PINAL MINERALS & MINING, LTD.
P.O. DRAWER 1010
MIAMI, ARIZONA 85539

April 30, 1979

Mr. FitzRandolph
State of Arizona
Atomic Energy Commission
2929 W. Indian School
Phoenix, Arizona

Dear Mr. FitzRandolph:

This letter is in reference to our recent conversations concerning renewal of Pinal Minerals and Mining Radioactive Material License.

Pinal Minerals and Mining plans are continuing as outlined in previous reports. We are hopeful that research and development will demonstrate that In Place Leaching is economically and environmentally feasible in the Dripping Springs quartzite. Our total operation is about the size of an operation that a major corporation would use for a pilot plant to generate sufficient data for determining mine planning and mine method baseline environmental data.

Our plans have always been to conduct our operation in such a fashion as to permit PM&M and the AAEC to generate meaningful data for a possible new industry in Gila County.

To date we have ran Leach Tests by Heap Leaching on a prepared pad. As outlined in our report we are presently leaching on a very small Dump Leach which is located on top of the orebody. When leaching is completed on this Test Dump Leach, the material will be removed and placed on our Heap Leach pad.

Plans are to study the rock formation below the Test Dump Leach to determine if it is feasible and satifactory to both PM&M and the AAEC to continue with a In Place Leach Test. The In Place Leach Test is envisioned to cover an area of approximately 200 feet by 300 feet. If research demonstrates that we should proceed with the In Place Leach Test, the Monitor Wells will be placed in areas approved by the AAEC. Pinal Minerals and Mining has never had any plans to run the In Place Leach Test until a report is prepared on test work to date and until detailed In Place Leach plans are approved by the AAEC.

Based on the foregoing and our discussion we will appreciate it if you will confirm that the application have been reinstated.

Sincerely,

Thomas A. Clary
General Partner

cc John McKlveen, Ph. D.

9609270332 790430
PDR ADOCK 04008752
C PDR

AAEC-3
Jan. 1967

ARIZONA ATOMIC ENERGY COMMISSION
RADIOACTIVE MATERIAL LICENSE

Pursuant to Chapter 4, Title 30, Arizona Revised Statutes, and the Arizona Atomic Energy Commission Regulations for the Control of Ionizing Radiation, and in reliance on statements and representations heretofore made by the licensee designated below, a license is hereby issued authorizing such licensee to transfer, receive, possess and use the radioactive material designated below; and to use such radioactive material for the purpose(s) and at the place(s) designated below. This license is subject to all applicable rules, regulations, and orders now or hereafter in effect and to any conditions specified below. In accordance with letter dated May 26, 1978, signed by Thomas A. Clary.

Licensee		
1. Name	Pinal Minerals & Mining, Ltd.	3. License number: 4-9 is hereby amended in its entirety:
2. Address	P.O. Box 1010 Miami, AZ 85539	4. Expiration date: May 31, 1979
		5. Amendment #1

6. Radioactive material (element and mass number)	7. Chemical and/or physical form	8. Maximum quantity licensee may possess at any one time
A. Natural Uranium	A. Ore being, or having been, leached with Acid.	A. Quantity contained on a 25,000 square foot heap leach pad.
B. Natural Uranium	B. Ammonium Diuranate containing U_3O_8	B. 100,000 pounds

9. Authorized Uses:

A. Heap leaching.

B. Recovery of uranium from leach solutions.

CONDITIONS

10. The authorized place of use is on land in the Northeast Quarter of Section 31, Township 2 South, Range 15 East, Gila and Salt River Meridian, with said authorized place of use to further be entirely located within 500 feet distance of Section 32 of the aforementioned township.

11. The Licensee shall comply with the provisions of Article 4, "Standards for Protection Against Radiation" and Article 10, "Notices, Instructions and Reports to Workers; Inspections", of Arizona Regulations for the Control of Ionizing Radiation.

12. Radioactive material shall be used by, or under the supervision of, Thomas A. Clary.

13. The Licensee shall comply with the provisions of R12-1-318 and R12-1-321 of Arizona Atomic Energy Commission Regulations for the Control of Ionizing Radiation.

ARIZONA ATOMIC ENERGY COMMISSION

RADIOACTIVE MATERIAL LICENSE

SUPPLEMENTARY SHEET

License Number 4-9
Amendment #1

14.A. The Licensee shall employ a radiation consultant acceptable to the Arizona Atomic Energy Commission for the purpose of: (a) monitoring and reporting radiologic emissions and potential emissions to the environs, correlate with meteorologic and plant operation data as appropriate; (b) monitoring, evaluating and reporting radiation exposure and potential exposure to workers; (c) making recommendations to the Licensee regarding such emissions and exposures.

B. The radiation consultant is John McKlveen, Ph.D. and/or his firm, Aradtek, Inc.

15. Except as specifically provided otherwise by this License, the Licensee shall possess and use radioactive material described in Items 6, 7 and 8 of this License in accordance with statements, representations and procedures contained in application and letter dated February 23, 1978, as amended by letter dated May 26, 1978.

Lynn FitzRandolph
Lynn FitzRandolph
Health Physicist II

DATE ISSUED:
May 31, 1978

ARIZONA ATOMIC ENERGY COMMISSION

RADIOACTIVE MATERIAL LICENSE

SUPPLEMENTARY SHEET

License Number 4-9
Amendment #2

SEP 1978
RECEIVED

Pinal Minerals & Mining, Ltd.
P.O. Box 1010
Miami, Arizona 85539

In accordance with letter dated August 23, 1978, initiated by John W. McKlveen, License No. 4-9 is hereby amended as follows:

Items 6, 7, 8 and 9A are amended:

6. Radioactive Material (element & mass number)	7. Chemical and/or Physical Form	8. Maximum Quantity Licensee May Possess At Any One Time
A. Natural Uranium	A. Ore being, or having been, leached with acid.	A. Unspecified

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9. Authorized Use:

   A. Heap leaching. In situ leaching.

Condition 15 is amended to read:

15. Except as specifically provided otherwise by this License, the Licensee shall possess and use radioactive material described in Items 6, 7 and 8 of this License in accordance with statements, representations and procedures contained in application and letter dated February 23, 1978; as amended by letter dated May 26, 1978; and letter dated August 23, 1978.

Lynn FitzRandolph
Lynn FitzRandolph
Health Physicist V

DATE ISSUED:
September 15, 1978

sp

ARIZONA ATOMIC ENERGY COMMISSION

RADIOACTIVE MATERIAL LICENSE

SUPPLEMENTARY SHEET

License Number 4-9
Amendment #2

Pinal Minerals & Mining, Ltd.
P.O. Box 1010
Miami, Arizona 85539

In accordance with letter dated January 15, 1979, signed by Thomas A. Clary, License 4-9 is hereby amended as follows:

Condition #14.B is amended to read:

14.B The radiation consultant is John McKlveen, Ph.D.

Lynn FitzRandolph
Lynn FitzRandolph
Health Physicist V

Date Issued:
February 8, 1979

APPLICATION FOR LICENSE TO MINE AND PROCESS URANIUM ORE AT THE LUCKY BOY MINE

PINAL MINERALS AND MINING, LTD.
Post Office Drawer 1010
Miami, Arizona 85539

Thomas A. Clary and Richard C. Mayberry
General Partners

Prepared by

ARADTEK, INC.
Post Office Box 40813
Tucson, Arizona 85717

John W. McKlveen
Vice President

Submitted to:

ARIZONA ATOMIC ENERGY COMMISSION
2929 West Indian School Road
Phoenix, Arizona 85018

May 1978

TABLE OF CONTENTS

1. BACKGROUND AND DESCRIPTION OF PROPOSED ACTIVITIES

Pinal Minerals and Mining, Ltd., proposes to operate an open-pit mine and leaching operation at an area of uranium mineralization on the southern slopes of the Pinal Mountains approximately 17 miles south of the Town of Globe, in Gila County, Arizona. The on-site recovery plant will use an ion-exchange resin to strip the uranium from the leach solution. During full production operations the plant is projected to yield about 200 lbm of yellow cake (U_3O_8) per day. The uranium will be stored in a large tank until sold and preferably removed by the purchaser. The entire process is described in Section 3.

