SUSQUEHANNA - WESTERN, INC.
777 GRANT STREET • DENVER 3, COLORADO • TAbor 5-7681

February 28, 1962

U. S. Atomic Energy Commission
Division of Licensing & Regulation
Washington 25, D. C.

Attention: R. L. Kirk,
Deputy Director

SUBJECT: DLR:JJL 40-3698

Gentlemen:

This refers to your letter of December 21, 1961, which requested answers to seventeen (17) questions in support of our application for renewal of Source Material License No. R-228.

Please find enclosed four (4) copies of our reply.

Yours very truly,

SUSQUEHANNA-WESTERN, INC.

G. H. Bryant, Manager
Metallurgical Division

cc

bcc: R. E. Shreve
R. F. Bell
H. L. Hazen
Denver

Copy Provided
Compliance
3/26/62
DW

QUESTION 1

1. A detailed description of your organization, including authority and responsibility of each level of management and/or supervision in regard to development, approval, and adherence to operating procedures.

ANSWER

The accompanying sheets show the organization chart and a description of the authority and responsibility of each level of management.

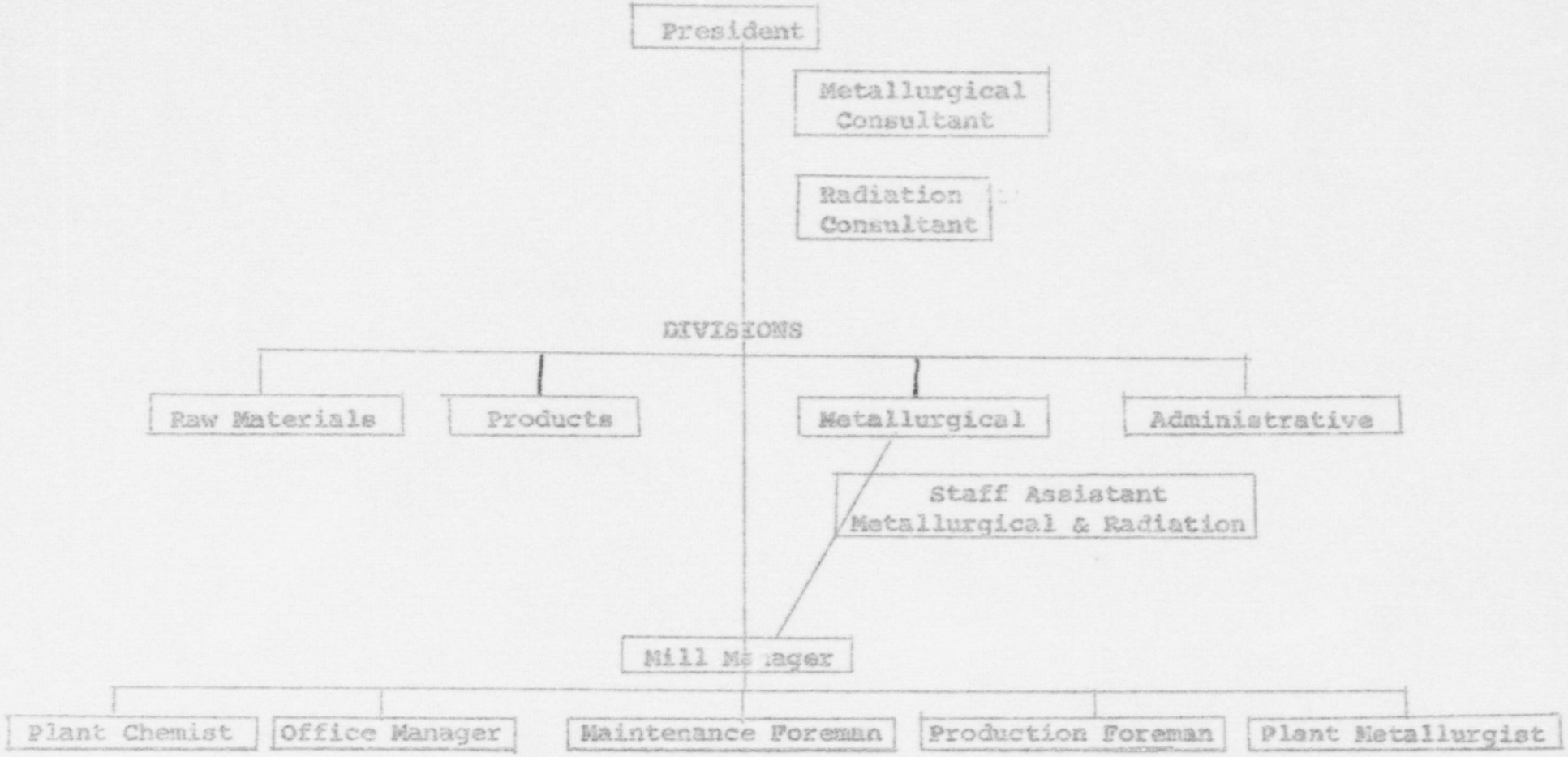


CHART OF ORGANIZATION

METALLURGICAL CONSULTANT

I. Basic Function

Is responsible to the President for Metallurgical and Chemical Consultation and advice to operating management in the design, development, installation, and operation of all metallurgical processing units of the Company.

II. Responsibilities

1. Advises on all flow sheets and designs for metallurgical operating units and modifications to plants and processes.

2. Advises on construction and installation of new plants, new equipment or modifications thereto.

3. Advises on operation of metallurgical process by continuous examination of operating reports and personal observation.

4. Analyses operating conditions and makes recommendations for operation to line management.

5. Assists in developing of specifications and in purchasing of equipment.

6. Assists in the development of proper records for control of operations and for adequate reports for analysis.

7. Assists in the development of proper health and safety programs including radiation control.

III. Relationships

1. The President - Is directly responsible to the President for all relationships with the Company.

2. Division Manager - Advises and consults with division managers with respect to metallurgical processes.

3. Government Agencies - Represents the Company in relationships with government agencies as requested by the President to maintain good relationships and adhere to governmental regulations.

4. Operating Management - Assists operating management in the Field as requested by Division Managers.

5. Other - Maintains such other relationships as may be requested by the President.

RADIATION CONSULTANT

I. Basic Function

Is responsible to the President for consultation and advice to operating management in the development, installation, training and operation of all radiation protection programs of the Company.

II. Responsibilities

1. Advises on the development of programs for radiation protection in all operating units.

2. Establishes programs, records, reports for radiation protection programs.

3. Instructs company personnel in these programs for adequate sampling procedures, laboratory analysis, reporting and subsequent action for the protection of personnel.

4. Advises on modification to equipment, schedules, or processes to give adequate protection to personnel.

5. Audits Company programs to guarantee adequate radiation protection.

6. Assists in development of specifications and purchase of proper samples, laboratory and other equipment for radiation control programs.

III. Relationships

1. The President - Is directly responsible to the President for all relationships with the Company.

2. Division Managers - Advises and consults with division managers with respect to Radiation Control.

3. Government Agencies - Represents the Company in relationships with government agencies as requested by the President to maintain good relationships and adhere to governmental regulations.

4. Operating Management - Assists and instructs operating management in the field as requested by Division Managers.

5. Audit - Audits the radiation protection programs of the Company.

6. Other - Maintains such other relationships as may be requested by the President.

MANAGER - METALLURGICAL DIVISION

I. Basic Function

Directly responsible to the President for the direction of all metallurgical processing operations of the company.

II. Responsibility and Authority

1. Is responsible for the direction of all metallurgical operations.

2. Approves all metallurgical processes and operational procedures with consultation of the Metallurgical Consultant and/or appropriate division managers.

3. Approves new construction design and purchase orders for new equipment for metallurgical processing operations from an operations point of view.

4. Prepares the budget for the Metallurgical Division and approves expenditures within budgetary and policy limitations.

5. Supervises the personnel of the division through Mill Managers, Mill Superintendents or other operating supervision.

6. Is responsible for employee relations activities of the Metallurgical Division such as selection, orientation, morale, wage and salary administration, etc. delegating through subordinate supervisors.

7. Is responsible for personnel planning and for training and individual development of persons under his supervision.

8. Is responsible for health and safety including radiation control of all metallurgical processing operations.

9. Conducts or assists in negotiation of new contracts or agreements concerning metallurgical processing operations.

10. Assists in the planning of new projects for metallurgical processing.

11. As a member of the Management staff, participates in the formulation of programs, policies and procedures.

III. Relationships

1. The President - Is directly responsible to the President for all matters concerning the Metallurgical Division.

2. Subordinates - Directs the activities of Mill Superintendents and Chemical Engineer.

3. Metallurgical Consultant - Coordinates and cooperates with the Metallurgical Consultant on matters of metallurgical processing and procedures.

4. Division Managers - Coordinates with other Division Managers and Company officers.

5. Government Agencies - Maintains good relationships with government agencies and regulatory bodies connected with metallurgical processing.

6. Labor Representatives - Maintains relationships with any labor organizations connected with processing operations.

7. Other - Maintains memberships in professional societies relative to their work and relationships with other organizations as required.

MANAGER - ORE PROCUREMENT

I. Basic Function

Negotiates with ore producers for the supply of ore for the Company processing operations.

II. Responsibilities

1. Is responsible for contacts and negotiations with ore producers assigned to various mills to assure delivery of proper quality and quantity of ore.

2. Is responsible for contacts and negotiations with shippers and transportation companies for efficient transportation of ore to the mills, negotiating transportation rates.

3. Handles complaints of producers and shippers and assists them in solving their problems to assure continued flow of quality ore.

4. Works closely with Manager - Metallurgical Division and Mill Managers and Superintendent to assure delivery of proper grades and types of ores for the various mill circuits.

5. Maintains public relations contacts within the industry and in the community to further the best interests of the Company.

6. Maintains familiarity with ore reserves, producers potentials and general mining conditions within the territories supplying ore to the various mills.

7. As Division Manager makes recommendations and participates in management decisions with other division managers, the President and other officers of the Company.

III. Relationships

1. President - Is directly responsible to the President for all assignments.

2. Division Managers - Coordinates and cooperates with other division managers and Company officers.

3. Government Agencies - Maintains good relationships with government agencies and regulatory bodies connected with ore procurement.

4. Producers and Shippers - Maintains close contact with ore producers and shippers to maintain a good ore supply.

5. Public Relations - Maintains good contacts with the industry and with the communities and areas which serve the Company facilities.

6. Other - Maintains contacts with professional societies and others as may be necessary.

MANAGER - RAW MATERIALS DIVISION

I. Basic Function

Is directly responsible to the President for the direction of all activities for the purpose of obtaining raw materials for process by the Company.

II. Responsibilities and Authority

1. Under the direction of the President seeks sources of raw materials for present facilities or for new projects and proposals.

2. Makes recommendations concerning long-range programs for procurement of raw materials and for present procurement programs. Makes final decisions to drop ore procurement where geology or economics are involved.

3. Evaluates or directs the evaluation of potential properties, prospects or sources of raw material.

4. Is responsible for final negotiations, subject to approval of the President, for the leasing, purchase or acquisition of raw materials sources.

5. Directs the activities of ore buying through ore buying representatives.

6. Directs the activities of mine development and production through mine superintendents.

7. Prepares exploration and operating budgets for the Raw Materials Division for approval of the President and other Company officials and authorizes expenditures, under budgetary and policy limitations, for the division.

8. Is responsible for employee relations activities of the Raw Materials Division, such as selection, orientation, wage and salary administration, etc., delegating through subordinate supervisors.

9. Is responsible for the planning of personnel requirements and for the training and individual development of personnel in the Raw Materials Division.

10. Is responsible for health and safety in the Raw Materials Division, establishing and administrating programs through subordinate supervisors.

11. Supervises mining operations personnel through mine superintendents.

12. Maintains familiarity with current and projected markets and new techniques in exploration and development of mineral deposits.

13. As Division Manager, makes recommendations and participates in management decisions with other division managers, the President and other officers of the Company.

III. Relationships

1. The President - Is directly responsible to the President for all matters concerning his division.

2. Subordinates - Directs the activities of Mine Superintendents, District Geologists and Ore Procurement Manager.

3. Division Managers - Coordinates all activities with other Division Managers and their divisions.

4. Government Agencies - Maintains contact with government agencies and regulatory bodies concerned with his area of work.

5. Other - Maintains memberships in professional societies appropriate to his work or other contacts as required.

MANAGER - ADMINISTRATIVE DIVISION
(and Assistant Secretary)

I. Basic Function

Directly responsible to the President for planning, organization, development and direction of financial controls, contract adminstration, supply, personnal and employee relations and procedures and organizational development.

