmental and occupational monitoring, analysis, and instrument calibration. Up-to-date copies of all written procedures are accessible to all employees and can be found in designated areas throughout the mill, as well as in the Director of Environmental Affair's and the RPA's office.

The RPA has reviewed and approved in writing all standard procedures, which are implemented at the Homestake Mill, to ensure that proper radiation safety practices are being followed. In addition, all standard procedures are reviewed, and updated where necessary, annually by the RPA. For work on non-routine maintenance jobs where the potential for additional exposure to radioactive material exists (due to the nature of the work) and for which no standard operating procedure is implemented, a radiation work order is issued by management and approved by the RPA. The experience of the Operations Superintendent and Maintenance Superintendent is utilized to determine which non-routine maintenance jobs require the RPA's consideration; however, the RPA reviews the entire maintenance log at least monthly. The objective of the review is to determine that all jobs having potential for additional

exposure to airborne uranium, due to the nature of the work, are correctly processed through the radiation work order program.

Mill inspections are conducted at Homestake's uranium mill to ensure that the ALARA - Radiation Protection Program is being effectively operated on a routine basis. The RPA, or his designee, who is a qualified representative of the radiation safety staff, conducts a daily walk-through inspection of the mill to see that good radiation safety practices are being followed. The mill manager conducts a weekly inspection of all mill areas to observe radiation control practices. Weekly, the RPA and the mill manager will discuss the status of the mill condition from a radiological standpoint. Also, the RPA reviews the maintenance work logs on at least a monthly basis. The RPA prepares a monthly report, which is submitted to the Director of Environmental Affairs and the resident manager, that reviews the inspection observations and includes a summary of the month's environmental and occupational monitoring results.

All training, inspections, and the weekly mill status meetings relevant to this ALARA program will be documented.

HOMESTAKE MINING COMPANY
CORRESPONDENCE FILE COPY

TO Distribution

DATE July 3, 1980

FROM H. M. Conger

SUBJECT Statement of Policy
Environmental Affairs

During the recent past the mining industry has been thrust into the forefront of the so-called environmental movement, experiencing simultaneously social, political, and economic pressures that bear directly on the conduct of business.

Mining and associated processing activities by their very nature involve the disturbance of land, consumption or conversion of resources, and the creation of emission and waste products that make them a highly visible target for controls. Unfortunately, their visibility is heightened by a legacy of operations conducted in an era with values different from contemporary standards.

Concerns for conservation of resources, preservation of esthetic values, protection of the environment and public health are real, and are a manifestation of a growing awareness by the public of the interdependence between man and his environment. Recognition of these perceptions is a key step to continued, successful operations in today's world.

Homestake will meet all legally mandated environmental standards and is committed to surpass those standards when it is technically and economically feasible to do so.

Programs to meet this goal are underway in all areas; to realize fully the positive potential of these programs, they must be integrated into the Company's overall operations so that we can progress from a "fire-fighting" stance to a planning mode.

To facilitate this transition and to document Homestake's commitment, I am establishing a corporate policy for the conduct of the Company's environmental affairs; a copy is attached. As conditions warrant, guidelines and procedures will be formulated to implement this policy. It is the responsibility of each manager to see that this policy is communicated to appropriate staff personnel and that it is enforced.

Distribution:

Officers - Homestake Mining Company
Managers - Operating Facilities
Managers - Field Offices
Managers - Foreign Operations

Att.-Homestake Mining Company
Statement of Policy
Environmental Affairs

Homestake Mining Company
Grants Operation

Quality Assurance
Program for
Radiological Monitoring

December 15, 1986

Richard F. Farrell
Radiation Protection Administrator

Edward E. Kennedy
Director of Environmental
Affairs

John M. Parker
General Manager

Take Out:	Replace With:	Date:	RPA Signature Approval
Old Quality Assurance Program for Radiological Monitoring	New Quality Assurance Program for Radiological Monigoring	6-30-87	Richard F. Farrell
		December 18, 1987	Richard F. Farrell
Old Pg 2	New Pg 2	1-11-89	Richard F. Farrell

HOMESTAKE MINING COMPANY-GRANTS

Quality Assurance Program for Radiological Monitoring

Homestake Mining Company (Homestake) has in place at its Grants operation a Quality Assurance Program for their radiological occupational and environmental monitoring procedures. Homestake has adopted this program in the interest of providing adequate confidence in the validity of the results for each of their monitoring programs. This Quality Assurance Program applies to all steps of Homestake's monitoring programs; which include sampling, preparation of samples, shipment of samples, measurement of radioactivity, data reduction, data evaluation and the reporting of monitoring results. This program was developed to satisfy the requirements of 10 CFR Part 20. Regulatory Guide 4.15 was utilized as a reference for developing this Homestake Program.

The major purpose of this Quality Assurance Program is to maintain the monitoring programs in a continual high quality status; one that won't change with a change in personnel. The Grants Operation has a formal Standard Procedures Manual for all of its monitoring programs which is strictly adhered to. These procedures are reviewed and evaluated on at least an annual basis by the Radiation Protection Administrator (RPA). Each of the Radiation Technicians are fully trained in the application of these Monitoring Procedures before they are released for unsupervised work. In addition, refresher training is provided on at least an annual basis.

The Personnel performing the quality-related activity shall be knowledgeable and qualified in the principles and techniques of the activities performed. They shall be made aware of the nature and goals of the Quality Assurance Program. Management shall ensure the adequacy of

personnel who shall be performing the monitoring activities under this Quality Assurance Program.