The uranium deposits were originally identified in the early 1950's. Mr. G. A. Stacey and others residing in Clifton, Arizona, staked the Lucky Boy deposit on or about 1953 with subsequent leasing to Phelps Dodge Corporation and then to Tulsa Minerals Corporation. Exploration included bulldozing shallow cuts and drilling numerous vertical holes. A series of underground workings were developed and consisted of a 200 foot adit that connects to a 65 foot incline from which about 130 feet of levels and slopes were developed. There are also about 130 feet of workings on the adit level surrounding the top of the incline. Updip from the main workings along the shear zone that influenced mineralization is an adit about 60 feet long. Between March 1956 and June 1967, Tulsa Minerals shipped approximately 2,430 tons of ore with an average grade of 0.18% U_3O_8.(1) Pinal Properties, Ltd. acquired the property by a mining lease agreement from Shepphard, Johnson and Clary on April 19, 1977. Whereas no

further underground development is anticipated in the foreseeable future, the existing tunnels may be used for future in-situ leaching as described in Section 3.

Since July 1977, approximately 53 additional test holes have been drilled on-site. Whereas these surveys have yet to delineate a specific direction to the orebody, the results have identified a reserve approximately 100' x 300' with an average thickness of 50 feet and an average grade of 0.075% U_3O_8. Based on ground density and 70% recovery of uranium, calculations yield 126,000 lbm of recoverable U_3O_8. Estimating a sale price of $50/lbm the proven recoverable uranium has a gross value of about $6,300,000. The drilling operations have indicated the mineralization trend is greater than 200 feet in width and 450 feet in length and radiometric surveys revealed an anomalous area 1,000 feet by several hundred feet in width. When this area is included the Lucky Boy deposit has geologic potential for containing 1,000,000 lbm of recoverable U_3O_8.

It is anticipated that the facility will employ up to 20 full-time personnel who will work three shifts, 365 days per year for approximately 3 years. The mine, recovery plant and testing operations will cost about $1,000,000 of which about $500,000 will be preoperational expenses. At present, the facility has been constructed and pilot operation has demonstrated "proof of concept." Approximately 1,000 lbm of uranium has been recovered.

At the conclusion of mining and recovery operations the facility will be decommissioned in accordance with the Arizona Atomic Energy Commission legislation which is currently being evaluated by the State legislature. If the legislation is not acted upon favorably the restoration will be effected by the operator and will include the removal of all equipment and facilities, reasonable clean up and decontamination of the plant environs, return of the rock tailings to the pit area, covering with overburden to minimize future radiation releases, reason-

able contouring to natural conditions, and neutralization with Mescal limestone.

2. THE SITE AND SURROUNDING ENVIRONMENT

2.1 Site Location and Land Use

The site of the proposed "Lucky Boy" is in Sections 31 and 32, Township 2 South, Range 15 East, among a series of sharply dissected cuestas in the Mescal Mountains on the southern slopes of the Pinal Mountains. It is west of the Pioneer Pass Road and about three-quarters of a mile southwest of the former Pioneer Stage Station. The old stagecoach route from Winkelman to Globe, now a rough dirt road, passes to the east of the site and provides access to the site from either Globe directly via Pioneer Pass or from the turnoff to the Dripping Springs Wash which intersects State Route 77 about 20 miles south of Globe. Figure 2.1-1 shows the general location while Figure 2.1-2 delineates the specific topographical features at the site.

The land includes unpatented mining claims shown as Paula #1 through Paula #14, recorded in Gila County Book 381, pages 708-721; unpatented mining claims shown as Tuesday No.'s 2, 4 and 6, recorded in Gila County Book 431, pages 433, 435 and 436; Arizona State Prospecting Permits PP-33777, PP-47883, PP-47884, and PP-47885. In addition, Pinal Properties, Ltd. has applied for an Arizona State Mineral Lease on the W/2, NW/4, NW/4 and the W/2, SW/4, NW/4 of Section 32, Township 2 South, Range 15 East, all on PP-33777. It is anticipated that applications will be made for additional state mineral leases when the orebody is further defined. Mining operations should be expected to disrupt the lands described within the claims specified. The recovery plant and appurtenees are located on less than one acre and these facilities are not expected to expand.