II. Responsibilities and Authority

1. Plans, establishes and directs adequate financial controls and systems and procedures for the administration of these controls as follows:

   a. Supervises, guides, and approves the preparation of overall capital expenditures, operating and cash flow budgets by the Administrative Assistant on the basis of requests from the Division Managers and data supplied by the Chief Accountant.

   b. Establishes procedures and supervises and guides the Chief Accountant in reporting the comparisons of actual expenditures to budgets.

   c. Analyzes expenditures as compared to budgets and makes reports, with recommendations, to the President concerning financial position, cash requirements and operating costs.

   d. Supervises and guides the Chief Accountant in the development and operation of an accounting system to serve the needs of the Corporation and its management and to insure compliance with government regulations.

   e. Under the direction of the Treasurer, establishes internal auditing procedures and independent accounting auditing to insure control and verification of accounting results.

f. Under the direction of the Treasurer, establishes adequate and economical insurance coverage for all company facilities and activities.

g. Establishes bank accounts and systems for control of bank accounts and provides communications with banks and financial and credit reporting agencies.

2. As Assistant Secretary, under the direction of the Secretary, is responsible for the security of corporate books and records, acts as custodian of corporate documents, contracts, leases, deeds to property, etc., provides for the disposition of records and affixes corporate seal and attests, signs or countersigns documents executed on behalf of the corporations.

3. Coordinates all corporate operational activities necessary to insure contract compliance with government regulatory bodies (except radiation control) and assists other Division Managers in assuring conformity of their operations with any existing contractual requirements.

4. Develops and administers office systems and procedures working through the Chief Accountant and Division Office Managers for the accumulation and presentation of reporting data for government agencies, financial institutions, and company management.

5. Is responsible for preparation of the Budget for the Administration Division and for direction of the Division to conform to budgetary controls.

6. Provides communications, transportation and office space for the activities of the Company.

7. Under the direction of the President is responsible for personnel selection and development and employee relations, delegating through the Employee Relations Manager as follows:

a. Establishment of plans and programs in manpower requirements and filling of these requirements by internal development or external recruiting and selection.

b. Establishment of plans, programs and policies for the training and development of personnel.

c. Establishment of plans, programs, and policies for employee relations, including wage and salary administration, employee benefit programs, recreation programs, etc.

d. Establishment and maintenance of suitable personnel records to conform to government regulations and company policies.

8. Is responsible for purchasing, supply and warehousing functions delegating to the Purchasing Agent and coordination through divisional buyers and warehouse personnel for:

a. Establishment and maintenace of purchasing and receiving procedures.

b. Establishment and maintenance of warehouse and inventory controls and procedures.

9. Is responsible for employee relations activities of the Administrative Division and the Denver Office, such as selecting, orientation, morale, wage and salary administration, etc., delegating through subordinate supervisors.

10. Assists in public relations functions by representing the company at community or civic functions, technical societies, legislative hearings, or with government officials or agencies.

11. As a member of management staff, participates in the development of programs, policies, and procedures.

XXI. Relationships

1. The President - Is responsible and accountable to the President for all functions. Acts as advisor on all matters under his jurisdiction.

2. The Treasurer - Is responsible to the Treasurer for functions as Assistant Secretary and for financial matters.

3. Subordinate Department Heads - Directs the activities of the Manager of Employee Relations, the Purchasing Agent and the Chief Accountant.

4. Division Managers - Coordinates administrative functions with other Division Managers acting in a staff relationship in matters of records, accounting and personnel.

5. Government and Financial Agencies - Maintains contacts with government agencies in financial and contractual matters.

6. Consultants - Maintains contacts with consultants, auditors, legal counsel, etc. as necessary.

7. Others - May maintain relationships with professional societies or other organizations or represent others as requested.

STAFF ASSISTANT -- METALLURGICAL DIVISION

I. Basic Function

As a staff assistant to the Manager-Metallurgical Division, acts as Project Coordinator or performs special assignments in the development of improvements to existing processes and facilities or expansions or new projects, including Health and Safety and Radiation Control Programs.

II. Responsibilities

1. Acts as project coordinator for one or more projects under the direction of the Manager-Metallurgical Division for administration of special projects as defined in Project Coordinator job description.

2. Investigates miscellaneous projects as assigned by the Manager-Metallurgical Dividion for improvements to present metallurgical processes and facilities or for potential processes.

3. Establishes programs and directs or conducts experiments to ascertain the feasibility of new metallurgical processes or modifications or to establish operating conditions and limitations.

4. Evaluates projected processes and submits reports to the Manager-Metallurgical Division with recommendations for metallurgical processing.

5. Makes recommendations for design of facilities and equipment related to these projects.

6. May investigate and prepare reports on existing operations or smaller miscellaneous projects.

7. Plans programs for Industrial Health and Safety in all operations, including health, safety, fire prevention, radiation protection and first aid and works with superintendents and managers to install and carry out such programs.

8. Prepares and issues literature, instructions, handbooks, etc., and carries out educational programs in health and safety as above.

9. Works with consultants on Radiation Control and sees that external audit systems are carried out.

10. Coordinates activities with Radiation Consultant and government bodies such as State Health Department, local health authorities, and the AEC to insure conformance to government regulations.

III. Relationships

1. Manager-Metallurgical Division -- Is directly responsible to the Manager-Metallurgical Division for all assignments.

2. Division Managers -- Coordinates with appropriate division managers to investigate projects and to expedite completion of various phases of the projects.

3. Laboratories-- Directs experimentation within company or outside laboratories for investigation of projects.

4. Radiation Consultant -- Works closely with radiation consultant to insure smooth operation of the Radiation Control Program.

6. Government Agencies -- Works closely with the AEC, Public Health Authorities, and other regulatory bodies to promote company programs and insure compliance with government regulations.

7. Other -- Maintains relationships as indicated for Project Coordinator or any other as may be necessary.

MILL MANAGER

Supervises the operation of a continuous process mill for the separation of uranium oxide from its ores, and attendant equipment, buildings, grounds, and roads.

Working through subordinate supervisors of production, maintenance, office, and supply, is responsible for production, efficiency, and conformance to all government regulations. Is also responsible for maintenance of equipment, buildings, grounds, and sanitation, safety, and health.

Through subordinate supervisors is responsible for use of manpower, personnel relations, morale, and enforcement of Company policies.

Coordinates work with metallurgical consultant, engineering, sales, mining, personnel, administrative division, and ore procurement for maintenance of flow of ore through the mill.

Works closely with AEC personnel and policies, to maintain conformance to regulations.

Supervises the maintenance of supplies at proper levels.

Analyzes any unusual circumstances and takes corrective action in any area mentioned above. Works from general company policies and objectives.

Is responsible for the training and individual development of all personnel.

Sets up research projects, maintains familiarity with new developments through literature and societies, works with other departments in planning and installation of new equipment or processes.

Participates in the development of budgets and authorizes expenditures for the mill.

Submits all necessary reports to other departments, general office, and government agencies.

(continued...)

Acts as public relations representative for the Company in the area.

Requires a knowledge of mining and milling equivalent to a college degree and a good knowledge of supervision and management.

PLANT METALLURGIST

I. Basic Function

Is responsible to the Mill Manager for Metallurgical and Chemical processes in a continuous process mill for the extraction of uranium oxide from its ores, a continuous process mill for the extraction of vanadium from its ores, and other such processes as may be established.

II. Responsibilities

1. Establishes control systems for the metallurgical processes in the mills.

2. Analyzes the processes from reports and observations and makes recommendations for corrections and changes to improve the efficiency of operations from a metallurgical point of view, including use of various ores and blends for efficient mill operation.

3. In co-operation with the production staff, analyzes immediate processing problems and makes recommendations for correction.

4. Conducts experiments and does research into metallurgical problems and makes recommendations for improvement of processing on a long-range basis.

5. Is responsible for radiation testing and control. Maintains reports and recommends necessary corrective action.

6. Is responsible for all chemical work, including amenability work, analysis of in-process solutions, finished product, raw materials, chemicals used in processes, and for preparation of chemicals used in laboratory work. Devises new laboratory methods.

7. Supervises the employes of the Chemical Laboratory, assigning work, instructing, directing, and following up work assignments.

8. Is responsible for use of manpower, personnel relationships, morale, and conformance to company policies within the Chemical Laboratory.

9. Is responsible for cleanliness, health, safety and maintenance of equipment within the department.

10. Is responsible for the training and individual development of personnel in the department.

11. Maintains necessary laboratory supplies and equipment.

12. Submits necessary reports for company use and for government agencies.

III. Relationships

1. Mill Manager -- Is responsible directly to the Mill Manager for all assignments.

2. Production Supervision -- Co-ordinates with production and maintenance supervisors on all matters of metallurgical processing and chemical controls.

3. Laboratory Employes -- Supervises the Chemical Laboratory employes.

4. Other -- Maintains such relationships with professional societies and others as required.

PRODUCTION FOREMAN

Supervises the production departments in a continuous process millfor the extraction of uranium from its ores, including three shift operation of mill and one shift operation of ore receiving and preparation.

Works through mill operations foremen and lead men in various areas.

Is responsible for the efficient operation of all departments, the maintenance of equipment within his area, health, cleanliness and safety and availability of supplies and equipment.

Coordinates his work with engineering, maintenance, ore procurement, laboratory, sales, warehouse, office, and administration and conforms to government regulations.

Is responsible for the use of manpower, personnel relations, morale, and enforcement of Company policies.

Plans operations, analyzes and takes corrective action on production problems to maintain best efficiency.

Is responsible for the indoctrination, training, and individual development of all personnel within his department.

Participates in the development of budgets and the control of costs for his department.

Participates, with engineering, laboratory, consultants and others, in the development of new methods of operation.

Is responsible for all records for company and government use which pertain to the production and ore receiving departments.

Requires a knowledge of mining and milling equivalent to a college degree and a good knowledge of supervision and training.

MAINTENANCE FOREMAN

Supervises a department of employees in Maintenance and Utility of a continuous process mill in extraction of Uranium Oxide from its ore and all necessary equipment, stationary and mobile, inclusive of buildings, grounds and roads. Supervises some new installations.

Is responsible for the mechanical operation of all equipment through regular and preventive maintenance programs.

Is responsible for the work direction of personnel, scheduling of employees; for maintaining employee morale, handling of employee relations, personal problems and complaints, and for conformance to Company policy and safety regulations. Is responsible for indoctrination, training, and individual development of his personnel.

Is responsible for seeing that maintenance machinery and tools are maintained, work area is clean and in good repair and safety and fire fighting equipment is properly placed and in good working order.

Plans and schedules maintenance operations, work loads, new installations and preventive work, coordinating with production departments. Does some technical planning and drawing. Plans for and requisitions parts, supplies, tools, and materials to be on schedule for projects. Assists in determining stock levels for maintenance parts and supplies.

Receives general objectives and broad plans from the Mill Superintendent. Coordinates activities with engineering, production, office, laboratory and other departments. Participates in decisions on plant operations.

Analyzes conditions of equipment and recommends corrective or preventive maintenance action, replacement of equipment or installation of new equipment.

Makes budget requests and reviews and analyzes expenditures, taking corrective action within his department and making recommendations concerning maintenance costs.

Maintains or supervises maintenance of personnel and maintenance records as required.

Requires a knowledge of maintenance of mill equipment and mobile equipment, buildings, grounds, and roads. Should have a knowledge of supervision, costs, supply, purchasing, and other management tools.

OFFICE MANAGER

Supervises a group of employes of the district office in the performance of office and clerical duties including payroll and labor distribution, cost records, settlement data, requests for check orders, voucher register and production and inventory reports to the general office and government agencies.

Is responsible for all district reports and accounting records, maintenance of office supplies, office procedures, distribution of mail, petty cash, workman's compensation, group insurance, and compiling of budget data for the office and other departments.

Supervises the purchasing and warehousing functions through the District Buyer, a warehouseman and other warehouse personnel with respect to purchases, expediting, warehousing, inventory control and processing and maintaining all necessary records.

Supervises office personnel, assigns work, directs, instructs, and follows up on work assignments. Is responsible for discipline, personnel relations, morale, and training of employes in the office.

Acts as personnel representative in screening applicants, interpreting and administering benefit programs, testing, and processing and maintaining personnel records. Coordinates training activities and administers and maintains records on wage administration.

Checks on work, checks reports and handles unusual problems connected with reports to the general office and government agencies.

Requires a general knowledge of clerical and accounting procedures and of the basics of supervision and training.

PLANT CHEMIST

Supervises the operations of the chemical laboratory for continuous process mill for the extraction of uranium oxide from its ores, ore receiving department, and two continuous process plants for the production of sulfuric acid.

Is responsible for all chemical work including amenability work, analysis of in-process solutions, finished product, acid and acid processes and raw materials, chemicals used in processes and preparation of chemicals used in laboratory work.

Supervises a group of employes, assigning work, instructing, directing, and following up on work assignments. Is responsible for use of manpower, personal relationships, morale, and enforcement of company policies within the department.

Is responsible for cleanliness, health, safety, and maintenance of company policies within the department.

Is responsible for cleanliness, health, safety, and maintenance of equipment within the department.

In cooperation with others, participates in or supervises experimentation and development of new methods for the improvement of efficiency of operations. Carries out experiments in cooperation with engineering, metallurgical consultant or geology which pertain to other operations or investigation of other enterprises. Devises new laboratory methods.

Maintains necessary laboratory supplies and equipment.

Is responsible for the training and individual development of personnel in the department.