The implementation and effectiveness of this program is the responsibility of all Homestake employees working at the mill. The RPA is responsible for operating the Quality Assurance Program and ensuring its continual use at Homestake. Homestake's management shares in this responsibility by providing to the RPA adequate authority and resources to effectively operate and manage the program. The RPA is responsible directly to the Director of Environmental Affairs, who reports directly to the Operation Superintendent. The RPA has sufficient authority to implement and conduct the Quality Assurance Program. He has the authority to identify problems; to initiate recommend, or provide solutions; and to verify implementation of those solutions. The RPA approves and at least annually reviews, and modifies where necessary, all of the monitoring practices and procedures. Additionally, the RPA shall review, and modify where necessary, those quality assurance procedures associated with monitoring, including sample collection, packaging, shipment, and receipt of samples for offsite analysis; preparation and analysis of samples; maintenance, storage, and use of radioactivity reference standards; calibration and checks of radiation and radioactivity measurement systems; and reduction, evaluation, and reporting of data.

Homestake's management is strongly committed to ensuring that the Quality Assurance Program is effectively operated. Management is responsible for developing, implementing and enforcing rules, policies and procedures necessary to maintain an effective program and ensure the strict adherence to this program. Management is also committed to ensuring that the appropriate reasonable monies and resources shall be available to conduct the program effectively.

The key aspect of Homestake's Quality Assurance Program is maintaining the ability to track and control a sample in its progress through the sequence of monitoring processes. Record-keeping is extremely important in keeping track of a sample. Records shall be kept covering the following process: field and implant collection of samples for subsequent analysis, including sample description; sample receipt and laboratory identification coding; sample preparation and radiochemical processing (e.g., lab notebooks); radioactivity measurements of samples, instrument backgrounds and analytical blanks; and data reduction and verification. Records of results of measurements of radioactive check sources, calibration sources, backgrounds and blanks shall be maintained.

The final results of the monitoring programs shall be retained for the life of the facility. The support records for monitoring programs shall be maintained for a period not to be less than 5 years.

AIR QUALITY MONITORING

1. Air Sampling Pumps

Homestake utilizes several different types of air sampling equipment, including high, medium and low volume vacuum pumps. These pumps are periodically calibrated on a routine basis (at least quarterly) as defined in Homestake's Standard Radiation and Environmental Procedures Guide, to ensure the accuracy of the information generated. These calibration procedures are documented in the Standard Procedures Guide for Homestake's monitoring programs. The calibration checks and adjustments are documented as part of the calibration procedures along with other appropriate information, including instrument identification, date and name of individual calibrating pump.

2. Radiation Survey Equipment

Homestake utilizes many different types of radiation detection equipment. Each piece of radiation detection equipment is sent out to an outside contractor for calibration which is on at least a semi-annual basis. A certificate of calibration which is traceable to the National Bureau of Standards, is obtained and filed for documentation. Reference standards and check sources traceable to the National Bureau of Standards are also utilized by Homestake to determine counting efficiency. Accurate background readings for radiation survey equipment is determined, when appropriate, during individual monitoring runs. The results of these measurements are recorded as part of the standard routine monitoring information. Background measurements shall be made frequently, as well, usually before each use or on a daily basis during those days measurements are to be collected, to ensure that levels are within the expected range. Homestake check sources are measured daily on those days samples are collected, and are measured prior to sample collection to ensure the efficiency of the equipment. Any piece of equipment found to measure check sources with greater than 20% error shall be sent off for repair or calibration.

Ground Water Monitoring

Homestake utilizes formal ground-water monitoring procedures for determining the quality of ground water near their mill and tailing facilities (see Standard Radiation and Environmental Procedures Guide). These procedures require the sample collection period to be of sufficient time to ensure that the sample collected for analysis is drawn from far out into the alluvium. These samples undergo formal sample preparation procedures identified in the Standard Radiation and Environmental Procedures

Guide (ie., appropriate field analysis, filtration, preservation, etc.). Quality control is maintained by submitting replicate samples, spiked samples, and blanks. In addition, an appropriate level (5 to 10%) of the samples collected are split and submitted to outside contract laboratories for verification of results.

Analysis of Quality Control Samples

Homestake has developed a quality control procedure for sample analysis that provides a means to determine the precision and accuracy of the monitoring and laboratory process. Analysis of replicate samples provide a means for Homestake to determine precision, while analysis of blanks and spikes of known concentrations in water samples provides a means of determining accuracy. An appropriate level (5 to 10%) of Homestake's analytical requirements shall consist of quality control samples to ensure the accuracy of the analytical procedures. This includes interlaboratory analyses where samples are split with outside laboratories to provide a means of detecting errors that might not be detected by intralaboratory analyses alone.

Computational Checks

To ensure accuracy, the computation of radiation concentrations and employee exposures to radioactive materials at Homestake will include the independent verification of an appropriate level of the results by a person other than the one performing the original computation. For computer calculations, the input data shall be verified by a knowledgeable individual. All computer programs shall be documented and verified before initial routine use and after each modification of the program.