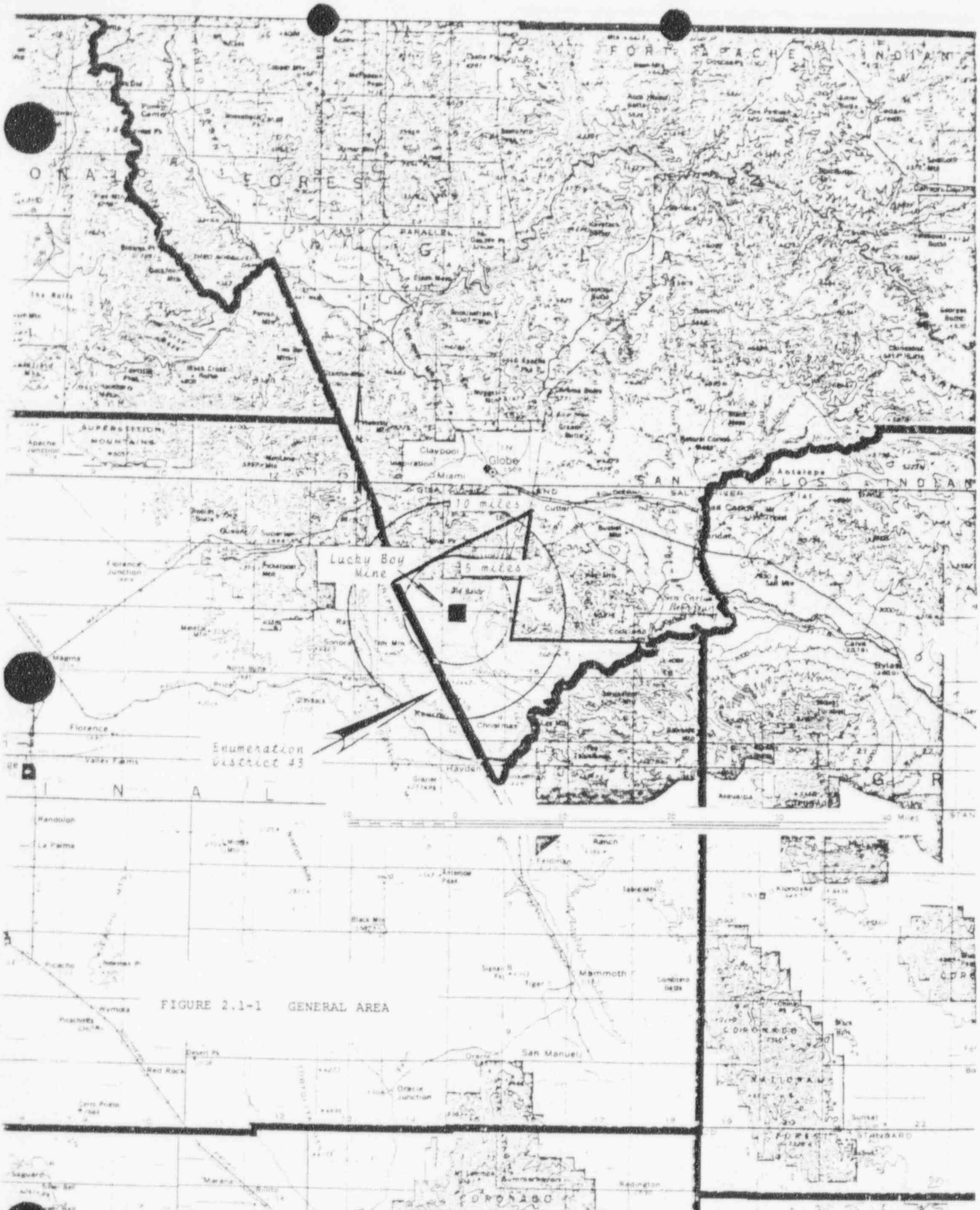

FIGURE 2.1-1 GENERAL AREA

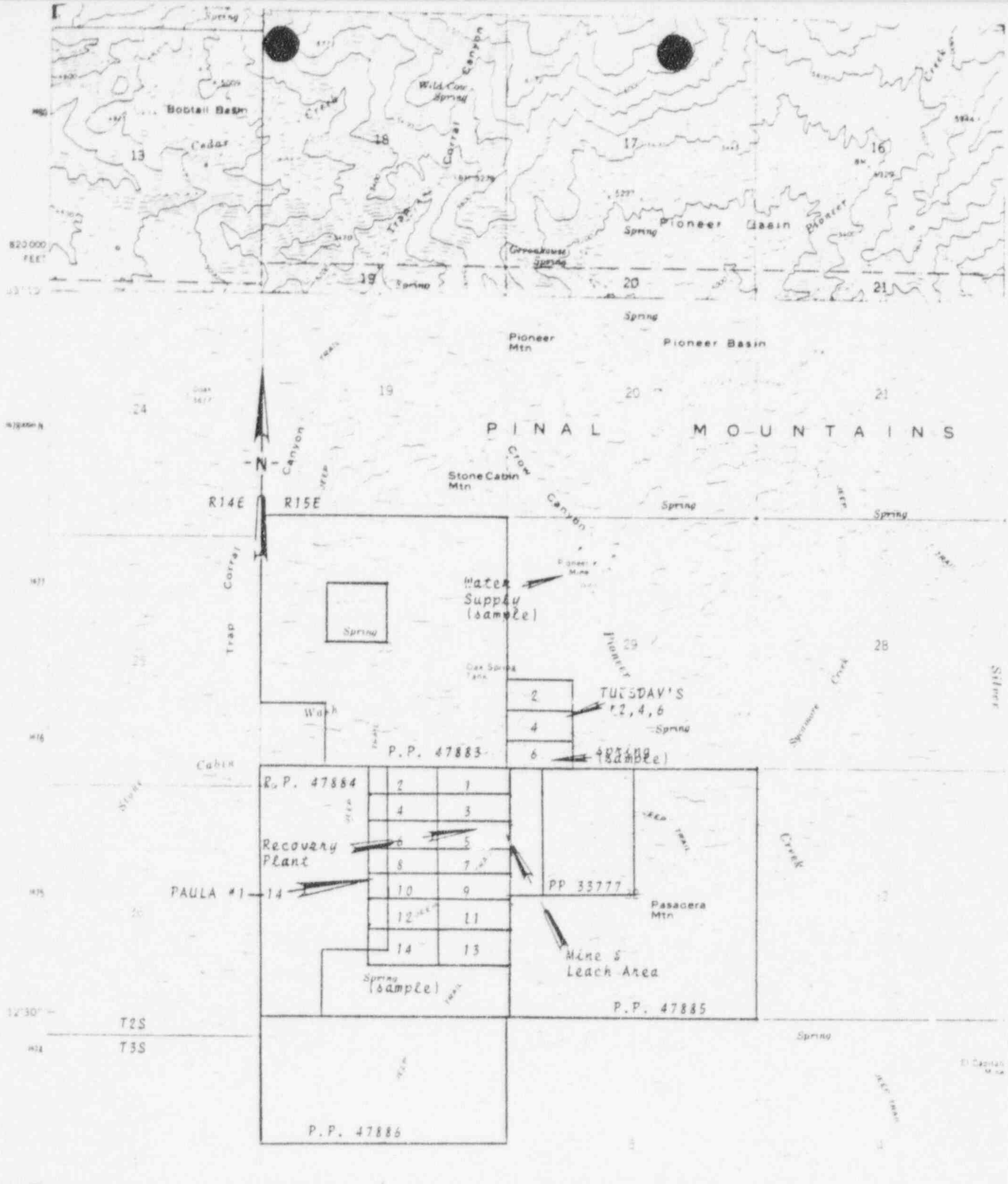

FIGURE 2.1-2 SITE TOPOGRAPHY

2.2 Demography

The site is located in an area which has seen considerable previous mining activity. Numerous abandoned, seldom worked or small scale open-pit and underground mines exist in the vicinity but no large operation is currently in progress within 5 miles of the site. There is one house at the old Pioneer Stagecoach Stop (Figure 2.1-2) about three-quarters of a mile northeast of the recovery plant. One caretaker is present during the week while the owner and his wife (who are also partners in the Lucky Boy Mine) frequent the home on weekends. The 1970 census within Enumeration District #43, shown in Figure 2.1-1, identified 76 homes and a population of 261.(3) Table 2.2-1 summarizes the population information for the surrounding towns.(4,5,6)

2.3 Regional Historic or Cultural Landmarks

No historic places have been reported in the vicinity or the site.(7) Furthermore, no ruins, artifacts or other indications of historical significance have been identified during exploration and environmental surveys on the mining properties.

2.4 Geology

A generalized stratigraphy of the region is shown in Figure 2.4-1.(8) In most cases, the uranium mineralization occurs in the middle of the upper member of the Dripping Springs Quartzite.

The host rock for the Lucky Boy deposit is weakly metamorphosised siltstone and lies about 40-45 feet above the barren quartzite. At the surface the rocks are bleached and somewhat iron stained. The uranium deposit is about 170 feet stratigraphically below the Mescal Limestone level.

Rocks in the immediate vicinity of the deposit are tilted into a cuesta in which the strata strike generally N. 50°W. and dip 25° SW. Fractures are abundant

TABLE 2.2-1

TOWNS AND SETTLEMENTS IN VICINITY OF LUCKY BOY MINE

TOWN	DIRECTION FROM SITE	DISTANCE	YEAR	POPULATION	CHANGE	1/2 HR DRIVE
Globe	NNE	17	1970	7,333		32,000
			1975	9,200-9,350	+26.5%	
Hayden	SSE	12	1970	1,283		31,186
Miami	N	17	1960	3,350		
			1970	3,394	+1.0%	32,000
			1975	3,750-4,000	+7.0%	
Superior	NW	17	1970	4,975		48,000
			1975	5,300-5,650	+10.0%	
Winkelman	SSE	12	1970	974	-13.3% (from 1960)	31,186

URANIUM DEPOSITS, DRIPPING SPRING QUARTZITE

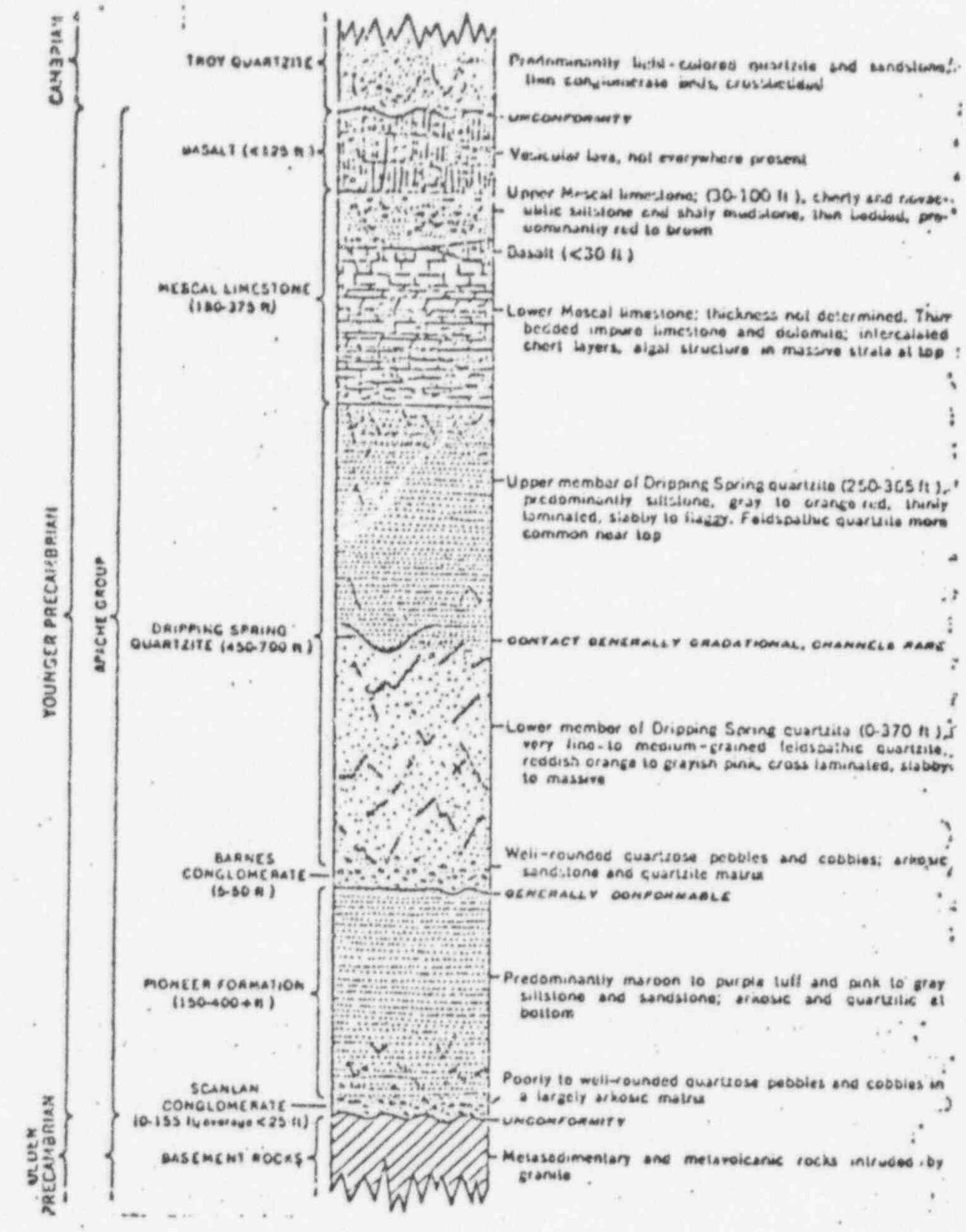

FIGURE 2.4-1 GENERALIZED COLUMNAR SECTION OF THE APACHE GROUP, GILA COUNTY, ARIZONA.

and trend in several directions, but the dominant ores trend northwestward and dip steeply to the southwest. Drilling to date indicates a northeast trending orebody of secondary mineralization, whereas it is more likely that the primary mineralization is sinuous, NW trending and bedding controlled. This is due to the predominate fractures being normal to the strike of the beds.