Submits reports for company use and for government agencies.

Requires a knowledge of chemistry equivalent to a college degree and a basic understanding of supervision.

QUESTION 2

2. The qualifications and experience of the personnel in your organization assigned the responsibility for developing, conducting and administering the radiation safety program for the mill.

ANSWER

The accompanying sheets describe the qualifications and experience of personnel responsible for the radiation safety program.

NAME: Allen D. Gray

TITLE: President, Susquehanna-Western, Inc.
Mines Development, Inc.

EDUCATION: Pennsylvania State University, B.S. (1948)
Colorado School of Mines, M.E.M. (1952)

POSITIONS: Industrial Engineer
Island Creek Coal Company (1948)

Production Engineer
R & P Coal Company (1949-1950)

Senior Engineer
Colorado School of Mines
Research Foundation (1951)

Instructor
Colorado School of Mines (1952)

General Manager
Mines Development, Inc. (1954-1958)

President
Susquehanna-Western, Inc.
Mines Development, Inc. (1958 - Present)

NAME: H. L. Hazen

AGE: 70

TITLE: Metallurgical Consultant

EDUCATION: University of California at Berkeley, College of Mining; left during 1913 after completing 4 years of a 5-year mining course.

POSITIONS: Assayer, Refineryman, Area Mill Man, Nevada Hills Mining Co., Fairview, Nevada (Cyanide Mill) (1914 - 1915).

Chief Metallurgical Assistant
Ore Testing Laboratory
Hamilton, Beauchamp & Woodworth
San Francisco, California (1916 - 1919)

1920 - 1949: With the following --

Mill Superintendent
Melones Cyaniding Co.
Melones, California

Consulting Metallurgist (self-employed)
Crooker Building
San Francisco, California

General Manager & Metallurgist
Caliente Cyaniding Company
Delmar, Nevada

President & General Manager
Standard Cyaniding Company
Lovelock, Nevada

General practice as Consulting Metallurgical Engineer (including services to the AEC)
777 Grant Street
Denver 3, Colorado (1950 - Present)

NAME: G. H. Bryant

AGE: 32

TITLE: Manager, Metallurgical Division --
Susquehanna-Western, Inc.
Mines Development, Inc.

EDUCATION: Clover Park High School (1946)
Tacoma, Washington
(College Preparatory, General Education)

College of Puget Sound (1948 - 1950)
Tacoma, Washington
(Pre-Engineering)

Colorado School of Mines (1953)
Golden, Colorado
Engineer Mines (E.M.) Degree

POSITIONS: Jr. Field Engineer (1953 - 1954)
Schlumberger Well Surveying Corp.
Sidney, Nebraska
(Performed Electric Oil Well Logging Surveys in Julesburg Basin Area)

Superintendent (1954 - 1956)
Helmar Enterprises, Nevada & California
(Operated Tungsten & Chrome Mines & Mills)

Mill Foreman (1956 - 1958)
Mines Development, Inc., Edgemont, South Dakota
(In charge of operating & maintenance crews)

Mill Superintendent (1958 - 1960)
Susquehanna-Western, Inc., Riverton, Wyoming
(In charge of all Riverton operations for uranium mill and Sulfuric Acid Plant)

Manager, Metallurgical Division (1960 - Present)
Susquehanna-Western, Inc., Denver, Colorado
(In charge of company metallurgical operations, including Edgemont Mill, Riverton Mill, and Texas Mill.)

NAME:	H. E. Dixon	
AGE:	33	
TITLE:	Staff Metallurgist Susquehanna-Western, Inc. Denver, Colorado	
EDUCATION:	Arlington High School Arlington, Mass.	(1941-1947)
	West Virginia Wesleyan West Virginia (B.S.-Chemistry)	(1947-1950)
	Boston University Mathematics	(1953-1954)
	Mass. Institute of Technology Mining Engineering	(1954-1955)
EXPERIENCE:	U. S. Navy (S 1/c)	(1945-1946)
	Chemist Plymouth Rubber Co. Canton, Mass.	(1950-1952)
	Metallurgist National Lead Co., Inc. Grand Junction, Colorado	(1952-1958)
	Chief Metallurgist Phillips Petroleum Co. Grants, New Mexico	(1958-1960)
	Metallurgist Susquehanna-Western, Inc. Denver, Colorado	(1960)
	Staff Metallurgist Susquehanna-Western, Inc. Denver, Colorado	(1961-Present)

NAME: R. E. Shreve

AGE: 39

TITLE: Mill Manager
Susquehanna-Western, Inc.

EDUCATION:

Rifle High School Rifle, Colorado	(1936-1940)

EXPERIENCE:

U. S. Navy	(1942-1944)
Research Chemist U. S. Vanadium Corporation Rifle, Colorado	(1944-1947)
Superintendent Vanadium Corp. of America Naturita, Colorado Durango, Colorado White Canyon, Utah Jumasha, Peru	(1948-1953)
Superintendent Kerr-Mcgee Oil Ind. Shiprock, New Mexico	(1954-1958)
Superintendent Gunnison Mining Company Gunnison, Colorado	(1958-1960)
Mill Superintendent Susquehanna-Western, Inc. Riverton, Wyoming	(1960)
Mill Manager Susquehanna-Western, Inc. Riverton, Wyoming	(1961-Present)

NAME:	H. T. Holliday	
AGE:	32	
TITLE:	Maintenance Foreman Susquehanna-Western, Inc.	
EDUCATION:	Morril High School Shoshoni, Wyoming	(1943-1947)
	University of Wyoming Laramie, Wyoming Northwest University Powell, Wyoming (Civil Engineering)	(1947-1948)
EXPERIENCE:	U. S. Navy	(1951)
	Farmer Wyoming	(1951-1956)
	Station Manager Ainsworth Buick & Pontiac Riverton, Wyoming	(1956)
	Driver Brough Trucking Company Riverton, Wyoming	(1956-1959)
	Owner of Service Station	(1957-1958)
	Utility Man Susquehanna-Western, Inc. Riverton, Wyoming	(1959)
	Mechanic Trainee Susquehanna-Western, Inc. Riverton, Wyoming	(1959-1960)
	Mechanic 5 Susquehanna-Western, Inc. Riverton, Wyoming	(1960)
	Mechanic Crew Foreman Susquehanna-Western, Inc. Riverton, Wyoming	(1960-1961)

H. T. Holliday (Continued)

Maintenance Foreman (1961-Present)

NAME: R. L. Beseda

AGE: 32

TITLE: Production Foreman
Susquehanna-Western, Inc.

EDUCATION:

Powell High School (1943-1947)
Powell, Wyoming

Northwest College (1947-1948)
Powell, Wyoming

Colorado School of Mines (1948-1952)
Golden, Colorado
(Geological Engineering)

EXPERIENCE:

U. S. Army (1952-1954)
1st Lieutenant

Geologist (1954-1956)
Colorado Exploration Company
Golden, Colorado

Ford & Fox Consulting Geologists (1956-1958)
Riverton, Wyoming

Operations Foreman (1958-1960)
Susquehanna-Western, Inc.
Riverton, Wyoming

Production Foreman (1960-Present)
Susquehanna-Western, Inc.
Riverton, Wyoming

NAME: R. F. Stoker

AGE: 39

TITLE: Plant Metallurgist
Susquehanna-Western, Inc.

EDUCATION:

Nucla High School (1936-1940)
Nucla, Colorado

Mesa Junior College (1945-1947)
Grand Junction, Colorado

Woodbury College (1947-1948)
Los Angeles, California

EXPERIENCE:

U. S. Marine Corps (1942-1945)
Corporal

U. S. Army (1949-1950)
Lieutenant

Chemist (1950-1951)
Vanadium Corporation of America
Naturita, Colorado

Asst. Chief Chemist (1951-1956)
Climax Uranium Company
Grand Junction, Colorado

Chief Chemist (1956-1958)
Mines Development, Inc.
Edgemont, South Dakota

Process Engineer (1958)
Susquehanna-Western, Inc.
Riverton, Wyoming

Plant Engineer (1958-1961)
Susquehanna-Western, Inc.
Riverton, Wyoming

Plant Metallurgist (1961-Present)
Susquehanna-Western, Inc.
Riverton, Wyoming

NAME:	E. Axe	
AGE:	33	
TITLE:	Office Manager Susquehanna-Western, Inc.	
EDUCATION:	Laramie High School Laramie, Wyoming	(1941-1945)
	University of Wyoming Laramie, Wyoming (Business Administration Degree)	(1946-1950)
EXPERIENCE:	U. S. Navy	(1945-1946)
	Merchant Marine 3/C	(1951)
	Clerk Pan American Petroleum Riverton, Wyoming	(1952-1954)
	Self Employed	(1954-1956)
	Office Manager Vitro Minerals Corporation Casper, Wyoming	(1957-1960)
	Office Manager Susquehanna-Western, Inc. Riverton, Wyoming	(1960-Present)

NAME: Robert F. Bell

TITLE: Consultant to Company

HIGHEST ACADEMIC DEGREE: M.D., University of Colorado, 1937

POSITION IN UNIVERSITY: Assistant Clinical Professor;
Acting Head of Division of Industrial Medicine,
University of Colorado Medical Center.

SCIENTIFIC EXPERIENCE: Residencies: 1 year - University of Maryland Hospital, Baltimore, Md.; 1 year - Sheppard-Enoch Pratt Hospital, Baltimore, Md.; 1 year - Salt Lake Clinic, Salt Lake City, Utah; 1 year - (Preceptorship) Dr. K. C. Sawyer, Denver, Colo.

Teaching Appointments: Clinical Instructor in Physical Diagnosis of Chest, Johns Hopkins University - 1 year; Clinical Instructor, University of Colorado - 5 years; Assistant Clinical Professor, University of Colorado - 10 years.

Industrial Physician with E. I. duPont de Nemours & Co., Inc. - 10 years, the last 6 years of which was in the capacity of Medical Supervisor.

From 1951 to present time: Acting Head of Division of Industrial Medicine, in addition to maintaining a private practice; duties with Division include medical consultation with industry, teaching, and administration.

NAME: James C. Gilliland

HIGHEST ACADEMIC DEGREES: B. S., Chemical Engineering,
University of Nebraska, 1949

M. S., Industrial Hygiene Engineering
Harvard University, 1950

POSITION IN UNIVERSITY: Assistant Professor of Industrial Hygiene Engineering in Department of Medicine.

SCIENTIFIC EXPERIENCE: Industrial Hygiene Engineering Consultant with the Division of Industrial Medicine - 9½ years. Duties include both field and laboratory evaluations of the many factors involved in offering a general industrial hygiene service to industry. He also performs extrinsic research activities and acts as statistician for the Division.

RELATIONSHIP TO COMPANY: To assist Dr. Bell in his capacity as consultant.

NAME: Beverly R. Sullivan

HIGHEST ACADEMIC DEGREE: B.S., Chemistry, Iowa State University, 1947

POSITION IN UNIVERSITY: Chemist

SCIENTIFIC EXPERIENCE: Chemist for Division of Industrial Medicine - 6½ years. Performs trace metal analyses and general toxicology.

RELATIONSHIP TO COMPANY: To assist Dr. Bell in his capacity as consultant.

NAME:	C. W. Lembke
AGE:	37
TITLE:	Plant Chemist Susquehanna-Western, Inc.
EDUCATION:	Nebraska School of Agriculture (1939-1942) Curtis, Nebraska
	Chadron State College (1951-1955) Chadron, Nebraska (B.A. Degree-Chemistry & Physics)
EXPERIENCE:	U. S. Army (Sgt.) (1942-1945)
	Self Employed (1945-1955)
	Industrial School Disc. (1955-1956) Science Teacher Edgemont, South Dakota
	Chemist (1956-1958) Mines Development, Inc. Edgemont, South Dakota
	Plant Chemist (1958-Present) Susquehanna-Western, Inc. Riverton, Wyoming

QUESTION 3

3. A description of the area in which the mill is located, including the location and size of nearby inhabited areas, locations of streams and rivers, and sources of water supply for the mill. A topographical map with the above identifications is preferred.

ANSWER

Refer to the accompanying Arapahoe and Riverton West Quadrangle maps (In Appendix) for the general topographical characteristics of the area surrounding the mill. Exhibit 1 shows the mill site and the location of nearby inhabited areas (more specific description of inhabited locations within a 1 mile radius will be given in answer to Question 14). Drawing 524-36 (In Appendix) shows the location of sources of water supply for the mill.