Homestake Mining Company Grants Operation	Occupational and Environmental Monitoring and Surveillance Procedures	December 15, 1986

Richard F. Farrell
Radiation Protection Administrator

Edward E. Kennedy
Director of Environmental Affairs

T.G. White
General Manager

Take Out:	Replace With:	Date:	RPA Signature Approval
Old Monitoring & Surveillance Program	New Monitoring & Surveillance Program	6-30-87	Richard F. Farrell
		12-18-87	Richard F. Farrell
	Insert additional water monitoring procedures	1-9-88	Richard F. Farrell
Old Pg 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15 Table 1A Table 2 Water monitoring program	New 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16 Table 1B Table 2 Water monitoring program	1-11-89	Richard F. Farrell
	Included additional perimeter monitoring location. Changed personnel alpha survey requirements	8-15-89	Richard F. Farrell

HOMESTAKE MINING COMPANY

MONITORING AND SURVEILLANCE PROGRAM

Homestake Mining Company's Grants uranium operations has been monitoring the impacts of their milling and tailings facilities on its employees and the surrounding environment since it commenced operating in 1958. These programs are periodically reviewed in order to determine the adequacy or necessity of the data obtained for evaluating the occupational and environmental impact. Various engineering and operational controls are utilized by Homestake to minimize the release of radioactive materials into the environment of the employee and the unrestricted area. In spite of the fact that all practicable control measures are being utilized to keep radioactive releases and employees exposures to a minimum, Homestake realized that some excursions do occur and, therefore, have designed their monitoring programs to detect such events as soon as possible.

The monitoring and surveillance programs presented here have been designed to insure the operation's compliance with 10 CFR Part 20 U.S. Nuclear Regulatory Commission Standards for Protection Against Radiation and to satisfy the requirements of Homestake's Radioactive Material License. Recommendations and guidelines from The Nuclear Regulatory Commission (NRC) and the Mine Safety and Health Administration, as well as the knowledge gained from Homestake's past experiences, have been utilized as guides in the preparation and development of Homestake's monitoring and surveillance programs. The in-plant occupational portion of Homestake's monitoring program satisfies the requirements of NRC

Regulatory Guide 8.30 (Health Physic Survey in Uranium Mills). Homestake effluent and environmental monitoring program was designed to satisfy those guidelines described in NRC Regulatory Guide 4.14 (Radiological Effluent and Environmental Monitoring at Uranium Mills).

Each of the following programs contained within this Monitoring and Surveillance Document shall contain Analytical Lower Limits of Detection in accordance with Regulatory Guide 4.14, identified above.

ENVIRONMENTAL MONITORING PROGRAMS (summarized in Table 1 attached)

Air Quality Monitoring

1. Stack Sampling

   Effluents from the three yellow cake stacks (the dryer, roaster and packaging room stack) are sampled isokenetically on a quarterly basis for particulates. The particulates are analyzed for Natural Uranium by Homestake's analytical laboratory (see attachment 1 for Homestake's analytical procedure). A representative grab sample is collected semi-annually from two Crusher Building stacks and is analyzed for Natural Uranium, Radium-226 and Thorium-230.

*Pursuant to discussions with NRC, Homestake has committed to also analyzing the yellow cake stack effluents for Th-230 and Ra-226 during the period of July 1987 through June, 1988 where the data will be re-evaluated for continued analysis.

Stack samples will be collected during periods of typical ore and yellow cake throughput, as well as periods when no throughput is being experienced. This should more clearly define actual long term emissions as it is routine operational procedures not to be crushing ore or drying yellow cake 24 hours a day.

Homestake personnel have been trained by various means in the techniques of stack sampling, including training by U.S. Environmental Protection Agency and N.M. Environmental Improvement Division - Air Quality Control personnel, and various stack sampling sources. In-house training is also conducted on a periodic basis (at least annually).

Homestake Mining personnel utilize a Research Appliance Company RAC - Stacksampler System, or the equivalent, for conducting the isokenetic sampling program discussed above. The U.S. Environmental Protection Agency's Standards of Performance for New Stationary Sources, Title 40 CFR Part 60, Appendix A, Method 5 is the procedure used by Homestake for isokenetic stack sampling.

2. Particulate Air Sampling

Homestake continuously samples total suspended particulates at five air monitoring locations around their property boundary (see Figure 1). Those locations identified as HMC-1, HMC-2

and HMC-3 are areas at the restricted area's boundary expected to have the highest predictable concentrations of airborne radioactive particulates. The predominant wind direction is in a north easterly direction. The location identified HMC-BKG represents background conditions and is located at the southwestern most corner of the restricted area. Location HMC-5 represents the site of the nearest residence expected to have the highest predicted airborne radionuclide concentration in the area of the Homestake Mill. Location HMC-4 is located at the southwest corner of the restricted area which is upwind from the mill and tailing facility and is situated close to nearby residences.

Homestake uses a Sierra Instruments Model #305-200 High Volume Air Sampler with Flow Controller, or the equivalent, to continuously sample the ambient air of the locations shown in Figure 1. The samples are collected on 8 inch by 10 inch Whatman membrane filters (or equivalent) which are changed weekly, or more frequently, as required by dust loading. Quarterly composites of the collected sample filters are prepared for each sampling station. The composite samples are analyzed quarterly for Natural Uranium, Radium-226, Thorium-230 and Lead-210 at Homestake's analytical laboratory.

3. Gas Sampling

Radon gas concentrations are monitored on a continuous basis at the 6 locations identified in Figure 1. Terradex Corporation's track-etch passive radon monitors (PRM) or the equivalent, are used to continuously monitor radon gas at each sampling location. The alpha particle sensitive detector is replaced and analyzed on a quarterly basis by an approved independent laboratory. The technique by which the PRM detectors measure radon gas concentrations consists of exposing an alpha-particle sensitive plastic detector, which is mounted in a plastic container, to ambient air. The decay of radon gas contained the area causes imprint tracts on the alpha-sensitive detector which can then be counted at a later time. The radon gas concentration can subsequently be calculated by determining the number of tracks per unit area of the detector. A filter is placed over the detector container to inhibit the entrance of any alpha-emitting dust particles.