Major minerals and elements present include metatorbernite, bassetite and iron minerals. Minor amounts of fluorescent opal, a yellow uranium mineral tentatively identified as uranophane, goethite, jarosite, gypsum, B-uranophane, pyrite, pyrrhotite and chalcopyrite have been either identified or are suspected to be present.(1) Although uranium is the only mineral present in quantities that warrant mining, the copper which is extracted during the leaching operations may accumulate in sufficient quantities to be marketed as by-products.

2.5 Seismology

Figure 2.5-1, a general epicenter location map for Arizona, reveals that the Lucky Boy Mine is located in an area where a few quaternary fault traces have been identified and earthquakes recorded. Although the exact dates of the small earthquakes around Globe could not be determined, a literature survey revealed that they were probably less than III on the modified Mercalli scale and none occurred after 1973. The most recent seismic activity of any significance occurred in the Prescott area during the first quarter of 1976. Several tremors were reported, as well as two moderate-sized earthquakes which produced intensities of IV and VI on the modified Mercalli scale.(9-14) Table 2.5-1 defines the modified Mercalli scale.

2.6 Hydrology

Except for short periods during spring rains and following summer thunderstorms, all streams and washes in the vicinity of the mine are dry. The mining

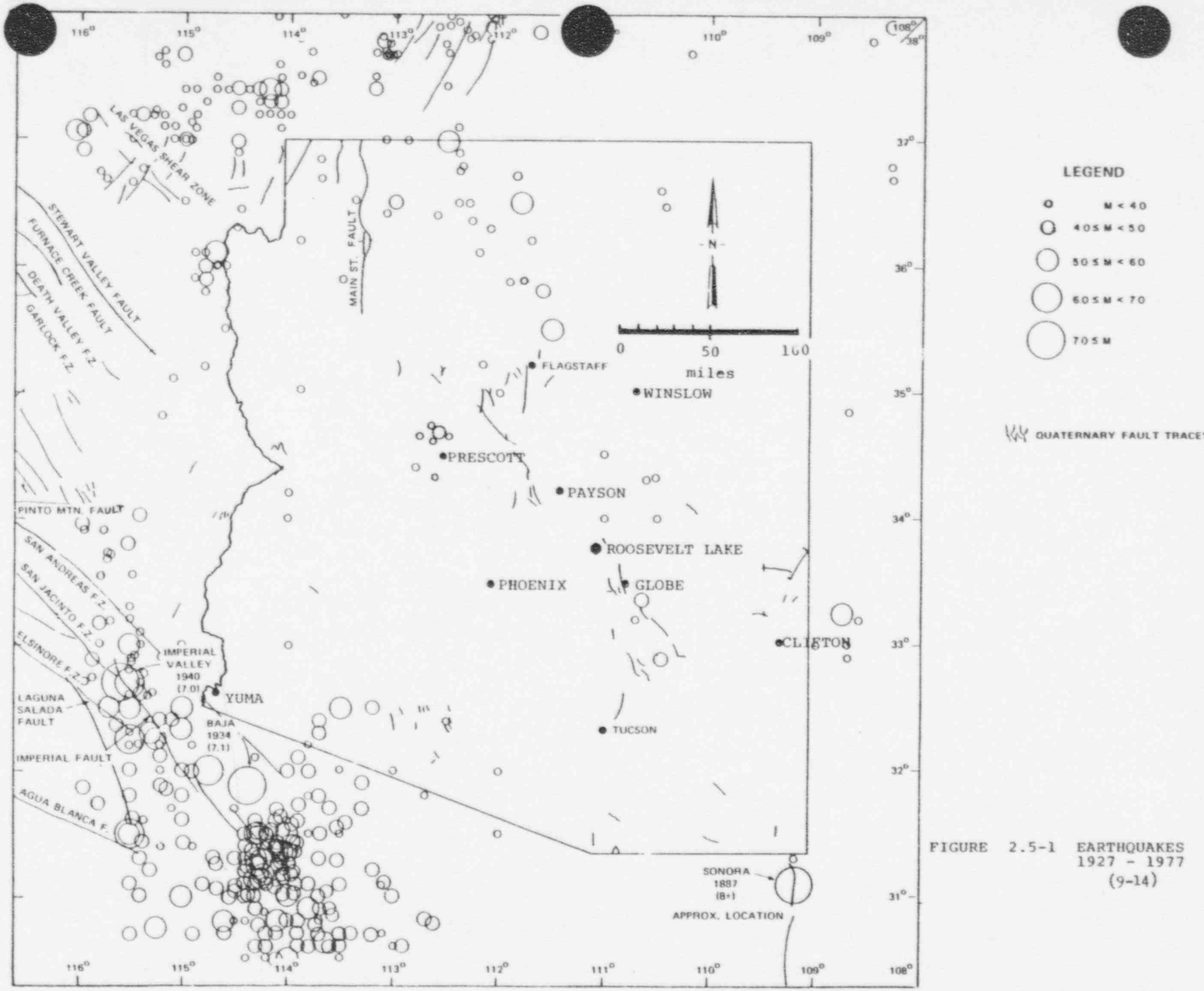

FIGURE 2.5-1 EARTHQUAKES 1927 - 1977 (9-14)

TABLE 2.5-1

MODIFIED MERCALLI INTENSITY SCALE OF 1931

I. Not felt - or, except rarely under especially favorable circumstances. Under certain conditions, at and outside the boundary of the area in which a great shock is felt: sometimes birds, animals, reported uneasy or disturbed; sometimes dizziness or nausea experienced; sometimes trees, structures, liquids, bodies of water, may sway--doors may swing, very slowly.

II. Felt indoors by few, especially on upper floors, or by sensitive, or nervous persons. Also, as in grade I, but often more noticeably: sometimes hanging objects may swing, especially when delicately suspended; sometimes trees, structures, liquids, bodies of water, may sway, doors may swing, very slowly; sometimes birds, animals, reported uneasy or disturbed; sometimes dizziness or nausea experienced.

III. Felt indoors by several, motion usually rapid vibration. Sometimes not recognized to be an earthquake at first. Duration estimated in some cases. Vibration like that due to passing of light, or lightly loaded trucks, or heavy trucks some distance away. Hanging objects may swing slightly. Movements may be appreciable on upper levels of tall structures. Rocked standing motor cars slightly.

IV. Felt indoors by many, outdoors by few. Awakened few, especially light sleepers. Frightened no one, unless apprehensive from previous experience. Vibration like that due to passing of heavy or heavily loaded trucks. Sensation like heavy body striking building or falling of heavy objects inside. Rattling of dishes, windows, doors; glassware and crockery clink and clash. Creaking of walls, frame, especially in the upper range of this grade. Hanging objects swung, in numerous instances. Disturbed liquids in open vessels slightly. Rocked standing motor cars noticeably.

V. Felt indoors by practically all, outdoors by many or most: outdoors direction estimated. Awakened many, or most. Frightened few--slight excitement, a few ran outdoors. Buildings trembled throughout. Broke dishes, glassware, to some extent. Cracked windows--in some cases, but not generally. Overturned vases, small or unstable objects, in many instances, with occasional fall. Hanging objects, doors, swing generally or considerably. Knocked pictures against walls, or swung them out of place. Opened, or closed, doors, shutters, abruptly. Pendulum clocks stopped, started or ran fast, or slow. Moved small objects, furnishings, the latter to slight extent. Spilled liquids in small amounts from well-filled open containers. Trees, bushes, shaken slightly.