EXHIBIT 1

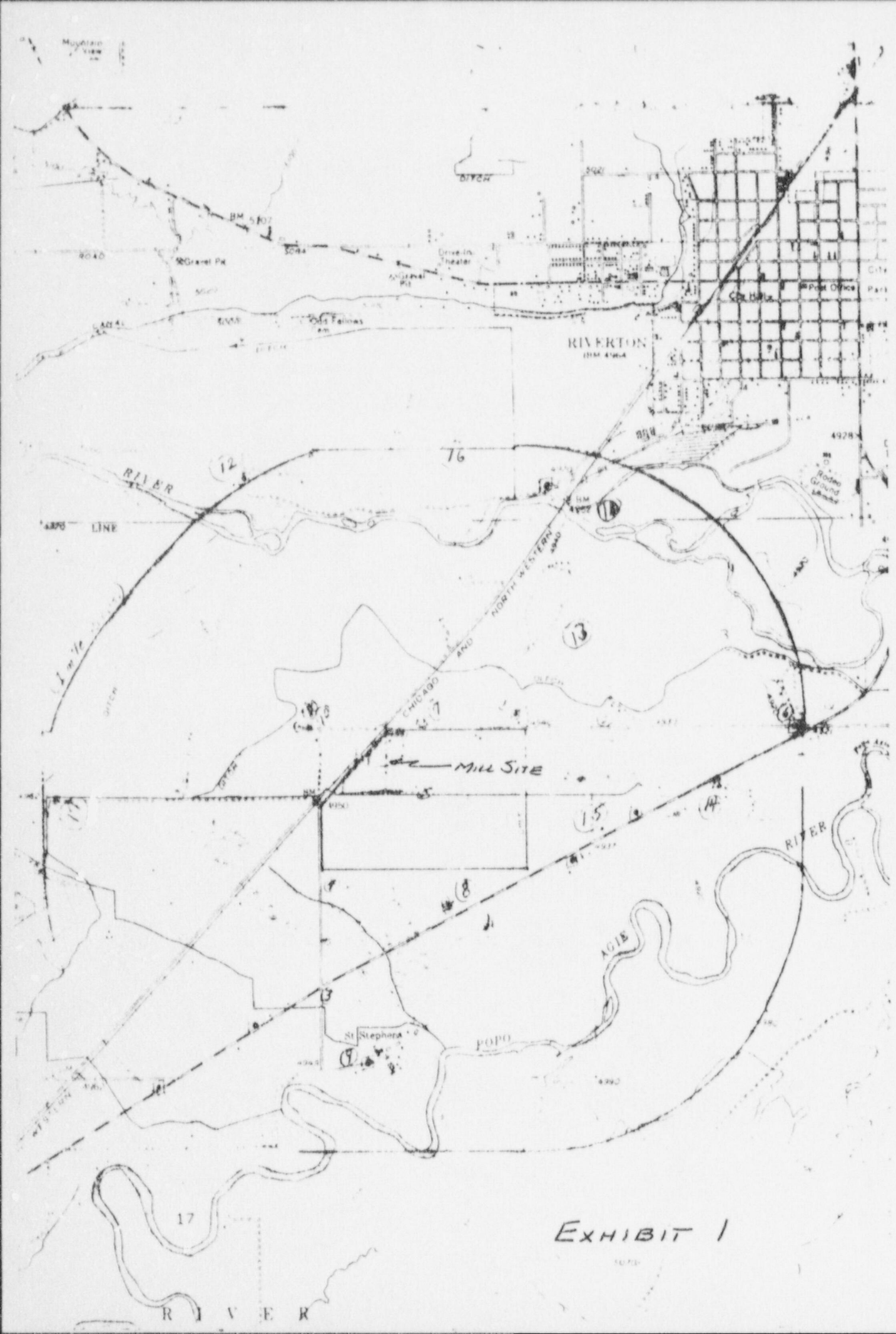

RIVERTON
RIVER
Mill Site
St Stephens
POPO
AGIE
RIVER
R I V E R
CHICAGO AND NORTH WESTERN
LINE

EXHIBIT 1

QUESTION 4

4. A description of the method for restricting both the mill and the tailings pond from unauthorized entry.

ANSWER

The entire restricted area, including the mill and tailings pond, is fenced. At approximately 300 feet intervals, signs reading "Caution, Radioactive Materials" and containing the prescribed radiation symbol are posted on the fence. There are similar signs posted at entrances to the restricted area.

QUESTION 5

5. The ultimate control or disposition of solid and liquid mill tailings, including a description of the geological, hydrological and topographical characteristics of the surrounding area which will affect the degree to which liquid effluents may reach underground and/or surface waters.

ANSWER

All solid and liquid mill tailings are discharged to the tailings pond which is within the restricted area. There are no outlets from the tailings pond. Our liquid effluent sampling program (Described in Question 6) has shown to our satisfaction that no liquid effluents are reaching underground and/or surface waters.

QUESTION 6

6. A description of the liquid effluent survey program (assuming plant effluents reach subterranean or surface water supplies), including the number, location and frequency of check samples and a step-by-step procedure for sample analysis of uranium, radium, and thorium-230.

ANSWER

Every available well within a radius of 1 mile of the mill, including the deep and shallow wells on the restricted area, will be sampled (15 samples) a minimum of once per year for Uranium, Ra226 and Th230 analyses. In addition, upstream and downstream samples of the Popo Agie and Wind Rivers will be similarly analyzed a minimum of once per year.

Previously, samples were obtained bi-yearly at the same locations. No single sample, however, has ever exceeded 1/10 of 10CFR20 unrestricted area values which, in our opinion, justifies this reduction in sampling frequency.

The analyses for uranium is performed by fluorometric techniques similar to those outlined in IDO-12017, USAEC, Idaho Operations Office, Idaho Falls, Idaho. Samples for Ra226 and Thorium 230 analyses are sent to H. L. Hazen Research, Inc., Golden, Colorado.

CONFIDENTIAL

Company _____ Page _____
Location _____ Quarter _____

M.P.C.: U Natural - 2.00×10^{-5}
M.P.C.: Ra226 - 1×10^{-8}
M.P.C.: Th230 - 2×10^{-6}

WATER WELL SAMPLES

UNRESTRICTED AREAS

Property Owner	Sample Number	U Natural /uc/ml X 10^{-5}	U Natural X MPC	Ra226 /uc/ml x 10^{-8}	Ra 226 X MPC	Th230 /uc/ml X 10^{-6}	Date Taken	Th 230 X MPC
Mayland								
Blomberg (Shallow Well)								
Westlake								
Jensen								
St. Stephen's								
Duran								
Stradley								
Brown								
Phillips								
Lucus								
Dewey, Mark								
Whiteman								
Blomberg (Deep Well)								

CONFIDENTIAL

Company _____ Date _____
Location _____

MPC: U Natural - 2.00×10^{-5}
MPC: Ra226 - 1×10^{-8}
MPC: Th230 - 2×10^{-6}

RIVER WATER SAMPLES

UNRESTRICTED AREAS

Sample No.	River Name	Location from Plant	Date Taken	U Natural /uc/ml $\times 10^{-5}$	U Natural X MPC	Ra226 /uc/ml $\times 10^{-8}$	Ra 226 X MPC	Th230 /uc/ml $\times 10^{-6}$	Th 230 X MPC
	Popo Aggie	Up Stream							
	Popo Aggie	Down Stream							
	Wind River	Up Stream							
	Wind River	Down Stream							

Comments:

CONFIDENTIAL

Company _____ Page _____
Location _____ Quarter _____

M.P.C.: U Natural - 5.00×10^{-4}
M.P.C.: Ra226 - 4×10^{-7}
M.P.C.: Th230 - 5×10^{-5}

TAIL POND AND SWI

WATER WELL SAMPLES
RESTRICTED AREAS

Property Owner	Sample Number	U Natural /uc/ml x 10^{-7}	U Natural x MPC	Ra226 /uc/ml x 10^{-9}	Ra 226 x MPC	Th230 /uc/ml x 10^{-6}	Date Taken	Th230 x MPC
SWI Tail Pond								
SWI Shallow Well								
SWI Deep Well								

Comments:

QUESTION 7

7. A description of the equipment used to remove solid radioactive material and soluble radium if tailings are discharged directly into a ground or surface water supply.

ANSWER

There are no tailings discharged directly into a ground or surface water supply.

QUESTION 8

8. A flow diagram of the mill production operation and a diagram of plant layout, indicating areas and points in the process where dust is generated.

ANSWER

Drawings 524-1G and 524-2G (In Appendix) are the mill flow sheets. Drawings 524-105G, 524-200G, 524-16G, and 524-101G (In appendix) are the plant layouts. Points in the process where dust is potentially generated are not specifically noted on the layout diagram. Commencing at the ore receiving grizzly and terminating at the ball and rod mill area, however, points of potential dust generation are those generally associated with the mechanical handling of ore through conveying, crushing, automatic sampling and binning operations. Commencing at the ball and rod mill, the process is wet until the final product packaging operation.

These original drawings may be updated by the inclusion of two additional thickeners and two additional leach agitators to the acid circuit.

QUESTION 9

9. A description of dust collection and ventilation equipment that are to be utilized when the mill is in operation, including the type, capacity and location of such equipment, e.g., ore transfer points, crushing, grinding, etc., and an analysis of the efficiency of the equipment as designed to control or prevent the release of airborne radioactivity to the environs.

ANSWER

Main Laboratory

1 - Duriron "Durco" Blower, Type AA-8, 350 CFM.

2 - Duriron "Dusco" Blowers, Type AA-16, 3150 CFM.

These blowers exhaust the fluorometric room and the various chemical hoods. Their efficiency of operation is indicated by the low airborne radiation results in this area.

Product Packaging

Rotoclone, AAF, Type N, Size 4 with No. 13K Exhauster, 3200 CFM.

This dust collector exhausts the drumming operation and small laboratory hood. Satisfactory efficiency is indicated by the low airborne radiation results in the area.

Product Drying

Aladdin Utility Set, Series 94 Blower, 13,000 CFM.

This general ventilation blower exhausts the product filtering and drying area. Satisfactory efficiency is indicated by the low airborne radiation results in this area.

Precipitation (Precipitation Vent. Blower)

AAF, Type 1108-04, 1800 CFM.

Question 9, Cont'd.

The efficiency of this blower is indicated by the low airborne radiation results in this area.

Sample Preparation Building

Sturdevant, 1015-H-1, 3000 CFM.

This blower exhausts the sample preparation operations such as pulverizing, blending, splitting, etc. Damper control to the various items of equipment is utilized. Satisfactory efficiency is indicated by the low airborne radiation results in this area.

Mill Laboratory

Duriron, Type AA-8, 350 CFM.

This blower exhausts the small laboratory fume hood in the mill laboratory. Satisfactory efficiency is indicated by the low airborne radiation results in this area.

Crushing Building

AAF, Type 1611-00, 4500 CFM.

This blower exhausts sample ore drying belt operations. Its capacity insures acceptable environmental control while this operation is being performed.

Crusher Control Room

This room, located in the crusher building, is utilized to observe several of the crusher processing operations by means of closed circuit television. Fresh filtered air supply to the room is provided by a fan which also maintains the room at positive pressure.

Drum Filter

General ventilation motor driven roof ventilator fans are mounted above each drum filter. Low airborne radiation results are obtained in this area.

QUESTION 10

10. A description of the survey program which is followed to determine concentrations of airborne radioactivity within the mill, including the make, model number and capacity of sampling devices, and the step-by-step procedures for sample analysis.

ANSWER

Gelman Bantam*	#19001,	15-35 liters/min
Gelman Bantam*	#19002,	15-35 liters/min
Hudson*	#606	5-40 liters/min
Gast*	AD-440	0-25 liters/min
MSA Fixt-Flow*	CT75355	15-50 cubic feet/min

Sample analysis is performed by a fluorometric technique as described in 1D0-12017, USAEC, Idaho Operations Office, Idaho Falls, Idaho. Refer to Question #11 for the survey program description.

*or equivalent

QUESTION 11

11. In the description of your air sampling program, please include:

a. A description of the sampling location in respect to operating personnel;

b. A description of the sampling location in respect to the process operations;

c. The approximate number of sampling locations in each area; and,

d. The approximate number of air samples taken in each mill area per month.

ANSWER

a. The mill has been divided into 41 sampling area, corresponding as closely as possible to operating movements. These areas are shown on drawings 524-101-G, 524-105-G, 524-16-G, 524-36 and 524-200-G. Each sampling area is further subdivided into one or more sampling locations.

The sampling locations are selected as being exposure representative in respect to operating equipment and worker occupancy. These sampling locations are shown by number on the above drawings. The numbers correspond to those on report sheets designated as Exhibit II.

b. As described in answer to Question 11a., the sampling locations are selected as being exposure representative in respect to operating equipment and worker occupancy.

b. Exhibit 11 shows the number of sampling locations in each area.

d. A minimum total of approximately 130 restricted air samples are evaluated every quarter (13 weeks). Each sampling location is sampled at least once per quarter (13 weeks.) The number of air samples taken in each mill area per month cannot be reasonably approximated due to the flexibility of our sampling program. Insofar as is possible, however, the samples are obtained during periods of actual process operation.