Biota and Soils Monitoring

1. Vegetation

Vegetation samples are collected on an annual basis at each of the six locations identified in Figure 1. Vegetation samples will be composited for each sample location and will consist of species palatable to grazing animals that contribute to the human food chain. The composited samples are analyzed for Natural Uranium and Radium-226.

2. Soil

Soil samples are collected on an annual basis at each of the six locations identified in Figure 1. Representative composite samples to a depth of 5 centimeters are collected for each sample location and are analyzed for Natural Uranium, Radium-226.

Direct Radiation

Gamma exposure rates are continuously monitored through the use of thermoluminescent dosimeters (TLD) at each of the six locations identified in Figure 1. Each TLD badge consists of Five LiF chips selected for uniform response contained in a plastic holder. The plastic provides adequate protection from weather for this badge to be used out-of-doors. The TLD's are exchanged on a quarterly basis and analyzed by an approved, independent laboratory (currently Eberline Instrument Co.). The integrated levels of direct external radiation are recorded for each of the five locations.

Surface Contamination

1. Yellowcake Shipments

The amount of alpha emitting surface contamination deposited on the outside of yellowcake shipment barrels is monitored before shipments are allowed to leave the mill restricted area. A group of barrels from each yellowcake lot is randomly selected to be monitored for alpha emitting surface contamination. This is done by randomly selecting a 100 cm^2

area on each barrel and wiping the area with a clean 47 mm Gelman fiber glass filter (or equivalent). The filters are then counted on a Eberline Sac 4 scintillation detector (or equivalent) to determine the amount of alpha activity removed from each barrel onto the filter.

2. Personnel Skin and Clothing

Each day, all persons, who enter the yellowcake precipitation and drying circuit building, are required to monitor themselves for alpha surface contamination or shower and change their clothing before leaving the restricted area. The personnel survey is performed individually by each person, for whom it is required before leaving the restricted area as he/she exits the yellowcake precipitation and drying circuit building. On a quarterly schedule an unannounced spot check is made of all mill employees by a qualified member of the radiation safety staff during which time he/she conducts the personnel monitoring. An Eberline AC-3 hand-held surface alpha scintillation detector with a Eberline RM-20 scaler (or equivalent), are used to perform the personnel skin and clothing surface monitoring. On a quarterly basis, the radiation detection equipment is calibrated by a qualified laboratory and is then evaluated by a qualified technician for background, efficiency, and operability; and adjusted to the proper settings. Proper settings refer to an alarm notification of an exceedance of 1,000 dpm alpha per 100 cm^2.

The survey is performed by individuals making a thorough sweep of the clothing and exposed skin (including the soles of shoes). Any excessive uranium concentrate contamination, as determined by the survey, shall be washed off in one of the mill's change rooms.

3. Survey of Equipment Prior to Release for Unrestricted Use

All equipment, that potentially has been contaminated with uranium or its decay products, must be monitored for removable surface alpha activity before it can be released for unrestricted use. All requests to remove equipment from the Mill must be initiated with the Operations Superintendent. The Operations Superintendent contacts the Radiation Protection Administrator and they determine if the equipment in question could potentially have been contaminated. Any material that is determined to have the potential to have been contaminated must be surveyed and the levels detected must not exceed the levels identified in the U.S. Nuclear Regulatory Guide 8.30.

Management's policy at Homestake Uranium mill facility is to restrict the release of equipment for which radiation surveys are required to instances where there is a clearly demonstrated need related to company business.

WATER QUALITY MONITORING

Wells SV,SB,SE,SA,DB,DE,DG,DL,P,F,B,I, and BC are sampled on a quarterly frequency for pH, TDS, water level, Ca, Mg, K, Na,

HCO_3, CO_3, CL, SO_4 and cation-anion balance. Wells SV, SB,SE, SA, DB, DE, DG, DL, and P are sampled on a semi-annual frequency for chromium, molybdenium, radium-226 and radium 228, selenium, thorium 230, uranium, vanadium and pH. Additionally, the volumes of water injected and recovered as part of the ground-water cleanup program is monitored on a weekly frequency and the values are documented.

OCCUPATIONAL MONITORING PROGRAM

Radiation exposure control of employees at Homestake's mill operation is of major concern for the company. Occupational exposure control in the restricted area is kept as-low-as-reasonably achievable (ALARA) through design engineering to prevent and control releases, respiratory protection programs, the use of protective clothing, and employee training programs. Since prevention and control devices are fail safe, routine occupational monitoring programs are enforced and maintained by trained and experienced personnel to keep occupational exposures to a m imum.

1. Routine Radioactive Particulate Dust Monitoring

Routine monitoring of radioactive particulate dust concentrations is accomplished at various locations throughout these areas most frequently occupied in the Yellowcake Precipitation Building (see Table 2). Weekly samples of

radioactive particulate dust concentrations are collected in the Crusher-Sample Splitting Building (Table 2). A medium volume (50 liters per minute), 24 hour area sample depending on yellowcake production periods, sampling times can be less than 24 hours) is collected at each location (see Table 2) and analyzed for total alpha. Samples are collected with an Eberline RAS-1 regulated air sampler, or an equivalent air sampler. The samples are analyzed for total alpha using an Eberline SAC-4 scintillation alpha counter, or equivalent. Annually, the samples are analyzed for Natural Uranium, Ra-226 and Th-230.