VI. Felt by all, indoors and outdoors. Frightened many, excitement general, some alarm, many ran outdoors. Awakened all. Persons made to move unsteadily. Trees, bushes, shaken slightly to moderately. Liquid set in strong motion. Small bells rang--church, chapel, school, etc. Damage slight in poorly built buildings. Fall of plaster in small amount. Cracked plaster somewhat, especially fine cracks chimneys in some instances. Broke dishes, glassware, in considerable quantity, also some windows. Fall of knick-knacks, books, pictures. Overturned furniture in many instances. Moved furnishings of moderately heavy kind.

VII. Frightened all--general alarm, all ran outdoors. Some, or many, found it difficult to stand. Noticed by persons driving motor cars. Trees and bushes shaken moderately to strongly. Waves on ponds, lakes, and running water. Water turbid from mud stirred up. Incaving to some extent of sand or gravel stream banks. Rang large church bells, etc. Suspended objects made to quiver. Damage negligible in buildings of good design and construction, slight to moderate in well-built ordinary buildings, considerable in poorly built or badly designed buildings, adobe houses, old walls (especially where laid up without mortar), spires, etc. Cracked chimneys to considerable extent, walls to some extent. Fall of plaster in considerable to large amount, also some stucco. Broke numerous windows, furniture to some extent. Shook down loosened brickwork and tiles. Broke weak chimneys at the roof-line (sometimes damaging roofs). Fall of cornices from towers and high buildings. Dislodged bricks and stones. Overturned heavy furniture, with damage from breaking. Damage considerable to concrete irrigation ditches.

VIII. Fright general--alarm approaches panic. Disturbed persons driving motor cars. Trees shaken strongly--branches, trunks, broken off, especially palm trees. Ejected sand and mud in small amounts. Changes: temporary, permanent; in flow of springs and wells; dry wells renewed flow; in temperature of spring and well waters. Damage slight in structures (brick) built especially to withstand earthquakes. Considerable in ordinary substantial buildings, partial collapse: racked, tumbled down, wooden houses in some cases; threw out panel walls in frame structures, broke off decayed piling. Fall of walls. Cracked, broke, solid stone walls seriously. Wet ground to some extent, also ground on steep slopes. Twisting, fall, of chimneys, columns, monuments, also factory stacks, towers. Moved conspicuously, overturned, very heavy furniture.

IX. Panic general. Cracked ground conspicuously. Damage considerable in (masonry) structures built especially to withstand earthquakes: Threw out of plumb some wood-frame houses built especially to withstand earthquakes; Great in substantial (masonry) buildings, some collapse in large part; or wholly shifted frame buildings off foundations, racked frames; serious to reservoirs; underground pipes sometimes broken.

X. Cracked ground, especially when loose and wet, up to widths of several inches; fissures up to a yard in width ran parallel to canal and stream banks. Landslides considerable from river banks and steep coasts. Shifted sand and mud horizontally on beaches and flat land. Changed level of water in wells. Threw water on banks of canals, lakes, rivers, etc. Damage serious to dams, dikes, embankments. Severe to well-built wooden structures and bridges, some destroyed. Developed dangerous cracks in excellent brick walls. Destroyed most masonry and frame structures, also their foundations. Bent railroad rails slightly. Tore apart, or crushed endwise, pipe lines buried in earth. Open cracks and broad wavy folds in cement pavements and asphalt road surfaces.

XI. Disturbances in ground many and widespread, varying with ground material. Broad fissures, earth slumps, and land slips in soft, wet ground. Ejected water in large amounts charged with sand and mud. Caused sea-waves ("tidal" waves) of significant magnitude. Damage severe to wood-frame structures, especially near shock centers. Great to dams, dikes, embankments often for long distances. Few, if any (masonry) structures remained standing. Destroyed large well-built bridges by the wrecking of supporting piers, or pillars. Affected yielding wooden bridges less. Bent railroad rails greatly, and thrust them endwise. Put pipe lines buried in earth completely out of service.

XII. Damage total--practically all works of construction damaged greatly or destroyed. Disturbances in ground great and varied, numerous shearing cracks. Landslides, falls of rock of significant character, slumping of river banks, etc., numerous and extensive. Wrenched loose, tore off, large rock masses. Fault slips in firm rock, with notable horizontal and vertical offset displacements. Water channels, surface and underground, disturbed and modified greatly. Dammed lakes, produced waterfalls, deflected rivers, etc. Waves seen on ground surfaces (actually seen, probably, in some cases). Distorted lines of sight and level. Threw objects upward into the air.

area is located around the confluence of two small ravines which provide intermittent runoff capability for several acres of hills which slope upward to the north and east. A diversionary ditch is being dug in the easterly ravine to route any flow away from the mine area and into the wash further south. The northernly ravine constitutes the mining area and the small, infrequent water flows can be tolerated. During bulldozing operations at the confluence of the ravines in mid-May, 1978, the underlying soil was observed to be damp. Moisture should be anticipated beneath the stream bed.

There are a few small springs with trickle flows or seepage. These are shown on Figure 1.2-2. Whereas perched water pockets should be anticipated and standing water has been observed at low points within the mine, the main water table has been estimated to be around 600 feet. No wells or exploratory drillings have been attempted to this depth.

2.7 Meteorology

The site is located in a semi-arid region of the Sonoran Desert which experiences the same overall airmass and moisture patterns that influence the remainder of the state. Briefly, during the winter months a westerly flow of air introduces moisture from the Pacific and Gulf of California, resulting in periods of rain and drizzle. Heaviest rainfall generally occurs between January and March. Thereafter, the air flow begins to reverse and transport moisture in from the Gulf of Mexico. The increased humidity coupled with high temperatures and vertical instability creates intense local thunderstorm and squall line activity, primarily during July, August and September.

While abundant weather data exist for Phoenix and the adjacent valley areas[15-17] the different topography prohibits extrapolation of the information to the site. Therefore, a battery powered remote meteorological station is being erected

adjacent to the recovery plant and will continuously monitor wind speed, direction, temperature, humidity and precipitation. Data will be collected, studied and tabulated until decommissioning of the facility. In the meantime, the following general observations can be made about local meteorology.

The majority of the time the weather is clear with abundant sunshine and low relative humidities. Temperatures may exceed 43°C during the summer months and short periods of freezing may be experienced during the winter. Sunny days and clear nights produce large diurnal temperature fluctuations which approach 25-30°C. Extended periods of calm will prevail during the evening, night and early morning with a high probability of stable inversions and fumigation conditions. Increasing winds, turbulence and unstable conditions are concomitant with available daytime solar radiation. Although annual rainfall amounts and precipitation rates are very site specific, the property should expect an average of between 4 to 6 inches per year. The proximity to large mountains and rugged terrain suggest increased localized thunderstorm activity and high winds during storm passage, the result of orographic lifting and unstable vertical convection. Thus, there should be more storms with greater intensity in the vicinity than the 23 thunderstorms Phoenix experiences per year, the majority occurring July through September.[15] Table 2.7-1 shows that local winds may exceed 70 mph during the storm.[18] A survey of storm data revealed 1977 was a typical year.[15-17] Finally, the rains and adverse weather experienced during the first quarter of 1978 did not create any problems at the pit mine, leach pad and reservoir, or recovery plant.

Tornadoes are a possibility also and Arizona has been identified as being within a Class II tornado intensity region.[19] This infers that characteristic tornadoes may possess maximum winds of 300 mph, travel at 60 mph and possess a radius of 150 feet. As summarized in Table 2.7-1, two funnels were reported

in 1977 but neither touched the ground. Many probably go unnoticed due to the sparse population and large uninhabited areas. Using the statistical methods advanced by Thom, the probability of a tornado striking within a 50 mile radius of the site, assuming an average of about 1 per year within this area, is about 9×10^{-6} per year or a recurrence interval of about 116,000.[20]

TABLE 2.7-1

High Winds Reported During 1977 Thunderstorms

Date	Wind Speed (mph)	Location
Feb.	70	6 miles south of Safford
Mar.	Tornado	Vicinity of Luke AFB
June	64	Phoenix
July	75	Chandler
July	Tornado	Yavapai County
Aug.	50	Tucson
Oct.	60	Buckeye
Jan. ('78)	52	Phoenix

2.8 Ecology

Vegetation is largely grass and low-growing desert plants except in the draws where mesquite and other woody plants are plentiful. Open grazing is permitted and cattle have free access to the sparse vegetation in the vicinity of the mine. Wildlife indigenous to the area include cottontail and jackrabbits, deer, javelina, mountain lion, bobcat, and ground squirrel. Various forms of lizards, snakes, including rattlesnakes, and perhaps gila monsters may be encountered.