EXHIBIT 2

LOCATIONS AS DESIGNATED BY AREA NUMBER

Area	Area Location	Area	Area Location
1		21	
2		22	
3		23	
4		24	
5		25	
6		26	
7		27	
8		28	
9		29	
10		30	
11		31	
12		32	
13		33	
14		34	
15		35	
16		36	
17		37	
18		38	
19		39	
20		40	

EXTERNAL & AIR-BORNE RADIATION SURVEY

SUSQUEHANNA-WESTERN, INC. CONFIDENTIAL Date _____ Survey No._____
Riverton, Wyoming

Sample No.	Sample Location	Time	Date	Level x10^{-11} /uc/ml	Remarks	Ext. MRH Gamma & Beta
	BULK SAMPLE ROOM -- AREA #1					
10	5 cu. ft. Blender					
20	Englebach Grinder					
25	3 cu. ft. Blender					
40	#1 Braun Pulverizer					
	Average Radiation Level _____					
Comments:						
	MOISTURE ROOM -- AREA #2					
35	Moisture & Sample Dry Ovens					
65	Moisture Scale					
	Average Radiation Level _____					
Comments:						
	FINAL SAMPLE PREPARATION ROOM, AREA #3					
50	#2 Braun Pulverizer					
45	4 qt. Blender					
70	8 qt. Blender					
	Average Radiation Level _____					
Comments:						
	COARSE ORE BIN, AREA #4					
014	Coarse Ore Bin Vibrator					
015	Coarse Ore & Grizzly (below)					
	Average Radiation Level _____					
Comments:						

Sample No.	Sample Location	Time	Date	Level x 10^{-11} /uc/ml	Remarks	Ext. MPH Gamma + Beta

CRUSHING & SAMPLING BUILDING 1st FLOOR, AREA #5 ~~(Plant in Operation)~~

095 #5 Belt conveyor
045-C #1 Chain & bucket sampler
065-C #2 Chain & bucket sampler
090 Vezin sampler
Average Radiation Level _____
Comments:

CRUSHING & SAMPLING BUILDING 2nd FLOOR, AREA #6

035 #1 Impact breaker
045-B #1 Chain & bucket sampler
065-B #2 Chain & bucket sampler
055 #2 Impact breaker
080 5 x 6 crusher
Average Radiation Level _____
Comments:

CRUSHING & SAMPLING BLDG. 3rd & 4th FLOOR, AREA #7

025 #1 Belt conveyor
030 #1 Vibrating screen
045-A #1 Chain & bucket sampler
065-A #2 Chain & bucket sampler
070-A Sample dryer (3rd floor)
070-B Sample dryer (4th floor)
Average Radiation Level _____
Comments:

Sample No.	Sample Location	Time	Date	Level x 10^{-11} /uc/ml	Remarks	Ext. MRH Gamma + Beta

OVER ORE BINS, AREA #8

105 Stockpile bin
112 C bin
110 A bin
Average Radiation Level _____
Comments:

BELOW ORE BINS, AREA #9

203 B bin belt feeder (Carb)
205 C bin belt feeder
200 A bin belt feeder
204 B bin belt feeder (Acid)
600 #1 acid belt conveyor
215 #1 carbonate belt conveyor
Average Radiation Level _____
Comments:

ROD & BALL MILL AREA, AREA #10

225 Weightometer, Carb. Circuit
230 Ball mill
235 Ball mill classifier
602 Weightometer, Acid Circuit
605 Rod mill
Average Radiation Level _____
Comments:

Sample No.	Sample Location	Time	Date	Level x 10^{-11} /uc/ml	Remarks	Ext. MRH Gamma + Beta
	PACHUCA FEED AREA, AREA #11					
255	Carb thickener (above)					
440	Grind solution steady head tank					
260	Carb. diaphragm pump					
	Average Radiation Level _____					
Comments:						
	DRUM FILTER AREA 2nd FLOOR, AREA #12					
280	#1 Filter feed tank					
305	#1 North drum filter					
326	#2 South drum filter					
355	#3 Filter samd pump					
414	#2 Separan dilution tank					
375	Filter blower					
276	#2 Pachuca (top)					
	Average Radiation Level _____					
Comments:						
	DRUM FILTER AREA 1st FLOOR, AREA #13					
317	#1 Filtrate pump					
337	#2 Filtrate pump					
362	#3 Filtrate pump					
	Average Radiation Level _____					
Comments:						
	TANK AREA NEAR Y.C. PACKAGING, AREA #14					
320	Unclarified carb preg. tank 1st					
412	Jaguar hold tank 1st					
880	S-X preg tank					
557	Y.C. repulper tank					
	Average Radiation Level _____					
Comments:						

Sample No.	Sample Location	Time	Date	Level x 10^{-11} /uc/ml	Remarks	Ext. MRH Gamma + Beta
	ACID LEACH TANK AREA 2nd FLOOR, AREA #15					
635	#2 leach tank					
650	#4 leach tank					
775	U.S. Filter					
	Average Radiation Level _____					
Comments:						
	ACID LEACH TANK AREA 1st FLOOR, AREA #16					
761	Precoat mix tank					
670	Leach tank floor sump pump					
	Average Radiation Level _____					
Comments:						
	ACID CIRCUIT WASHING & CLASSIFICATION AREA, AREA #17					
706	#1 diaphragm pump					
715	#2 thickener					
717	#2 diaphragm pump					
720	#3 cyclone					
735	#4 thickener					
737	#4 diaphragm pump					
	Average Radiation Level _____					
Comments:						
	YELLOW CAKE AREA 2nd FLOOR, AREA #18					
500	Carl clarified filter					
550	#1 Product filter (back)					
561	Yellow cake dust collector					
541	#2 Precip tank					
	Average Radiation Level _____					
Comments:						

Sample No.	Sample Location	Time	Date	Level x 10^{-11} /uc/ml	Remarks	Ext. MRH Gamma + Beta
	YELLOW CAKE PACKAGING, AREA #19					
564	Drum Vibrator					
566	Platform scales					
577	Product moisture oven					
	Average Radiation Level _____					
Comments:						
	1st FLOOR TAILINGS PUMP AREA, AREA #20					
740	#3 Tailings pump 5 x 5					
845	Organic hold tank 1st floor					
410	Jaguar mix tank					
	Average Radiation Level _____					
Comments:						
	YELLOW CAKE STORAGE AREA, AREA #@21					
945-A	South end					
945-B	Middle					
945-C	North end					
	Average Radiation Level _____					
Comments:						
	S-X AREA 2nd FLOOR, AREA #22					
791	S-X feed flow meter					
805	#1 Organic advance pump					
809	#5 Organic advance pump					
815	#1 Strip Mixer					
822	#1 Strip Settler					
	Average Radiation Level _____					
Comments:						

Sample No.	Sample Location	Time	Date	Level x 10^{-11} /uc/ml	Remarks	Ext. MRH Gamma + Beta
	AUXILIARY FACILITIES, AREA #23					
1	#1 Boiler					
932	#2 Air compressor					
570-1	#1 NaOH Storage tank					
386	#2 Vacuum pump					
	Average Radiation Level _____					
Comments:						
	MILL OFFICE, AREA #24					
908-B	Mill office					
Comments:						
	MILL LABORATORY, AREA #25					
908-A	Mill Lab					
Comments:						
	MAIN LAB, AREA #26					
910-A	Amenability room					
910-B	Main room					
910-C	Office					
910-D	Balance room					
910-E	Fluo room					
910-F	Conc. balance room					
	Average Radiation Level _____					
Comments:						
	WAREHOUSE, AREA #27					
912-A	Office					
912-B	Northwest corner					

Sample No.	Sample Location	Time	Date	Level x 10^{-11} /uc/ml	Remarks	Ext. MRH Gamma + Beta
	AREA #27, Cont'd.					
912-C	Northeast corner					
912-D	Southwest corner					
912-E	Southeast corner					
	Average Radiation Level _____					
Comments:						
	MACHINE SHOP & MOBILE EQUIPMENT, AREA #28					
913-A	Southeast corner					
913-B	Southwest corner					
913-C	Northwest corner					
913-D	Center					
	Average Radiation Level _____					
Comments:						
	ELECTRIC SHOP, AREA #29					
913-E	Electric shop					
Comments:						
	OFFICE BUILDING, AREA #30					
946-A	Lobby					
946-B	Inner lobby					
946-C	Main room					
	Average radiation Level _____					
Comments:						
	CARPENTER SHOP, AREA #31					
985	Carpenter shop					
Comments:						

Sample No.	Sample Location	Time	Date	Level x 10^{-11} /uc/ml	Remarks	Ext. MRH Gamma + Beta
	PRODUCTION FOREMAN'S OFFICE, AREA #32					
941	Office					
Comments:						
	ACID PLANTS, AREA #33					
1000-B	Outside #2 acid plant					
517-570-975-A	#1 Plant boiler room					
	Average Radiation Level _____					
Comments:						
	TAILINGS AREA, AREA #34					
1000-F	Tailings area					
Comments:						
	OUTSIDE OF BUILDINGS, AREA #35					
1000-C	Near water tower					
1000-E	Near coarse ore grizzly					
1000-A	Parking lot					
	Average Radiation Level _____					
Comments:						
	DEEP WELL PUMP HOUSE, AREA #36					
925	Pump house					
Comments:						

Sample No.	Sample Location	Time	Date	Level x 10^{-11} /uc/ml	Remarks	Ext. MRH Gamma + Beta
	CHANGE ROOM, AREA #37					
906	Change Room					
Comments:						
	GARAGE BUILDING, AREA #38					
980-A	West end					
980-B	East end					
	Average Radiation Level _____					
Comments:						
	SAMPLE PLANT SCALE ROOM, AREA #39					
35-A	Scale room					
Comments:						
	YELLOW CAKE DRYER ENCLOSURE 2nd FLOOR, AREA #40					
551	#2 product filter (front)					
560-A	Product dryer deck					
560-B	Product dryer, 2nd fooor east					
563	Screw auger					
	Average Radiation Level _____					
Comments:						
	CONTROL ROOM - CRUSHING PLANT, AREA #41					
071	Control room					
072	Motor control center					
	Average Radiation Level _____					
Comments:						

Sample No.	Sample Location	Time	Date	Level x 10^{-11} /uc/ml	Remarks	Ext. MRH Gamma + Beta

CRUSHING & SAMPLING BLDG. 1st FLOOR, AREA #5-A ~~(Cleanup Period Not Oper.)~~

095 #5 Belt conveyor
045-C #1 Chain & bucket sampler
065-C #2 Chain & bucket sampler
090 Vezin sampler
Average Radiation Level _____
Comments:

CRUSHING & SAMPLING BLDG. 2nd FLOOR, AREA #6-A

035 #1 Impact breaker
045-B #1 Chain & bucket sampler
065-B #2 Chain & bucket sampler
055 #2 Impact breaker
080 5 x 6 Crusher
Average Radiation Level _____
Comments:

CRUSHING & SAMPLING BLDG. 3rd & 4th FLOOR, AREA #7-A

025 #1 Belt conveyor
030 #1 Vibrating screen
045-A #1 Chain & bucket sampler
065-A #2 Chain & bucket sampler
070-A Sample dryer (3rd floor)
070-B Sample dryer (4th floor)
Average Radiation Level _____
Comments:

QUESTION 12

12. A description of the procedure followed in determining the average daily and weekly exposures to airborne radioactivity for each employee who frequently or occasionally occupies areas where air contamination exceeds MPC values specified in 10 CFR 20.

ANSWER

One (1) survey constitutes all data developed over a quarterly period.

At the end of the survey period, averages for each sampling area are calculated from the total of all location samples in that particular area as listed in Exhibit 11. These average sampling area values are weighted with average worker occupancy in that area to determine the average airborne radiation concentrations for those workers who frequently or occasionally occupy areas wherein 10 CFR 20 values are exceeded. The report sheets, designated as Exhibit 111 are currently used for these individual exposure summaries.

In addition, breathing zone surveys over representative work cycles on One (1) worker in both the crushing and product packaging areas is obtained a minimum of every six (6) months. Occasionally other job classifications are "breathing zone" sampled. The "breathing zone" results are not incorporated into individual weighted average calculations. They are used as a check on the adequacy of our area sampling program.

Worker occupancy time studies were obtained by the following method:

Crushing, Yard and Sample Preparation Personnel

Personnel assigned to these duties are rotated within these assignments on a regular schedule. Daily time-study sheets were self-completed by these personnel for a one (1) year period and the results on each operator averaged. These results will be re-evaluated every six months by self-completed daily time studies over a period of approximately (2) two weeks.

Question 12, Continued

Other Operating Personnel

Self-completed daily time study sheets were obtained over approximately a thirty (30) day period. These results were averaged in respect to job classification.