Those operators scheduled to work in the Yellowcake Precipitation and Crusher-Sample Splitting buildings are required to fill out a weekly time study report identifying the amount of time spent in individual building individual work areas. Weekly employee exposures are calculated as a percent of maximum permissible concentration from the area alpha concentrations and the time spent in the areas.

2. Non-routine Employee Exposure Monitoring

Employees engaged in non-routine maintenance activities which, due to the nature of the work, has potential to cause additional exposure to airborne radioactive dust in the yellowcake precipitation area are monitored by trained personnel to insure exposures are kept to ALARA. A 10-minute

breathing zone sample is collected during those non-routine jobs, which is analyzed for total U-nat. The sample is collected by an Eberline RAS-1 regulated air sampler, or an equivalent sampler, and the filter is fluorometrically analyzed for total U-nat. A time study report which solicits pertinent information for exposure evaluation is completed for each employee who is assigned to the above referenced type of work. The employee exposure for the particular job is calculated as a percent of maximum permissible concentration from U-nat concentration and the time spent on the job. Each employee's individual non-routine maintenance exposure is accumulated with his previous exposures for overall evaluation.

3. Bioassay

Plant design and engineering controls are the primary means of controlling dust emissions and employee exposures to radiation to ALARA. The use of respiratory protection equipment is required in areas with a potential of exceeding maximum permissible levels. This and time scheduled in the area is used to insure employee exposures are kept below the maximum allowable dose. Respiratory protection equipment is required for all employees working in the yellowcake packaging area, during yellowcake sample preparation, whenever it is necessary to conduct any kind of work with either the roaster or dryer hearth doors open. Also, respirator use is required during

non-routine precipitation building maintenance which has the potential, due to the nature of the work, to cause additional exposure to yellowcake dust, and during any work performed in conditions requiring respiratory protection equipment as determined by a supervisor or the Radiation Protection Administrator.

The routine Radioactive Dust Monitoring and the Non-routine Employee Exposure Monitoring programs are the primary means of evaluating each employee's exposure to airborne radioactive particulates. Homestake has established its Bioassay Program to confirm the reliability of the air monitoring programs, and to insure the overall protection of the employee's health. Routine bioassay analyses are performed on all mill employees routinely exposed to airborne yellowcake dust, and those employees involved in maintenance tasks in which yellowcake dust may be inhaled, assuming no respiratory control, causing exposures in excess of maximum permissible exposure levels (see Homestake's Uranium Mill Bioassay Program). Urine samples are analyzed fluorometrically for uranium content by an approved commercial laboratory. Action levels for uranium in urine are discussed in Homestake's Uranium Mill Bioassay Program.

4. Radon Daughter Surveys

Homestake routinely monitors radon daughters in nine locations

in the mill on a quarterly schedule. The nine areas monitored are those most frequently occupied in the ore processing portions of the mill, or those having the highest potential for significant concentrations of radon daughters in the air.

The locations surveyed on a quarterly basis include:

Crusher Feed Conveyor
Crusher Operator Station
Vibrating Screen
Sample Splitting Circuit
Top Fine Ore Bins
Ball Mill Area
Mill Leaching Circuit
Mill Filtering Circuit
Met. Lab Sample Prep. Room
Mill IX Control Room

The frequency for monitoring is increased to monthly or weekly if measurements of radon daughter concentrations are consistently observed which exceed 0.02 or 0.08 working level, respectively. Radon Daughter concentrations (working levels) are determined either by the Kunetz Method using a low-volume pump and and Eberline Sac 4 scintillation detector (or equivalent), or which an instant working level measurement using an MDA Scientific, Inc. survey instrument (or equivalent).

5. Direct Radiation

External radiation surveys are conducted monthly in various locations throughout the Homestake mill operating area, as well as the area in which the yellowcake product is stored, awaiting shipment. External radiation surveys are conducted with an Eberline PRS-2 portable ratemeter-scaler and HP-270 beta-gamma probe, or equivalent.

Those locations surveyed on a monthly basis include:

Crusher Building

Yellow Cake Dryer

Yellow Cake Drum Storage Area

Yellow Cake Packaging Room

Yellow Cake Sample Preparation Room

Filter Building

Digester Building

The purpose of the external radiation survey program is to detect any significant changes in radiation levels that might have occurred in these locations and to delineate any areas of potentially elevated external radiation exposure.

Homestake mill operating personnel assigned to work exclusively in areas of the mill where yellowcake concentrate is present are monitored for direct gamma radiation exposure with personal thermoluminescent dosimeters (TLD). The TLD's

are replaced monthly and analyzed for direct gamma radiation exposure on a weekly basis. The TLD service and analysis is provided by an approved, independent laboratory (currently Eberline Instrument Corporation).

6. Surface Contamination

Alpha contamination surveys of surfaces located at various points throughout the Homestake mill operating area are conducted on a weekly basis. The survey is conducted by wiping a 100 cm^2 area of the surface being monitored with a clean glass fiber filter. The amount of alpha activity which was removed from the 100 cm^2 area is then determined by analyzing the used filter in a scintillation alpha detector (Eberline Sac-4, or equivalent). Those locations surveyed for surface alpha contamination on a monthly basis include:

Precipitation Building Lunch Room
Precipitation Building Change Room Benches
Digester Building Shift Office
Digester Building Control Room
No. 2 Mill Lunch Room
Chemical. Lab Flourometeric Room
Mill Change Room Benches

The purpose of the alpha contamination surface program is to detect any significant build up on contamination levels that

might occur in these locations and to delinate areas in which additional cleaning is necessary.