2.9 Background Radiological Characteristics

Early radiation measurements at the site revealed radiation in the area of mineralization to be between 0.05 and 2.0 mR/hr.[1] These levels were confirmed during an April, 1978 survey conducted by ARADTEK, INC. In addition, isolated loose rocks with various radiation levels up to 1 mR/hr can be found throughout

the general mine area. These were deposited during previous mining operations.

During the April 1978 preoperational survey by ARADTEK, INC., radiation measurements were made using a Pressurized Ion Chamber (PIC) and a conventional Geiger Mueller Counter (Victoreen Thyac III with GM tube exposed). PIC measurements were made 3 feet above ground to conform with standard procedures while GM readings were obtained at the surface. Representative soil, vegetation, water and manure samples were obtained and assayed for uranium and representative daughters. The results, presented as Table 2.9-1, confirm that the uranium is out of equilibrium,[1] reveal that uranium daughters are present in the soil and silt in the wash south of the mine (see Locations 14-16), and that said radioactivity is being taken up by local vegetation (see Locations 15, 16).

3. THE MINE, LEACHING PAD AND RECOVERY PLANT

The Lucky Boy operations consist of a mine, leach recovery area and a process plant to remove the uranium from the leach solution.

Uranium bearing ore is blasted to proper size in place and transported to the heap leach pad by a front-end loader or equivalent vehicles. Previously, ore preparation included the use of a crusher. However, the equipment was cumbersome and created additional dust and radiation monitoring requirements. Consequently, it has been removed in favor of in-place blasting.

The 100'x 200' leaching pad was bladed out of the west side of the North-South ravine between the pit mine and the recovery plant. To neutralize acid spills and retard seepage, the pad material is composed primarily of Mescal limestone. A four inch layer of black-top, with a higher than normal oil content to inhibit seepage, was poured atop the pad and contoured to permit all drainage to collect in a shallow, 1,000 square foot reservoir. The reservoir contains an additional 12 mil plastic liner which is seamed to the black-top.

Table 2.9-1

Preoperational Environmental Surveys

April - May, 1978

Location	Description	Gamma Dose PIC µR/h	Gamma Dose GM mR/m	Soil	Soil ug/g (dry)	Soil pCi/g (dry)	Vegetation	Vegetation ug/g (dry)	Vegetation pCi/g (dry)
1	Recovery Plant Cement Pad Between 3 resin tanks (west) and large collection tank (east)	11.1	0.04						
2	South of Cement Pad between two small tanks	10.3	0.02	Uranium	44.				
				Th-230		0.32±0.02			
				Ra-226		0.6±0.2			
				Pb-210		2.2±0.3			
3	Inside trailer carpet area about 3 feet from sink	9.7	<0.01						
4	Barren solution return sump north of trailer	11.5	0.02	Uranium	44.				
				Th-230		5.4±0.1			
				Ra-226		0.4±0.3			
				Pb-210		1.4±0.2			
5	15 feet north of acid Storage tank, on road	8.7	<0.01						
6	Bend in road overlooking leaching area	11.9	0.03						
7	Y Junction in road above leaching pond	14.6	0.02						
8	Bend in road just above leaching pond	10.7	<0.01						
9	10 feet above distribution center for barren solution spray to leach heap adjacent to pregnant solution reservoir	20.6	0.02						
10	Pit area directly in front of crusher (at bottom of hill)	113	0.10	Uranium	450				
				Th-230		112±1			
				Ra-226		272±4			
				Pb-210		637±0.06			
11	Flat area atop hill east of main ore body north of E-W ravine	23.4	0.03				Uranium	0.71	
							Th-230		0.10±0.02
							Ra-226		0.6±0.1
							Pb-210		1.0±0.1
12	Base of Rock Pile, in wash below pit near old mine entrance	95.2	1.0						
13	50 feet south of #12 at edge of stream and beginning of east ravine	103	0.1	Uranium	0.53				
				Th-230		0.13±0.02			
				Ra-226		0.6±0.3			
				Pb-210		0.2±0.2			
14	Stream bed downstream of #13 and below mineralization outcropping	45.6	0.2	Uranium	2.8				
				Th-230		1.4±0.1			
				Ra-226		23.±1.			
				Pb-210		51±1			
15	Stream bed south of #14 across from old bore hole	18.2	0.02	Uranium	6.8		Uranium	4.9	
				Th-230		1.6±0.1	Th-230		0.56±0.02
				Ra-226		12±1	Ra-226		5.3±0.3
				Pb-210		6.1±0.3	Pb-210		3.2±0.2
16	50 feet downstream from #15	7.5	0.02	Uranium	7.5		Uranium	2.2	
				Th-230		1.9±0.1	Th-230		0.22±0.03
				Ra-226		5.3±0.5	Ra-226		15±1
				Pb-210		6.0±0.3	Pb-210		12.±1.
17	Further downstream and SE of trailer	13.8	0.02						

Table 2.9-1
(continued)

Location	Description	Water	mg/ℓ	pCi/ℓ	Manure	µg/g (dry)	pCi/g (dry)	Radon Daughters Working Level
1								
2								
3		(Tap)						
		Uranium	0.002					
		Th-230		< 1.1				
		Ra-226		4.3±0.7				
		Pb-210		6.9±1.6				
4								
5								
6								
7								
8								
9		(Pregnant solution)						
		Uranium	60.4					
		Th-230		51,300±200				
		Ra-226		575±28				
		Pb-210		5,290±190				
		Po-210		1,150±70				
10								0.006
11					Uranium	0.47		
					Th-230		0.14±0.02	
					Ra-226		1.8±0.2	
					Pb-210		4.0±0.2	
12								<0.006
13		(East Ravine)						
		Uranium	0.023					
		Th-230		< 0.6				
		Ra-226		< 0.6				
		Pb-210		< 1.5				
14								
15								
16								
17								
18	Runoff area north and east of north ravine above pit	(Small pool)						
		Uranium	0.016					
		Th-230		0.8±0.2				
		Ra-226		1.5±0.5				
		Pb-210		< 1.5				
19	Bob's Spring. Entrance road to mine	(Pool)						
		Uranium	0.005					
		Th-230		5.4±1.7				
		Ra-226		< 0.6				
		Pb-210		24.6±2.2				

A plastic pipe, 45 gpm sprayer system blankets the heap leach pad with barren liquor, pH-1 sulfuric acid. The pregnant solution collects in the reservoir and is pumped about 250 feet through 3.0 inch diameter heavy walled, seamless hose to a 40,000 gallon, glass-lined, 5/8 inch steel tank located at the north end of the recovery plant. In the future, leaching operations may be modified to permit in-place blasting followed by in-place leaching. The leach liquor would be pumped to the blast area and percolate the uranium bearing ore. The pregnant liquor will flow into the previously constructed mine shaft system. Thereafter, it will either be pumped from the mine or allowed to flow into a reservoir which would be located in the wash directly below the mine entrance.

When ready for processing the pregnant solution is pumped through a filter to a series of three rubber lined steel tanks filled with an uranium, ion-exchange resin. Thereafter, the barren solution is returned to another 40,000 gallon tank to await recycle to the leach pad.

After the resin is loaded it is backflushed with a salt solution. The uranium bearing solution is collected in a steel tank and anhydrous ammonia added to neutralize the material and precipitate the yellowcake. U_3O_8 sludge is then pumped to a large holding tank, located at the south end of the plant, where it is stored until sale and shipment.

The recovery plant, designed and constructed by Mountain States Research and Development, Tucson, Arizona, contains several natural as well as standard and specially designed safety features. The plant is located on a Mescal limestone formation. A sloped, concrete pad with 6 inch curbing permits spills or plant leakage to be washed to a collection sump. The sump's contents may be pumped to the leach heap or to an evaporation pond located about 1/2 mile south of the plant. The large barren and pregnant solution storage tanks contain more than 10 times the required volume for normal operation. The extra surge capacity

was provided as an additional backup for liquid storage in the event of a major plant malfunction.

The evaporation pond was constructed on a clay material and linked to the plant by a 1 inch diameter plastic pipe. The pipe size was made small intentionally to minimize a release to the surroundings in the event of rupture. In the near future, the pond will be tested using fresh water. If excess seepage is noted, the pond will be modified with an additional liner.

Fresh water is piped from the Pioneer Mine Workings located about 1 mile upgrade from the plant. Full production will require about 10-15 gpm. Although the exact water production capacity of the source is not known, it is unlikely that the demand will noticeably lower the hydrostatic head. Written approval for use of the water has been granted by Mr. L. Sheppard.