EXHIBIT 3

COMPANY _____

LOCATION _____

INDIVIDUAL EXPOSURE RECORD

CALC. FROM SURVEY NO. _____ PERIOD _____

DATA PREPARED BY _____ DATE _____

TYPES OF SAMPLES _____

SAMPLES TAKEN BY _____

SAMPLES ASSAYED BY _____

EQUIPMENT USED: SAMPLER _____

SAMPLER _____

SAMPLER _____

SAMPLER _____

EQUIPMENT CALIBRATED BY: _____ WYOMING DEPARTMENT OF PUBLIC HEALTH

TOTAL NUMBER OF SAMPLES THIS SURVEY: _____

RADIATION LEVEL FOR 56-HOUR WEEK: 1.79×10^{-11} //uc/ML OF NATURAL URANIUM

RADIATION LEVEL FOR 48-HOUR WEEK: 2.08×10^{-11} /uc/ML OF NATURAL URANIUM

RADIATION LEVEL FOR 44-HOUR WEEK: 2.28×10^{-11} /uc/ML OF NATURAL URANIUM

RADIATION LEVEL FOR 40-HOUR WEEK: 2.50×10^{-11} /uc/ML OF NATURAL URANIUM

COMPANY _____ QUARTER _____

LOCATION _____ DATE _____

AIRBORNE RADIATION EXPOSURE REPORT

Job Title	Employee Name	Consecutive Days on Job	Consecutive Hours on Job	MPC	Exposure Areas No.	Area Level x 10^{-11} UC/ml-~~Hrs~~	Hours In Area Hrs.	%	Tot. Ave. Level x 10^{-11} UC/ml	% MPC	Remarks:

BREATHING ZONE SAMPLES

QUARTER _____

SAMPLED BY _____

ASSAYED BY _____

EQUIPMENT USED _____

EQUIPMENT CALIBRATED BY _____

TOTAL NUMBER OF SAMPLES TAKEN _____

NAME OF OPERATOR	JOB CLASSIFICATION	LOCATION	DATE	TIME	LITERS OF AIR SAMPLED	U Natural MICROGRAMS ~~U-233~~ COLLECTED ON FILTER PAPER	SAMPLE TIME MINUTES	OPERATORS MPC	RADIATION LEVEL $\times 10^{-11}$ UC/ML	X M.P.C. FOR OPERATOR

REMARKS:

REMARKS:

REMARKS:

REMARKS:

350.07-2

QUESTION 13

13. If respirators are to be used in your program to control the exposures of personnel to within the limits specified in 10 CFR 20, an application for their use is to be submitted in accordance with Section 20.103 of 10 CFR 20.

ANSWER

No respirator factor is applied to individual airborne radiation exposure calculations.

QUESTION 14

14. A description of mill discharge stacks including stack heights, types and concentrations of effluents discharged, method for controlling release of radioactive material, and methods for determining the concentration of radioactive material released to the environs.

ANSWER

Mill discharge stacks associated with the chemical processing of the ores are described in Exhibit 1V. Natural draft is utilized on the 280 tank Vent and the Pachucas. Ventilation blowers for the remaining stacks are described in answer to Question 8. Stack descriptions are as follows:

Stack Name	Height Above Ground (Meters)	Type of Release	Discharge Rate (cu. ft./sec.)	Concentrations*	Method of Sampling
Rotoclone	16.86	Y.C. Dust	42	/uc/ml X 10-13 5,808	500 ml impinger, ¼" probe, 1pm for approx 30 min.
Y.C. Enclosure Vent	15.79	Y.C. Dust	228	27	" "
Precipitation Vent	16.43	Y.C. Dust	20	135	" "
#1 Pachuca	24.41	Ore Dust	10	300	" "
#2 Pachuca	24.41	"	12	160	" "
#3 Pachuca	24.41	"	12	175	" "
280 Tank Vent	17.25	"	6	240	1"-¼" Whatman filter, 10 1pm for approx. 30"
#1 N. Drum Filter	15.83	"	259	Nil	" "
#2 N. Drum Filter	15.83	"	259	Nil	" "
#3 N. Drum Filter	15.83	"	271	Nil	" "
#1 S. Drum Filter	15.83	"	271	Nil	" "
#2 S. Drum Filter	15.83	"	283	Nil	" "
#3 S. Drum Filter	15.83	"	283	Nil	" "

*Results Are From 4th Quarter, 1961.

Calculation of total emission from all of the above stacks results in a value of approximately 192 grams per day of which approximately 179 grams per day is from the Rotoclone stack. This is the only stack provided with an air cleaning device as described in answer to Question 8.

Question 14, Continued

All of the above-listed stacks are evaluated quarterly and diffusion calculations performed periodically.

In addition to stack effluent measurements, Exhibit 1 shows scope of our unrestricted area airborne radiation sampling program. Exhibit V describes the sample location and number which may be compared to the encircled numbers on Exhibit 1 for reference. This sampling is performed on a quarterly basis for fluorometric analyses of uranium content. Approximately 40,000 liters of air is obtained for each sample. External radiation readings are also measured at these unrestricted area sampling locations.

EXHIBIT 1V

ATMOSPHERIC DIFFUSION CALCULATIONS FOR _____ PLANT

_____ QUARTER 19 ___.

FORMULAS:

Maximum rise due to effluent temperature [1] (ft.)

$$h_t \text{ max} = 6.37g \frac{Q\Delta}{u^3 T_1} Z$$

Where

$$Z = \ln J^2 + \frac{2}{J} - 2$$

$$J = \frac{}{\sqrt{Q\ Vs}} \left(0.43 \sqrt{\frac{T_1}{gG}} - 0.28 \frac{Vs}{g} \frac{T_1}{\Delta} \right) + 1$$

Maximum rise due to effluent velocity [1] (ft.)

$$h_v \text{ max} = \frac{4.77}{1 + 0.43 \frac{u}{Vs}} \frac{\sqrt{Q\ Vs}}{u}$$

g = Acceleration due to gravity (ft./sec.^{2}) 32.15

u = Mean wind speed (ft./sec.)

Vs = Stack draft velocity (ft./sec.)

Q = Gas emission rate at temperature To (ft.^{3}/sec.)

To = Effluent temperature (^{o}C)

T_1 = Ambient air temperature (^{o}C)

Δ = To - T_1 (^{o}C)

J,Z= Parameters for calculating thermal rise (Bosanquet)

G = Gradient of potential atmospheric temperature (^{o}C/ft.)

Maximum downwind concentration from a continuous point source [2] ($\frac{\mu c}{ml}$)

$$\chi \text{ max} = \frac{2Q}{e \pi \bar{u} h^2} 10^{-9}$$

Distance of the maximum downwind concentration [2] (meters)

$$d \text{ max} = \left\{ \frac{h^2}{C2} \right\}^{1/(2-n)}$$

Q = Emission rate (μc/sec.)

h = Source Height (meters)

$\bar{u}$ = Mean wind velocity (meters/sec.)

e = 2.718

π = 3.1416

C^2 = and n are found in the following table [3].

Table 4.3 --- Sutton's Value for C^2 as a Function of Stack Height, (h) and Stability Parameter (n).

	C^2 [at various h values (meters)], $(\text{meters})^n$				
	n	h = 25	h = 50	h =75	h=100
Large lapse rate	0.20	0.043	0.030	0.024	0.015
Zero or small temperature gradient	0.25	0.014	0.010	0.008	0.005
Moderate inversion	0.33	0.006	0.004	0.003	0.002
Large inversion	0.50	0.004	0.003	0.002	0.001

Footnotes: ("Meteorology and Atomic Energy", AECU 3066)

1 71
2 49
3 53

STACK NAME _____

HEIGHT _____ METERS

DIAMETER _____ INCHES

DRAFT VELOCITY _____ ft./sec.

GAS EMISSION RATE _____ $ft.^3/sec.$ _____ ml./sec.

EFFLUENT TEMPERATURE _____ ^oC

M.P.C. for Unrestricted Area 8×10^{-13} uc/ml $\overset{*}{MPC} = 2 \times 10^{-12}$

Date	Time	Remarks	Liters of Air Sampled	Wind Velocity Direction	/uc/ml. 10^{-12}	X MPC for Unrestricted Area

Average _____

Maximum downwind concentration of _____/uc/ml. occurs _____ miles

or _____ meters from the plant.

Maximum velocity rise _____ feet.

Maximum temperature rise _____ feet.

Ambient air temperature is an average of _____ ^oC. for the quarter.
Data obtained from _____

Gradient of potential at atmospheric temperature used is _____ ^oC per 1000 ft.

Lapse Rate _____

Comments:

* Yellowcake M.P.C.

COMMENTS:

1. The MPC for each stack is based on the MPC for unrestricted areas if the dust is ore with the normal amount of daughter products. This is probably in error as all samples over MPC are on areas containing concentrate or exhausts where the uranium is carried off in the moisture, but we have no way to prove that some of the sample was not ore. We, therefore, will possibly have to comply with the MPC for ore.

2. The vents on the Pachucas have considerable velocity. The U3O8 in these samples is just solution containing dissolved uranium that is blown out the stack due to the high velocity. Much of this solution is combined with solids in a mud which falls out immediately upon leaving the stack.

3. Diffusion Calculations:

   All wind speed measurements made during the quarter are averaged to obtain the mean wind speed.

   Maximum downwind concentrations are actually less than shown as the actual stack height was used in making the calculations and no allowance made for the increase in effective stack height due to velocity and temperature rise.

   The maximum downwind concentrations occur at distances ranging from 1 to 1.7 miles from the mill. Should they all occur at the same point, the maximum downwind concentration would still be only 0.0073×10^{-13} /uc/ml or 0.0009 x MPC. Taking into account the increase in effective stack height due to temperature and velocity rise would decrease this value by a factor of about 5.

EXHIBIT V

COMPANY_____

LOCATION_____

UNRESTRICTED AREA SAMPLES

DATE PREPARED_____

QUARTER_____

TYPES OF SAMPLES_____

_____

SAMPLES TAKEN BY_____

SAMPLES ASSAYED BY_____

EQUIPMENT_____

_____

EQUIPMENT CALIBRATED BY_____

TOTAL NUMBER OF DUST SAMPLES_____

TOTAL NUMBER OF EXTERNAL RADIATION SAMPLES_____

SAMPLE NO.	LOCATION SAMPLED	DIRECTION AND DISTANCE FROM PLANT	TIME OF DAY	WIND DIRECTION	WIND VELOCITY	RELATIVE HUMIDITY	LITERS OF AIR SAMPLED	MICROGRAMS ~~Soluble~~ ON PAPER of U Natural	RADIATION LEVEL x 10^{-13} UC/ml	x MPC	EXTERNAL RADIATION COUNT MR/HR
1	Phillips Property	N 50'									
2	Mayland Property	E 1,600'									
3	Road to St. Mission	Stephen's S 2,100'									
4	Between Mill & Highway	W 50'									
5	SE of Stockpiles	Inside Plant Area									
6	South of Duran Home	E 5,300'									
7	Lucas Home	N 50'									
8	Mayland Home	S 500'									
9	St. Stephen's Mission	S 3,700'									
10	Jensen Home	N 50'									
11	Golliher Home	NNE 4,400'									
12	Rein Home	NNW 5,000'									
13	Duran Home	N 1,500'									
14	Indian Homes Farms	E 3,500'									
15	Westlake Farm	E 1,200'									
16	7-Diamond Court	N 5,300'									

PAGE _____

SAMPLE NO.	LOCATION SAMPLED	DIRECTION AND DISTANCE FROM PLANT	TIME OF DAY	WIND DIRECTION	WIND VELOCITY	RELATIVE HUMIDITY	LITERS OF AIR SAMPLED	MICROGRAMS ~~Strontium 90~~ ON PAPER of U Natural	RADIATION LEVEL x 10^{-13} UC/ML	x MPC	EXTERNAL RADIATION COUNT MR/HR
17	½ Mile W of Mill	W 5,300'									
R1	Broadway Madison	at NW 8,300'									
R2	Fremont Ave. NE 12th	NW 11,000'									
R3	N 1st at Jackson	NNW 10,500'									
R4	Big Horn Drive	NNW 13,200'									
R5	Main St. 12th W.	at N 8,700'									

350.09-2

QUESTION 15

15. Where retention systems such as levees, dikes, ponds, etc., are used to prevent the release of liquid or solid waste containing radioactive material to off-site areas, describe and submit an analysis of the retention capability and integrity of your system, conditions that might lead to accidental release of the waste, the environmental effects of such release and your program of inspection and maintenance to prevent such an accidental occurrence.

ANSWER

Drawing 62-10 in the Appendix shows tailings pond construction detail. The tailings area has been in use for over 3 years and has proven its capability to retain and store plant waste. We cannot forsee any circumstances which might lead to accidental release of the impounded waste. If tailings waste did enter ground or surface water supplies, this would be detected by our water sampling program. Frequent maintenance checks of the entire tailings area are made by the mill staff to insure the integrity of the system.

QUESTION 16

16. A description of the method for determining exposure of employees to external radiation. For film badge studies, indicate number and category of personnel involved in the program.

ANSWER

A minimum of one (1) external radiation reading is obtained at each airborne radiation sampling location with an Eberline Model E-112B or equivalent beta-gamma survey rate meter.

Commencing on April 1, 1962, film badge service will be provided by R. S. Landauer, Jr. & Company, Culver City, California. Every quarter one (1) worker in each job classification, except for office personnel, is badged monthly for a period of three months.

The monthly continuity of film badging is retained on the product packaging operator. The number of film badges is approximately fourteen (14) per month.