7. Calibration:

Radiation survey instruments and sample collection pumps which are properly maintained and calibrated are available at all times for use by trained Homestake representative. This is accomplished by calibrating and servicing the survey instruments and sampling pumps on a routing basis. Also, Homestake has available survey instruments and pumps that can be substituted for each other during the execution of the various monitoring programs.

The radiation survey instruments are calibrated on a semi-annual basis 9every six months) by an approved independent contractor. Each calibration is referenced back to the National Bureau of Standards (NBS) and arrives with a Certificate of Calibration.

Reference standards and check sources traceable to the NBS are also utilized by Homestake to determine the counting efficiency of the radiation survey and counting instruments. Reference standards and check sources are utilized as described in Homestake's Quality Assurance Program for Radiological Monitoring to ensure the efficiency, sensitivity and accuracy of the survey instruments.

Homestake utilizes several different types of air sampling equipment, including high, medium and low volume vacuum pumps. these pumps are periodically calibrated on a routine basis as defined in Homestake's Standard Radiation and Environmental Procedures Guide, to ensure the accuracy of the information generated. These calibration procedures are documented in the Standard Procedures Guide for Homestake's monitoring programs. The calibration checks are performed by trained Homestake personnel and are documented as part of the calibration procedures along with other appropriate information, including instrument identification, date and name of individual calibrating pump.

8. Training in Radiation Safety

The Homestake milling operation has an established employee training program to assist the new and present employees in the safe and efficient performance of their work assignments. The program consists of an initial employee orientation that utilizes formal classroom instruction and a continual skills training process for the employee's specific job function.

New employees are given an initial indoctrination in subjects which relate to his or her new occupation, including instruction in health protection problems associated with exposure to radioactive materials or radiation, the different forms of radiation prevalent in the milling operation, and

means by which the employee can keep his exposure ALARA. Periodically, at least annually, all mill employees are given refresher training by qualified personnel knowledgeable in radiation protection. The radiation training program is described in detail in Homestake's ALARA - Radiation Protection Program.

TABLE 1. HMC Environmental Radiological Monitoring Programs

Type of Sample	Number	Locations	Method	Frequency	Analytical Parameters
STACKS					
Particulates	3	YC Dryer Stack Vanadium Roaster Stack YC Packaging Room Area Stack	Isokenetic	Quarterly	Natural Uranium
Particulates	2	Crushing Circuit Stack	Representative Grab	Semi-annually	Natural Uranium, Radium-226, Thorium-230 stack flow
AIR					
Particulates	3	Locations at or near the site boundary and in different sectors that have the highest predicted concentrations of radioactive airborne particulates.	Continuous (High Vol.)	Weekly filter change or more frequently as required. Samples composited and analyzed quarterly.	Natural uranium, RA-226 Th-230, Pb-210
	2	Nearest Occupied Residences	Continuous (High Vol.)	Weekly filter change, or more frequently as required. Samples composited and analyzed quarterly.	Natural uranium, Ra-226 Th-230, Pb-210
	1	Control Location	Continuous (High Vol)	Weekly filter change, or more frequently as required. Samples composited and analyzed quarterly.	
Radon Daughter	6	Location described in Air - Particulates	Grab-Kusnetz	Quarterly	Working Levels
Radon Daughter	5	Locations described in Air - Particulates	Continuous-Track-etch	Quarterly	RN-222

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Table 1 (continued)

TABLE 1. HMC Environmental Radiological Monitoring Programs

Type of Sample	Number	Locations	Method	Frequency	Analytical Parameters
WATER					
Ground Water	12	Hydrologically down gradient and relatively close to the tailings impoundment.	Pumped-Grab	Quarterly	pH, TDS, Water Level Ca, Mg, K, Na, HCO_3 CO_3, Cl, SO_4, cation-anion balance
	8	Hydrologically down gradient and relatively close to the tailings impoundment	Pumped-Grab	Semi-Annual	Cr, Mo, Ra-226 and and Ra-228 Se, V pH
	1	Hydrologically up gradient of tailing impoundment (background)	Pumped-Grab	Quarterly	pH, TDS, water level Ca, Mg, K, Na, HCO_3 CO_3, Cl, SO_4 cation-anion balance
	1	Hydrologically up gradient of tailing impoundment (background)	Pumped-Grab	Quarterly	Cr, Mo, Ra-226 and Ra-228 Se, V, pH
NOTE: See Ground Water Section for Additional Requirements					
Surface Water	1	Mine ion exchange discharge	Grab	Quarterly	Dissolved and suspended natural uranium, Ra-226, Th-230, Pb-210
VEGETATION	6	Locations described in Air - Particulates	Grab	Annually	Ra-226, Pb-210
SOIL	6	Locations described in Air - Particulates	Grab	Annually	Ra-226, Pb-210
DIRECT RADIATION	6	Locations described in Air - Particulates	Continuous TLD	Quarterly	Gamma Exposure Rate
SURFACE	Variable	Yellowcake Product Shipment	Wipe	As Needed	Alpha Exposure Rate
	Variable	Release of Equipment for	Wipe	As Needed	Same
	Variable	Skin & clothing of applicable employees	Surface Alpha Scintillation	Every day	Same

Table 2

Routine Radioactive Particulate Dust Sampling Locations*

	Type	Duration
Y.C. Precipitation Building		
Y.C. Dryer	Area	24 Hour#
Vanadium Roaster	Area	24 Hour
Y.C. Sample Preparation Room/ Floor Area Around Y.C. Pkg. Room	Area	24 Hour
Surge Tank/Sodium Extraction	Area	24 Hour
Y.C. Filter/Emico Filter	Area	24 Hour
Y.C. Packaging Room	Breathing Zone	Composite Grab
Ore Crusher Building		
Operator Station	Area	8 Hour
No. 1 Sample Splitter	Area	8 Hour
2nd Floor Crusher	Area	8 Hour*

*Annually Ra-226 and Th-230 analyses will be performed.