There should be no off-site effluent releases. The leach system is a closed cycle operation and should require less than 12 gpm make-up water to account for evaporation and wind transport of the leach heap spray droplets. Miniscule quantities of acid vapor should be expected at the leach heap during spraying operations and a small ammonia odor may occur at the plant during recovery operations. Solid wastes which exhibit detectable contamination, e.g., rags, papers, filters, glassware and other miscellaneous non-biodegradable materials generated in plant operations will be packaged appropriately for disposal at a licensed low-level burial site. Non-radioactive solid wastes will be burned or transported from the site for proper disposal. Sewage is collected in a septic tank.

4. ENVIRONMENTAL IMPACTS OF PLANT CONSTRUCTION

The mine and recovery plant have been constructed with no impact on the off-site environs. On-site, a conscientious effort has been made to preserve natural vegetation and landscape.

5. ENVIRONMENTAL EFFECTS OF MILL AND MINE OPERATION

The pit mine operation may release small amounts of radon gas and airborne radioactive particulates during blasting and ore transport operations. There should be no gas or particulate releases from the leach heap or recovery plant during normal operations. A personnel radiation dosimetry and bioassay program will monitor the workers. An on-going environmental surveillance program has been designed to monitor for any releases to the surroundings. Should radiation or radioactive materials releases be observed, the data will provide a source term for comparison against permissible levels set forth in the Arizona Atomic Energy Commission Statutes and pathway information to determine potential off-site concerns. Since the altitude of the region is around 4,000 feet, uranium mineralization exists and radiation measurements have indicated exposures may range from 150 to 1,000 mR/yr., any plant release would be negligible compared to the widely varying natural background radiation. Due to the existing uranium mineralization in the area daughter products are being detected in some of the vegetation and water sampled (see Table 2.9-1; locations #15 & 16). The surveillance program provided in Section 6 will monitor for noticeable changes in these concentrations.

The activity at the mine and recovery plant should discourage animal intrusions. The acidic nature of the leach reservoir and evaporation pond will discourage consumption of these liquids. Finally, a fence has been erected around the evaporation pond.

6. PERSONNEL AND ENVIRONMENTAL MEASUREMENTS AND MONITORING

Monitoring and control technology to maintain a safe operating environment is consistent with the philosophy and standard practices maintained within the

nuclear industry. Even though current exposure and release limits provide a very low-risk of injury, it is prudent to avoid unnecessary exposure to radiation. Pinal Minerals and Mining, Ltd. is dedicated to reducing releases and exposures as far below the specified limits as is reasonably achievable and has retained ARADTEK, INC., radiation consultants to formulate and supervise a radiation safety program consistent with these objectives. The ALARA[21] philosophy will be implemented and maintained by means of good radiation protection planning and practice, as well as by management commitment to policies that minimize exposure and foster vigilance against departures from good practice. Toward that end, the following radiological monitoring program has been formulated:

A. Personnel will be monitored for exposures to external radiation by passive film badges. These will be collected monthly. The hostile mine environment coupled with rough handling by miners may justify shifting from open-faced film badges to encapsulated TLD dosimeters. Consistently low radiation exposures will be reviewed to determine if quarterly dosimeter processing may be justified.

B. A urine bioassay for uranium will be obtained at least once a month. Assay frequency may be reduced to quarterly if results continue to show less than 5 mgU/l.

C. Area radiation levels will be determined by quarterly TLD dosimeters placed at the pit-mine, leach-reservoir area, recovery plant and trailer.

D. Several locations around the site have been identified and marked. These locations will be monitored quarterly for background radiation using a micro-R meter. Quarterly soil and vegetation samples will be collected from three of these locations and assayed for U, Th-230, Ra-226, and Pb-210.

E. Water samples will be collected from the two ravines which run past the mine and the wash below the mine whenever the opportunity arises. Probably this will be twice a year; during spring rains and after a summer thunderstorm. Samples will be assayed for U, Th-230, Ra-226 and Pb-210. PH will be measured.

F. Quarterly water samples will be collected from Bob's Spring (entrance road to mine area), tap water in the trailer

(Pioneer Mine Workings), and the spring near the evaporation pond, and assayed for U, Th-230, Ra-226 and Pb-210. PH will be measured.

G. Leach pond and recovery plant effluents will be assayed for uranium and thorium daughters until their concentrations can be determined and radiological considerations addressed.

H. Radon daughter product measurements will be made before and after blasting operations and quarterly at two locations in the vicinity of the mine. Samples will be collected using a portable air pump and counted on an Alpha Sample Counter and scaler.

I. "Samples of Opportunity" such as snakes or other reptiles, animals and manure will be assayed for U, Th-230, Ra-226, and Pb-210, as they become available.

J. Collection and assay of high volume air samples and used respirator cartridges will be undertaken, as necessary, to determine the airborne radioactive particulate concentrations in dusty areas.

K. Selected soil or rock samples will be assayed to determine the presence of Th-232, Ra-228 and the potentially toxic elements Vanadium and Selenium, which often occur within uranium orebodies.

L. Several monthly swipes will be collected around the chemistry workbench and eating area inside the trailer. Samples will be counted using liquid scintillation techniques.

M. Continuous meteorological information including temperature, pressure, humidity, wind speed, wind direction and precipitation will be obtained and analyzed.

Personnel and site dosimetry will be provided by Landauer, Inc., Controls for Environmental Pollution, Inc. or equivalent. Specific nuclide assay and bioassay programs will be provided by Controls for Environmental Pollution, Inc., or other qualified laboratory. Gamma background measurements will be made using a Ludlum model 12S micro-R meter or equivalent. Radon measurements will be collected using a MSA portable pump and counted on a Ludlum model 43-9 Alpha Counter attached to a Ludlum model 2000 scaler or equivalent. On site portable monitoring equipment includes a Ludlum model-3 counter with dual face meter (cpm and mR/hr). Probe attachments to the counter include an end window GM tube and a model 44-2 1" x 1" NaI(Tl) scintillator. Equivalent portable instrumentation is available from other vendors also. Meteorological equipment will be supplied by Weather Measurements Corporation or equivalent.

All radiological programs, measurements, and site visits by ARADTEK, INC. will be recorded in a Radiation Safety Binder which will be available for inspection at the Pinal Minerals and Mining Office. Guidance for preparation of the binder and its contents, for data processing and interpretation of findings, is provided by numerous regulatory documents and published literature.(22-41)

N. During site visits, ARADTEK personnel will discuss radiation safety with employees, provide guidance to ensure the ALARA radiation philosophy is being followed, and answer questions related to radiation and radioactive materials.

7. ACCIDENTS AND ENVIRONMENTAL EFFECTS

Fire hazards have been minimized by plant engineering. The uranium recovery methods were designed to use chemicals, solutions and resins which are not volatile, flammable or explosive. The fuel oil tank and the on-site electric generator are located about 100 feet downgrade from the cement pad. Electricity distribution is via a readily accessible breaker panel located on the cement pad. By law, smoking is prohibited where uranium is mined.(42) Water and fire extinguishers are available.

Piping configurations and storage tanks have been designed and constructed to minimize the possibility of ruptures or spills. The liquid recovery systems operate at low pressure with sufficient valving to isolate failed components or prevent drainage from storage tanks. The recovery plant operation is situated atop a curbed, cement pad and all drainage is into a sump. Seamless, heavy-duty rubber hoses transport the barren and pregnant solutions between the reservoir and recovery plant. Visual inspection of the hose and rapid identification of abnormalities seem logical since the foot-path from the plant to the reservoir parallels the hose. The acid storage tank, located about 100 yards north of the plant, is trenched to contain the liquid in the event of a rupture.

Liquid releases would be either acidic, with or without uranium, or yellow cake sludge. If the effluent was not contained inside the concrete pad it would

be neutralized by the naturally occurring Mescal limestone and the radioactive material reclaimed. If kept moist to preclude build-up of airborne concentrations uranium poses minimal radiological concern due to its low specific activity, 0.67 uCi/gm, and no gamma radiation. However, there may be concentrations of uranium daughters' carried through the recovery operation. This possibility is being addressed and if radionuclides other than uranium are identified their radiological significance will be evaluated; this may result in modifications to decontamination procedures such as requiring gloves, respirators, et cetra.

The final yellow cake slurry will be retained in a large glass-lined steel tank until sale and shipment. It is hoped that the purchasers will provide the transportation vehicle. Transportation accidents have been generally established to involve both low-risk to the public's health and safety and insignificant radiation exposure to operational personnel. Should a transportation accident occur and the storage container breached, the uranium sludge should be kept moist and could be reclaimed with minimal effect on the environment. If transportation is not supplied by the purchaser, Pinal Minerals will ship the moist yellowcake in 55 gallon drums in accordance with applicable U.S. Nuclear Regulatory Commission, AAEC and Department of Transportation regulations.