CONFIDENTIAL

COMPANY _____

LOCATION _____

PAGE _____

QUARTER _____

MPC = 1250 MREM
1/4 MPC = 313 MREM

FILM BADGE SURVEY

EXTERNAL RADIATION

OPERATORS NAME	JOB CLASSIFICATION	FILM BADGE NO.	FIRST 4-WEEK PERIOD		SECOND 4-WEEK PERIOD		THIRD 5-WEEK PERIOD		TOTAL 13 WEEKS MREM	13-WEEK CUMULATIVE FILM ~~BADGE~~ MREM.
			MREM BETA	MR GAMMA OR X RAY	MREM BETA	MR GAMMA OR X RAY	MREM BETA	MR GAMMA OR X RAY		

COMMENTS: _____

350.13

QUESTION 17

17. A copy of the written radiological safety operating instructions supplied to employees. These instructions should include provisions for personal hygiene, including washing prior to eating or leaving the plant, instructions for wearing personnel monitoring devices, and instructions for cleaning up dust and spills within the plant.

ANSWER

Exhibit VI is a booklet which is issued to all newly-employed personnel.

Exhibit VII is posted on various bulletin boards throughout the mill area.

EXHIBIT VI

A Handbook

OF

Radiological Rules

AND

Plant Procedures

FOR

Employees

SUSQUEHANNA-WESTERN, INC.
MINES DEVELOPMENT, INC.

A HANDBOOK OF

RADIOLOGICAL RULES AND

PLANT PROCEDURES

Prepared by

SUSQUEHANNA-WESTERN, INC.

and

MINES DEVELOPMENT, INC.

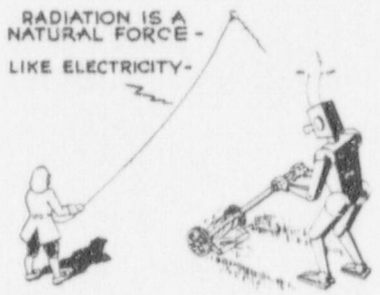
in the Interest of the
Health and Education of
Their Employees

Ed. 1960

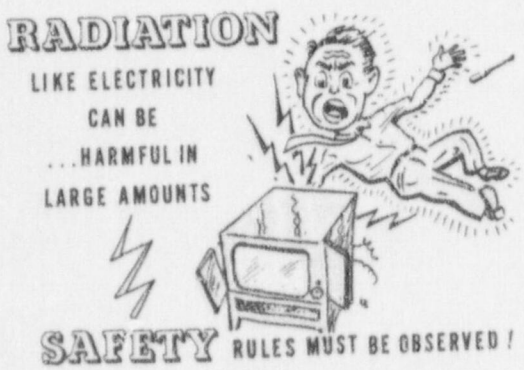
INTRODUCTION

The existence of radioactive materials . . . and, consequently, radiation itself . . . is as old as the universe. The problem of radiation as it might affect our health and safety, however, is relatively new.

It was not until 1895 that the form of radiation known as X-Rays was discovered by Wilhelm Konrad Roentgen. Since that time, mankind has found increasing uses of high energy radiation not only for established medical functions, but also in agriculture and industry. Properly handled and developed, radiation promises to provide us with a fuller, more abundant and happier life.



As a tremendous potential source of basic energy, however, radioactive materials must be handled in a special manner to ensure the safety of the people who work with it and who will be served by it. In much the same manner as we need to protect ourselves from direct exposure and contact with too much electricity, we also need to protect ourselves from too much radiation.



This great energy source which is so useful presents its own peculiar problems. It is to cope with these special problems that our established safety regulations must be carefully observed.

With the recent dawn of the atomic era, the U. S. Government, in cooperation with private industry, established maximum permissible radiation exposure limits for the human body. On the basis of these established exposure limits, radiological safety rules were developed to ensure on-the-job health safety for employees of our industry and others dealing with radioactive materials.

The personal protection provided for under these established safety procedures is sufficient to further ensure the employee that during his lifetime he may absorb the normal amount of radiation from doctors and dentists in the course of examination and treatment without having radiation build-up exceed the safe limit which might prove injurious to health.

This company, keenly aware of the importance of safety in all phases of mill operations, has prepared this employee manual in the interest of your health and safety.

THE PROBLEMS OF RADIATION

There are, admittedly, some problems in the handling of radioactive materials. Radioactive materials emit energy which has the power to damage living tissue.

Unfortunately, we cannot avoid exposure to radiation. We are all exposed to radiation from outer space, cosmic radiation, which increases in intensity as we go up in altitude. For instance, in Denver, Colorado, the mile-high city, we would receive twice the radiation from cosmic rays that we would receive at sea level. In addition, there are radioactive elements within the make-up of our own bodies, elements that have been radioactive from the beginning of time. Our bodies also tend to concentrate radioactive materials that we take into our bodies, particularly from the water which we drink. Water in some parts of the country, particularly from some mineral springs, has appreciable radioactivity. So, from the beginning of time, man has been exposed to inescapable natural radiation.

The effects of excessive radiation exposure on the body are manifested in several ways:

1. A sickness produced by a massive overdose of penetrating external radiation.
2. Localized injurious effects, generally from overdoses of less penetrating external radiation and most often to the hands.
3. Radioactive poisoning resulting when dangerous amounts of certain types of radioactive materials enter the body.

When we look at the foregoing, we realize that we can get into trouble with radiation by two entirely different means. One, by radiation originating from a source outside the body and coming at the body from the outside; the other, by exposure resulting from radioactive materials which have been taken into the body. It is almost obvious to us that precautions against one type of hazard will not be particularly helpful in protecting against the other type of hazard, and that, in fact, the radiation problem is made up of two separate problems.

Therefore, it is fundamental to our understanding to realize that the radiation problem is not one, but two problems, the problem of external radiation, and the problem of internal radioactive poisoning.

The external radiation hazard comes in two forms:

1. Long-range, highly penetrating external radiation.
2. Short-range, less penetrating external radiation.

This radiation effect is going on in our bodies constantly. We are constantly being bombarded by cosmic rays from outer space and rays originating from radioactive materials in the structure of our buildings, in our bodies, in the food we eat, etc.

Permissible radiation exposure figures have been set far below the level at which an injury can occur in any specific exposure situation. They are set up at this low level to reduce the cumulative effect of the radiation exposure.

The degree of the problem depends upon the quantity and type of radiation emitted. External radiation at uranium-ore processing mills such as ours is normally confined

to very low-level intensities. In many plant areas the level is only "background" or the same as would be found on a neighborhood street. The complete absence of high-energy sources at these mills precludes any possibility of massive overdoses with resulting sickness or localized damage such as might occur at certain AEC installations. This is not meant to imply that external radiation above maximum permissible concentrations could not exist at some time; only that any such existence, readily monitered through the proper use of film badges, would be of such a minor magnitude that control and safety would be routine.

By contrast with the external radiation exposure problem, the internal radiation exposure problem is a much more complicated one. Many factors are involved. There are four possible ways to get radioactive materials into the body:

1. By breathing.
2. By swallowing.
3. Through breaks in the skin.
4. By absorption through the skin.

Some chemical substances, such as sodium and potassium, are widely used

throughout the body, and, therefore, if a radioactive form of one of these elements is introduced into the body, it will be dispersed throughout the entire body. Other elements tend to concentrate in specific organs, as iodine does in the thyroid gland. The point to remember is that body organs react to a substance on the basis of its chemical nature only, without regard to whether or not the material is radioactive.

INTERNAL RADIATION IS RECEIVED

THERE ARE SEVERAL PRECAUTIONS

As a result of much work in this area, standards have been arrived at for the permissible body burden of various radioactive isotopes in the body. Working backward

from the permissible body levels, permissible air concentrations of the materials were arrived at, because it is primarily by means of breathing and swallowing that the radioactive materials can get into the body on a continuous basis.

The problem of absorption through the skin, where it exists, is handled by the provision of suitable protective clothing or gloves. The introduction of radioactive material through wounds is avoided by standard safety techniques to prevent injury.

In the handling of radioactive materials, it is possible that certain processes will permit the material to become airborne where it can be breathed by personnel. It is necessary under such circumstances that varying degrees of control precautions be taken. The simplest situation might require merely the application of ordinary hygienic procedures.

In most cases, the problem is one of maintaining good techniques over an extended period of time and insuring careful compliance by all employees with all regulations, even though the violation of a regulation in a single instance might not, of itself, be extremely serious. For instance, smoking is often forbidden in the areas

where radioactive materials are handled because of the obvious ease of transferring material from hand to cigarette to mouth and, thus, into the body. Eating is generally prohibited in the area for the same reason. Sometimes it is necessary that the employees take a full shower and change clothes before they leave for home. In each case, the degree of precaution is based upon the nature of the hazard of the specific material being handled.

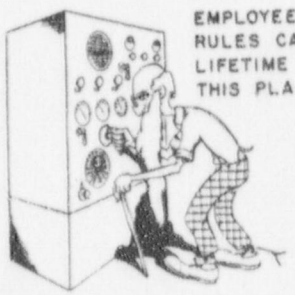
In general, therefore, the approach to the safe handling of radioactive materials which may present an airborne radiation hazard is to confine and contain the materials at all times so as to prevent their becoming airborne. All techniques are devoted to this end.

If your work brings you into contact with airborne radioactive materials, it is necessary that you comply strictly with all of the safety precautions which are laid down. Under no circumstances should procedures be violated or short cuts be taken on the basis that one or two exposures won't hurt anybody. While this may literally be true, the effect of such a disregard of such regulations over the long run may prove injurious.

PLANT REGULATIONS

Following are rules and procedures for governing each employee at the mills. These should be learned and followed at all times:

If you do not understand the instructions, check with your supervisor. Also, report any deficiencies or unusual conditions to him.



EMPLOYEES WHO OBEY RULES CAN WORK A LIFETIME SAFELY IN THIS PLANT.

AREAS FOR RADIOLOGICAL SAFETY RULES

The plant areas listed below are considered areas of radioactive airborne materials; that is, areas where any radioactive material may be dispersed in the air in the form of dusts, fumes, mists, vapors or gases. Employees working in these areas must regard the personal hygiene schedules and safety plant procedures outlined on the following pages:

Yellowcake Area: This area shall include the yellowcake filters; the yellowcake slurry tank; the yellowcake dryer; the yellowcake storage bin; the yellowcake loading, weighing, sampling and storage areas; the barren solution tank; the precipitation tanks; the yellowcake exhaust fans and all other areas which contain yellowcake.

Ore Receiving Area: This area shall include the ore pad and stockpiles; the coarse ore grizzly and bin; the crushing and sampling plant; and the sample preparation building.

Fine Ore Bin: This area shall include the belt tripper, the platform on top of the fine ore bins and the feed belt transfer points at the bottom of the bins.

PERSONAL HYGIENE

All employees working in any of the YELLOWCAKE AREAS shall endeavor to prevent yellowcake from entering the body.

Also, all employees in any DUSTY AREA shall endeavor to prevent dust of any kind from entering the body.

(1) Eating, drinking, smoking or chewing shall be prohibited in the yellowcake area.

(2) Lunch pails, food, drinks, tobacco and smoking materials shall not be taken into the yellowcake area.

(3) Men working in the Yellowcake, Ore Receiving and Fine Ore Bin areas shall store their lunches and eat them in an area designated by the supervisor as being non-dusty.

(4) All employees working in these areas shall wash their hands thoroughly before eating, drinking, smoking or chewing, and at the end of each shift before leaving the plant area.

(5) All skin eruptions, cuts, open wounds and abrasions shall be covered with a sterile bandage before entering and while working in the Yellowcake area.

(6) All employees working in the Yellowcake area shall shower before leaving the plant site.

(7) Operators and maintenance men cleaning or performing work on any of the equipment in the Yellowcake area which involves direct handling of yellowcake in any manner shall wear rubber or synthetic gloves, and aprons or coveralls to be provided by the company.

(8) Gloves shall be washed clean before removal and aprons washed clean after removal. In no instance shall clothing contaminated with yellowcake be worn outside the plant area.

(9) The productman shall change company-furnished coveralls every day and return the soiled clothing to the warehouse for laundry.

USE OF RESPIRATORS:

All employees required to work for any period of time in a known or suspected dusty location or in any area designated by a supervisor as being above maximum permissible concentration regarding air-borne radioactivity or other air-borne contaminants shall wear an approved type respirator.

. . . Respirators must be worn at all times while loading or dumping dry dusty ore. Whenever possible, equipment operators must load on the upwind side of the ore.

. . . The wearing of respirators in designated areas and on specific jobs shall be rigidly enforced by all supervisors.

. . . Supervisors shall inspect respirators regularly.

. . . In no case shall a respirator which has been stored in a location where it may have become contaminated with dust be used before it is sterilized.

. . . Wearing of respirators in any but the proper position over the nose and mouth shall be considered a violation of safety rules and subject to management action.

CARE OF RESPIRATORS:

Employees wearing respirators must be familiar with the FACELET and FILTER of the respirator and know how to exercise proper use and provide the proper care of respirators.

Respirator Facelet: That portion of the respirator which contacts the face. It is made of soft white cloth and can be easily replaced.

Respirator Filter: That part of the respirator which cleans the air being inhaled by the wearer. It is made of a special felt cloth material and is easily replaced.