#24 Hour indication is approximate depending, on ore throughput and yellowcake production.

Homestake Mining Company Grants Operation	Emission Control Device Program	December 15, 1986

Richard F. Farrell
Radiation Protection Administrator

Edward E. Kennedy
Director of Environmental Affairs

J. M. Parker
John M. Parker
General Manager

Take Out:	Replace With:	Date:	RPA Signature Approval
		December 18, 1987 ESE	Richard F. Farrell
		11-26-88	Richard F. Farrell

HOMESTAKE MINING COMPANY-GRANTS OPERATION

Emission Control Device Program

Criterion 8 of 10 CFR Part 40, Appendix A requires that "Checks must be made and logged -- which determine the efficiency of yellowcake stack emission control equipment operation".

Homestake's mill Precipitation Building houses two units which are used to dry yellowcake: the vanadium roaster and the yellowcake dryer.

Exhaust from the vanadium roaster exits the mill through a rotoclone in series with a hydrofilter. The operation of this collector is monitored by a continuous draft guage, which measures the negative pressure on the roaster vessel, and a continuous solution flow monitor. Each device reads out on a circular chart for permanent record. These charts are monitored by the operator each shift that yellowcake is being fed into the roaster. In the event the scrubber devices (negative pressure and adequate solution flow) are not operating at peak efficiency, an alarm will sound so that the operator may immediately rectify the situation. The alarms are checked at least once each shift that yellowcake is being fed into the roaster.

Exhaust from the yellowcake dryer exits through a rotoclone in series with a variable venturi wet scrubber. A continuous draft guage and solution flow device similar to those described for the vanadium roaster monitors the efficiency of the system and generates a permanent record on a circular chart. This system is set up with alarms similar to those described for the vanadium roaster and are checked on the same frequent described above when yellowcake is being fed to the dryer.

The yellowcake packaging area is exhausted through a wet rotoclone. A continuous draft guage and solution flow device similar to those described for the vanadium roaster monitors the efficiency of that particular system and also generates a permanent record on a circular chart. This system is also set up with alarms similar to those described for the vanadium roaster and are checked on the same frequency described above.

Corrective action is taken immediately when the performance of any of these systems is found to be outside the prescribed ranges for peak operating efficiency. When checks indicate that the equipment is not operating in this range, the operator shall take appropriate action to restore the parameters to the prescribed range. When the required actions cannot be taken without shutting down and repair of this equipment, that portion of the milling operation shall be suspended until corrective action has been restored to bring that source of emissions to acceptable levels.

At least annually, the emission control devices shall be inspected and maintained or repaired as appropriate. Areas to be examined during inspection include 1) excessive buildup of solids in the wet/dry zones and entrainment separator, 2) plugged water spray nozzles, 3) absorption in areas of high velocity such as throats and orifices, and 4) corrosion on scrubber vessel internal surfaces.

Written procedures shall be available for equipment operation and for operator actions if malfunctions occur (see attached). Equipment operators shall be trained in the function of each device and its operating characteristics. The operator shall be made aware of the consequences of

malfunctions and misoperation as well as the corrective measures that may be taken.

As a check to ensure the operating efficiency of the emission control devices, Homestake personnel monitor the stack discharges from the roaster and dryer on a quarterly basis. Homestake conducts isokenetic stack sampling in compliance with the U.S. Environmental Protection Agency's Standards of Performance for New Stationary Sources, Title 40 CFR Part 60, Appendix A, Method 5.

Attachment 1

Yellowcake Roasting, Drying & Packaging
Correction of Malfunctions in Dust Collection System

When an alarm sounds to indicate a malfunction in any of the dust collection systems the following procedure will be followed:

The recording chart at the instrument that initiated the alarm will be inspected to determine if it was a reduction in solution flow or loss of negative pressure that resulted in the sounding of the alarm.

In the event of a reduction or loss of solution flow the following steps will be taken:

1. Be sure that solution supply pump is running.
2. Check for broken solution lines
3. Check valve settings to be sure that valves are open.
4. Check underflows to see if any solution is present.
5. If solution flow can not be re-established shut off yellowcake feed to unit and check for plugged sprays and line.
6. If above routine corrective measures are not effective, call the Mechanical Department for assistance.
7. Do not turn yellowcake feed back into unit until desired solution flow is established.

In the event of a loss of negative pressure the following steps will be taken:

1. Be sure that the fan is running.
2. Check for leaks that allow air to be drawn into the ducts.
3. Be sure that spray solution is running from underflow lines.
4. If negative pressure can't be established by the above actions, shut off the yellowcake feed to the unit.
5. Check for plugged underflow lines; clean as needed.
6. Check for plugged ducts; clean as needed.
7. If the above routine corrective measures are not effective, call the Mechanical Department for assistance.
8. Do not turn yellowcake feed back into unit until desired negative pressure is established.