Natural phenomena accidents such as an earthquake have a small probability of occurrence and might cause piping failures, but releases would be minimal if employees isolated the affected areas. Neutralization and clean-up of the cement pad would be a realistic consideration, but a catastrophic failure of the storage tanks appears remote. Lightning caused range fires may occur but the sparse vegetation in the immediate vicinity of the recovery plant, coupled with the absence of flammable materials at the site, should help the facility to escape damage.

A complete release of liquids contained in all on-site tanks would require recovery of the radioactive materials but would not significantly impact on the

environment or the health and safety of the public. Affected areas off the cement pad could be scraped and transported to the leach pad and the uranium content recovered.

The prevalent defenses in-depth at the site, in the forms of installed engineered safeguards, operational controls, operational monitoring, management philosophy and employee diligence minimize the possibility of a release of liquids and the attendant consequences. Appendix I lists emergency response personnel for the mine and surrounding communities.

8. ECONOMIC AND SOCIAL EFFECTS OF PLANT CONSTRUCTION AND OPERATION

Whereas these categories were summarized in Section 1, a few additional comments are warranted. A 1,300 MWe nuclear plant requires a fuel load of about 130 tons of uranium, so the proven and potential reserves from the Lucky Boy Mine may provide anywhere from about 1/2 to 3 fuel loads. Since Arizona is principally an energy importer the uranium ore will make a small contribution to eradicate this undesirable situation and help achieve some form of energy self-sufficiency. Finally, the mining operation will provide increased knowledge of the environmentally and radiologically acceptable cost-effective techniques to recover uranium ore.

9. RECLAMATION AND RESTORATION

Whenever operations are to be terminated and the useful life of the facility is nearing its end, decontamination and disposition of the site facilities and site area will be undertaken. The Arizona Atomic Energy Commission has pending legislation which, if passed, will provide the necessary guidance for proper

decommissioning. If the legislation is not approved, Pinal Minerals and Mining and the Commission should develop a decommissioning plan which is compatible with the interests of both organizations and follow the procedures summarized in Section 1. The plan should provide appropriate ecological and radiological restoration in concert with a philosophy of minimum permanent environmental impact to the mine, leach and recovery areas and final radiation levels in accordance with the spirit of ALARA. At the completion of decommissioning, a final radiological survey will be performed jointly by both organizations before the Commission terminates the license.

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APPENDIX I

EMERGENCY NOTIFICATION AND RESPONSE PERSONNEL

PINAL MINERALS AND MINING, LTD.

Thomas Clary, General Partner Drawer 1010 Miami, Arizona 85539	Office: 425-3246 Home : 473-3081
Richard C. Mayberry, General Partner Drawer 1010 Miami, Arizona 85539	Office: 425-3246 Home : 473-3081

ARADTEK, INC.

Dr. John W. McKlveen	839-5751
Dr. Roy Post	298-0756

ARIZONA ATOMIC ENERGY COMMISSION

Lynn A. FitzRandolph 2929 West Indian School Road Phoenix, Arizona 85017	271-4845

CITY OF GLOBE

150 North Pine Street Gila County 85501

Mayor

Eugene R. Rabogliatti, DDS	268 S. Devereaux	425-4464

Manager:	Lionel Blair	425-7991
Attorney:	Frank E. Tippett	425-5779
Magistrate:	Don H. Haines	425-9651
Police Chief:	Edward F. Morrissey	425-5751
Fire Chief:	Gerald D. Fitzpatrick	425-4432
Emergency Services:	Carmen Corso	425-4646

TOWN OF WINKELMAN

113 Griffin Avenue	Gila County	85292

Mayor

Marvin Porter	Box 407	356-7017
Clerk:	(Vacant)	356-7854
Attorney:	Ed Dawson	425-5779
Magistrate:	Arnold O. Ortiz	356-7854
Police Chief:	Ronald Lee	356-7854
Fire Chief:	Roger Apodaca	356-7526

TOWN OF HAYDEN

520 Ray Avenue	Gila County	85235

Mayor

Carmelita C. Hart	Box 57	356-7398
Manager:	John Burleson	356-7801
Attorney:	Fred J. Ash	969-2234
Magistrate:	Florentino Pulido	356-7300
Police Chief:	Edward J. Graham	356-7300
Fire Chief:	Edward J. Graham	356-7300

TOWN OF MIAMI

500 Sullivan Street	Gila County	85539

Mayor

Katie Weimer	622 Live Oak St.	473-2813
Coordinator: (act.)	Larry Dickson	473-2281
Attorney:	Don Premeau & Robert Duber II	425-5662
Magistrate:	Martin Henderson	473-4461
Police Chief:	A. J. Castaneda	473-2466
Fire Chief:	Samuel E. Knight	473-2081

TOWN OF SUPERIOR

Pinal County Administration Building	Pinal County	85273

Mayor

Herbert V. Henson	109 Palo Verde	689-2441
Clerk:	Grace Villarreal	689-5752
Attorney:	William L. Tifft	425-5779
Magistrate:	Grace Villarreal	

APPENDIX II

CORRESPONDENCE WITH LOCAL, STATE AND FEDERAL AGENCIES
RELATING TO THIS LICENSING ACTION

ARIZONA ATOMIC ENERGY COMMISSION
RADIOACTIVE MATERIAL LICENSE

Pursuant to Chapter 4, Title 30, Arizona Revised Statutes, and the Arizona Atomic Energy Commission Regulations for the Control of Ionizing Radiation, and in reliance on statements and representations heretofore made by the licensee designated below, a license is hereby issued authorizing such licensee to transfer, receive, possess and use the radioactive material designated below; and to use such radioactive material for the purpose(s) and at the place(s) designated below. This license is subject to all applicable rules, regulations, and orders now or hereafter in effect and to any conditions specified below.

Licensee			
1. Name	Pinal Minerals and Mining, Ltd.	3. License number	4-9
2. Address	P.O. Box 1010 Miami, Arizona 85539	4. Expiration date	May 31, 1978
		5.	

6. Radioactive material (element and mass number)	7. Chemical and/or physical form	8. Maximum quantity licensee may possess at any one time
A. Natural Uranium	A. Ore being, or having been, leached with acid.	A. Quantity contained on a 25,000 square foot heap leach pad.
B. Natural Uranium	B. Ammonium Diuranate containing U_3O_8	B. 5000 pounds

9. Authorized Use:

   A. Heap leaching.

   B. Recovery of uranium from leach solutions.

CONDITIONS

10. The authorized place of use is on land in the Northeast Quarter of Section 31, Township 2 south, Range 15 east, Gila and Salt River Meridian, with said authorized place of use to further be entirely located within 500 feet distance of Section 32 of the aforementioned township.

11. The licensee shall comply with the provisions of Article 4, "Standards for Protection Against Radiation" and Article 10, "Notices, Instructions and Reports to Workers; Inspections", of Arizona Regulations for the Control of Ionizing Radiation.

12. Radioactive material shall be used by, or under the supervision of Thomas A. Clary

13. The Licensee shall comply with the provisions of R12-1-318 and R12-1-321 of Arizona Atomic Energy Commission Regulations for the Control of Ionizing Radiation

ARIZONA ATOMIC ENERGY COMMISSION

RADIOACTIVE MATERIAL LICENSE

SUPPLEMENTARY SHEET

License Number 4-9

14. A. The Licensee shall employ a radiation consultant acceptable to the Arizona Atomic Energy Commission for the purposes of: (a) monitoring and reporting radiologic emissions and potential emissions to the environs, correlated with meteorologic and plant operation data as appropriate; (b) monitoring, evaluating and reporting radiation exposure and potential exposure to workers; (c) making recommendations to the licensee regarding such emissions and exposures.

B. The licensee shall report the consultant's findings to the Arizona Atomic Energy Commission prior to May 31, 1978; this report shall be approved, as to factual matters therein, by the consultant. An initial report shall be made to the Arizona Atomic Energy Commission prior to April 20, 1978.

C. The radiation consultant is John McKlveen, Ph.D. and/or his firm, Aradtek, Inc.

15. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material described in Items 6, 7, and 8 of this license in accordance with statements, representations and procedures contained in application and letter dated February 23, 1978.

Date Issued:
February 28, 1978

Lynn FitzRandolph
Lynn FitzRandolph
Health Physicist II