. . . Filters in respirators shall be changed as often as necessary to give maximum filtering effect to the wearer. Anytime visible dust has collected on the filter, the filter shall be changed.

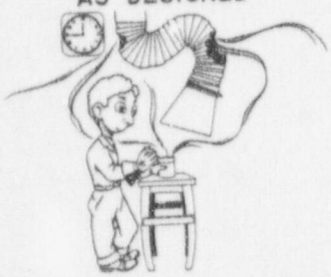
. . . Facelets for the respirators shall be changed as often as necessary to insure clean contact with the face.

. . . Respirators must be kept clean at all times by disassembly and use of soap and warm water.

. . . At least once a week respirators shall be sterilized by using cotton swabs soaked in alcohol. Materials for the sterilization process are provided by the plant. **Individuals using respirators will be responsible for sterilizing their own respiratory equipment.**

. . . In no case shall a respirator which has been stored in a location where it may have become contaminated with dust be used before it is sterilized.

EXHAUST SYSTEMS MUST BE OPERATED AS DESIGNED



GOOD DESIGN & INSTALLATION CAN BE RUINED BY POOR OPERATION OR MAINTENANCE

DUST AREAS

. . . All dust collection fans must be in operation and blast gates must be properly adjusted at all times while crushing, sampling, cleaning up, preparing samples, or any other operation liable to produce dust.

. . . Dust suppression equipment and additional water sprays must be used when crushing dusty ore.

. . . Respirators must be worn at all times while loading or dumping dry dusty ore.

. . . Whenever possible, equipment operators must load on the upwind side of the ore.

. . . Loading areas, grizzly and coarse ore bin must be kept clean.

. . . All areas must be kept clean as possible at all times to minimize airborne dust and to prevent contamination of shoes and clothing.

DUST CLEANUP

. . . Water, damp rags and vacuum **only** can be used for dust cleanup.

. . . **NEVER** UNDER ANY CONDITION MAY COMPRESSED AIR BE USED TO CLEAN UP DUST. BROOMS CAN BE USED ONLY IF AREA IS WETTED FIRST WITH WATER.

BROOMS STIR UP DUST

FILM BADGE

The film badge is a device designed to be worn or carried by an individual for the purpose of measuring the external radiation exposure. Film badges are worn by one or more individuals in each of the job classifications.

Each individual who is issued a film badge will wear the badge for a period of 13 weeks. At the end of this period, a new badge is furnished another individual in the same job classification to be worn for the next 13 week period. The 13 week schedule is repeated with all employees so that over a period of time each employee within the same job classification will wear the badge for a 13 week period. One portion of the badge is used throughout the 13 week period, another part of the badge is changed every two weeks.

Care must be taken to follow the listed rules to prevent a false exposure reading on the film. **False readings will be returned if the film is subjected to unusual heating, light, pressure, partial shielding or wetting with mill solutions.**

FILM BADGE REGULATIONS

. . . Wear the badge face-out with no obstruction before the face of the badge.

. . . Keep the badge clean at all times. If the badge is splashed with contamination of any kind, clean it immediately.

. . . Report to the foreman anything unusual that may cause the film to be contaminated.

. . . Do not subject the badge to extreme heat of any kind.

. . . Do not allow the badge to face a welding area at a close range.

. . . Report a lost badge to the foreman.

. . . Return film badges to their designated storage cabinets before leaving the plant area.

ADDENDUM

The regulations and procedures presented in this booklet will be considered supplemental to our official Plant Safety Rules and Regulations.

In addition to the information given herein, the following items are available for the inspection of each employee:

1. AEC Regulations
2. Source Materials License
3. Operating Procedures
4. Form AEC-3

Contact your supervisor or the office manager if you wish to examine those provisions affecting this operation and your work.

EXHIBIT VII

June 14, 1960

NOTICE

TO: ALL EMPLOYEES

SUBJECT: RADIOLOGICAL SAFETY

ATTACHED TO THIS BULLETIN ARE INSTRUCTIONS WHICH SET FORTH PROVISIONS FOR PERSONAL HYGIENE INCLUDING WASHING PRIOR TO EATING OR LEAVING THE PLANT, INSTRUCTIONS FOR WEARING RESPIRATORS AND FILM BADGES, AND INSTRUCTIONS FOR CLEANING UP DUST WITHIN THE PLANT.

THESE INSTRUCTIONS ARE POSTED IN THIS MANNER IN THE INTEREST OF YOUR HEALTH AND TO SUPPLANT PREVIOUS VERBAL INSTRUCTIONS GOVERNING RADIOLOGICAL SAFETY.

THE MAXIMUM PERMISSIBLE RADIATION EXPOSURE LIMITS HAVE BEEN ESTABLISHED BY THE A.E.C. SO THAT YOU MAY RECEIVE THE NORMAL AMOUNT OF RADIATION FROM DOCTORS AND DENTISTS DURING THE COURSE OF AN EXAMINATION WITHOUT THE TOTAL YOU RECEIVE DURING YOUR LIFETIME EXCEEDING THE SAFE LIMIT.

IF YOU DO NOT UNDERSTAND THE INSTRUCTIONS, CHECK WITH YOUR SUPERVISOR. ALSO REPORT ANY DEFICIENCIES OR UNUSUAL CONDITIONS TO HIM.

G. H. BRYANT
Mill Superintendent

ca

June 14, 1960

S-W RADIOLOGICAL SAFETY RULES

DEFINITIONS

1. YELLOWCAKE AREA: This area shall include the yellowcake filters; the yellowcake slurry tank; the yellowcake dryer; the yellowcake storage bin; the yellowcake loading, weighing, sampling, and storage areas; the barren solution tank; the precipitation tanks; the yellowcake exhaust fans; and all other areas which contain yellowcake.

2. ORE RECEIVING AREA: This area shall include the ore pad and stockpiles; the coarse grizzly and bin; the crushing and sampling plant; and the sample preparation building.

3. FINE ORE BIN AREA: This area shall include the belt tripper, the platform on top of the fine ore bins, and the feed belt transfer points at the bottom of the bins.

4. YELLOWCAKE: The common name used to identify the product made by the Susquehanna-Western uranium mill.

5. RADIATION: Any or all of the following: alpha rays, beta rays, gamma rays, X-rays, neutrons, high speed electrons, high speed protons, and other atomic particles; but not sound or radio waves, or visible, infrared, or ultraviolet light.

6. RADIOACTIVE AIR-BORNE MATERIAL: Any radioactive material dispersed in the air in the form of dusts, fumes, mists, vapors, or gases.

7. MAXIMUM PERMISSIBLE CONCENTRATION: The radiation limits established by the A.E.C. and published in the Federal Register, Title 10, Part 20. It is believed that the standards incorporated in these regulations provide, in accordance with present knowledge, a very substantial margin of safety for exposed individuals.

8. RESPIRATOR FACELET: Is that part of respirator which contacts the face. It is made of soft white cloth and can be easily replaced.

9. RESPIRATOR FILTER: Is that part of respirator which cleans the air being inhaled by the wearer. It is made of a special felt cloth material and is easily replaced.

10. FILM BADGE: A device designed to be worn or carried by an individual for the purpose of measuring the external radiation exposure.

SUSQUEHANNA-WESTERN

Radiological Safety Rules

A. PERSONAL HYGIENE

1. All employees working in any of the yellowcake areas shall endeavor to prevent yellowcake from entering the body. This will be accomplished by following all rules and practicing good personal hygiene at all times.

2. All employees working in any dusty area shall endeavor to prevent dust of any kind from entering the body.

3. All employees working in the Ore Receiving, Fine Ore Bin, or Yellowcake area shall wash their hands thoroughly before eating, drinking, smoking, or chewing, and at the end of each shift before leaving the plant area.

4. Eating, drinking, smoking, or chewing shall be prohibited in the Yellowcake area.

5. Lunch pails, food, drinks, tobacco, and smoking material shall not be taken into the yellowcake area.

6. Men working in the Yellowcake, Ore Receiving, and Fine Ore Bin areas shall store their lunches and eat them in an area designated by the supervisor as being non-dusty.

7. All skin eruptions, cuts , open wounds, and abrasions shall be covered with a sterile bandage before entering and while working in any of the Yellowcake area.

8. All employees working in the Yellowcake area shall shower before leaving the plant site.

9. Operators and maintenance men cleaning or performing work on any of the equipment in the Yellowcake area which involves direct handling of yellowcake in any manner shall wear rubber or synthetic gloves, and aprons or coveralls to be provided by the company. Gloves shall be washed clean before removal and aprons washed clean after removal. In no case shall clothing which is contaminated with yellowcake be worn outside the plant area.

10. The productman shall change company-furnished coveralls every day and return the soiled clothing to the warehouse for laundering.

B. RESPIRATORS

1. All employees required to work for any period of time in a known or suspected dusty location or in any area designated by a supervisor as being above maximum permissible concentration regarding air-borne radioactivity or other air-borne contaminants shall wear an approved type respirator.

2. Filters in respirators shall be changed as often as necessary to give maximum filtering effect to the wearer. Anytime visible dust has collected on the filter, the filter shall be changed.

3. Facelets for the respirators shall be changed as often as necessary to insure clean contact with the face.

4. Respirators must be kept clean at all times by disassembly and use of soap and warm water. At least once a week respirators must be cleaned and sterilized. Sterilization is accomplished by using cotton swabs soaked in alcohol provided. Individuals using respirators will sterilize their own respiratory equipment each shift that it is used.

5. In no case shall a respirator that has been stored in a location where it may have become contaminated with dust be used before it is sterilized.

6. The wearing of respirators in designated areas and on specific jobs shall be rigidly enforced by all supervisors. Supervisors shall inspect respirators regularly.

7. The wearing of respirators in any but the proper position over the nose and mouth shall be considered a violation of posted safety rules.

C. DUST CLEANUP

1. Never under any condition can compressed air be used to clean up dust. Brooms can be used only if area is wetted first with water.

2. Water, damp rags, and vacuum only can be used for dust cleanup.

3. All areas must be kept as clean as possible at all times to minimize airborne dust and to prevent contamination of shoes and clothing.

4. Dust suppression equipment and additional water sprays must be used when crushing dusty ore.

5. All dust collection fans must be in operation and blast gates must be properly adjusted at all times while crushing, sampling, cleaning up, preparing samples, or any other operation liable to produce dust.

6. Loading areas, grizzly and coarse ore bin must be kept clean.

7. Respirators must be worn at all times while loading or dumping dry dusty ore. Whenever possible, equipment operators must load on the upwind side of the ore.

D. FILM BADGES

1. Film badges are worn by one or more individuals in each of the job classifications.

2. The same individual wears the film badge for a period of 13 weeks. Then a new badge is furnished for another individual in the same job classification for the following 13 week period. Over a period of time each individual in each job classification will wear the badge for a 13 week period. One portion of the badge is worn for 13 weeks and the other is changed every two weeks.

3. Care shall be taken to follow the below listed rules or a false exposure reading will be recorded on the film.

   (a) Wear the badge face-out with no obstruction before the face of the badge.

   (b) Keep the badge clean at all times. If the badge is splashed with contamination of any kind, clean it immediately.

   (c) Report to the foreman anything unusual that may cause the film to be contaminated.

   (d) Report a lost badge to the foreman.

   (e) Do not allow the badge to face a welding area at a close range.

   (f) Do not subject the badge to extreme heat of any kind.

4. False reading will be returned if the film is subjected to unusual heating, light, pressure, partial shielding, or wetting with mill solutions.

5. A storage cabinet is provided where the film badge shall be placed when the individual leaves the plant area.

APPENDIX 1

OVERSIZE
DOCUMENT
PAGE(S) PULLED

SEE APERTURE CARD FILES

APERTURE CARD/PAPER COPY AVAILABLE THROUGH NRC FILE CENTER

NUMBER OF OVERSIZE PAGES FILMED ON APERTURE CARD(S) 2

ACCESSION NUMBERS OF OVERSIZE PAGES:

9810290037-01—02

9706250008 - dupe

DRP-08

COPYRIGHTED DOCUMENT

This document is Copyright protected and, therefore, has not been filmed.

To view the document, please go to the NRC File Center, TWFN 5-C3.

COPYRIGHTED DOCUMENT

This document is Copyright protected and, therefore, has not been filmed.

To view the document, please go to the NRC File Center, TWFN 5-C3.

9810290055

Place label here

COPYRIGHTED DOCUMENT

This document is Copyright protected and, therefore, has not been filmed.

To view the document, please go to the NRC File Center, TWFN 5-C3.

COPYRIGHTED DOCUMENT

This document is Copyright protected and, therefore, has not been filmed.

To view the document, please go to the NRC File Center, TWFN 5-C3.

OVERSIZE
DOCUMENT
PAGE(S) PULLED

SEE APERTURE CARD FILES

APERTURE CARD/PAPER COPY AVAILABLE THROUGH NRC FILE CENTER

NUMBER OF OVERSIZE PAGES FILMED ON APERTURE CARD(S) 2

ACCESSION NUMBERS OF OVERSIZE PAGES:

9810290062
9810290063