Homestake Mining Company
Grants Operation

Uranium Mill
Bioassay Program

November 22, 1988

Richard F. Farrell
Radiation Protection Administrator

Edward E. Kennedy
Director of Environmental Affairs

Tom G. White
General Manager

Take Out:	Replace With:	Date:	RPA Signature Approval
Old Pg 2,3	New Pg 2,3	1-16-89	Richard Farrell

HOMESTAKE MINING COMPANY-GRANTS

Uranium Mill Bioassay Program

I. Introduction

Homestake Mining Company, at Grants has initiated a formal bioassay program to comply with current health regulations. In accordance with the U.S Nuclear Regulatory Commission (NRC) regulations (10 CFR 20.103 (a)(3)) uranium mining companies shall use measurements of radioactivity excreted from the body, measurements of radioactivity in the body or any combination of such measurements may be necessary for timely detection and assessment of individual intakes of radioactive material by exposed individuals. NRC Regulatory Guide 8.22 "Bioassay At Uranium Mills" was used as a guide for establishing this program (on file in the Director of Environmental Affairs Office). Control of exposures to radioactive materials by engineering controls, operational practices and respiratory protection will be continually evaluated under this program through bioassay analysis. Homestake Mining Company will provide the proper facilities for bioassay analytical work. The equipment and facilities shall be used in accordance with the procedings set forth in Regulatory Guide 8.22. Chemical analytical procedures used in this bioassay program are accepted by the National Bureau of Standards.

II. Bioassay Program Policies

Routine bioassay analyses shall be performed on all mill employees routinely exposed to airborne yellowcake dust and those employees involved in maintenance tasks in which yellowcake dust may be inhaled assuming no respiratory control, causing exposure to yellowcake

exceeding 40 x 10^{-10} uCi/ml U-nat in a period of 1 work week or to ore dust exceeding 520 x 10^{-10} uCi/ml U-nat in a period of 1 calendar quarter. Exposure to radioactive airborne particulates in the restricted area of the HMC mill is controlled primarily by engineering controls and operation practices, and secondarily by the use of respiratory protective equipment (Mill Respiratory Protection Program). The purpose of the bioassay program are 1) to evaluate the effectiveness of exposure control practices, 2) to alert management in the event that an employee has received an unusally large dose of radioactive material, and 3) to set up a procedure to insure that appropriate corrective action will be taken if the bioassay results exceed pre-selected levels (Table 1). The Director of Environmental Affairs and the Radiation Protection Administrator are responsible for the management of the Bioassay Program. Other qualified personnel can be designated to review analytical results and administer routine operations of the program.

III. Sampling Requirements and Schedule

All yellowcake drying and precipitation building operators, shall each provide samples of their urine at least once every two weeks. In the event that other employees are assigned to routine duties in the precipitation building, they shall also each provide a sample of their urine at least every two weeks. The urine sample container will be collected from the employee upon his return to work following the distribution of speciman collection containers by the Environmental Department personnel. One sample obtained from a person who is known to have no lung or systematic uranium burden other than that from natural background sources and one sample spike with known amount of U-nat will

be collected to be analyzed with each group of urine samples processed to assure quality control. Designated Environmental Department personnel will monitor the bioassay program to insure that specimens shall be collected for the appropriate persons. Any person(s) who is suspected to have received an exposure exceeding the specified limits assuming no respiratory control, shall provide a sample of their urine. A RWP non-routine sample such as this will be collected, if practical, at least 48 hours but not more than 96 hours following the day of the RWP non-routine work. Anyone scheduled for urine sample collection will turn their full sample container in to the security guards upon arriving at work.

IV. Bioassay Results

All urine specimens collected will be fluorometrically analyzed to measure the amount of soluble uranium contained in the urine. The Director of Environmental Affairs and the Radiation Protection Administrator are responsible for evaluating the analytical results. The urinalysis results will be available for review within 30 days of sample collection. Upon review of the results by designated HMC personnel, appropriate action will be taken upon exceedance of the pre-selected levels (See Table 1). Corrective actions taken depend on the amount of uranium detected in the urine and shall be implemented in accordance with Table 1 in this procedure.

V. Prevention of Sample Contamination

Samples shall normally be collected at the employee's residence just prior to returning to work following the distribution of speciman

collection containers. Extreme care is to be taken to insure the sample is not contaminated. The hands should be washed prior to sample collection. Only the sterile disposable collection containers provided by HMC will be used for sample collection. Purposefully contaminated samples will result in disciplinary action. All laboratory analyses shall be performed by HMC approved facilities and procedures or an accredited outside lab.

Table 1

CORRECTIVE ACTIONS BASED ON URINARY URANIUM RESULTS

Urinary Uranium Concentration	Actions
Less than 15 ug/l	None
15 to 30 ug/l	1. Confirm results (repeat urinalysis). 2. Determine why air samples were not representative and did not warn of excessive concentrations of airborne uranium. Make corrections. 3. Identify the cause of airborne uranium and initiate additional control measures. 4. Determine whether other workers could have been exposed and perform bioassay measurements for them. 5. Consider work assignment limitations to ensure the worker does not exceed a urinary uranium concentration of 30 ug/l.
Greater than 30 ug/l	1. Take the actions given above for 15 to 30 ug/l. 2. Continue operations only if it is vertually certain that no other worker will exceed a urinary uranium concentration of 30 ug/l. 3. Establish work restrictions for affected employees.
Greater than 30 ug/l for four consecutive specimens or greater than 130 ug/l for any specimen, or air sampling indication of more than a quarterly limit of intake.	1. Take the actions given above. 2. Have additional urine specimen tested for albuminuria