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RADIOACTIVE OCCURRENCES AND URANIUM PRODUCTION IN ARIZONA

FINAL REPORT

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and
Mineral Technology
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This report is preliminary and has not been edited or reviewed for conformity with Arizona Bureau of Geology and Mineral Technology standards.

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CONTENTS

ABSTRACT 1

INTRODUCTION 2

Purpose and Scope 2
Previous work and Sources of Information 2
Acknowledgments 3
Key to Individual County Listings 4

URANIUM OCCURRENCES IN ARIZONA (discussions) 7

COLORADO PLATEAU REGION 10

Morrison Formation 10
Lukachukai Mountains 11
Carrizo Mountains 12
Black Mesa 12
Mineralization timing and source 12
Potential 13
Chinle Formation 30
Monument Valley 30
Monument No.2 Mine 31
Cameron-Holbrook region 31
Vermilion Cliffs-Lee's Ferry 33
Toreva Formation 40
Breccia Pipes 43
Orphan Lode 44
Hopi Buttes 51
Other Host Rocks 54

Synthesis of Stratabound Deposits 56

SOUTHERN ARIZONA REGION

Stratabound Occurrences 58
Dripping Spring Quartzite 58
Red Bluff Mine 61
Cretaceous Sandstones 68
Duranium Mine 68
Cenozoic Sediments 70
Northern Whitlock Hills 71
Date Creek Basin 75
Miocene dolomites 81
Mineta Formation 83
Precambrian Sediments and Unconformities 84

Non-stratabound Occurrences
Precambrian granites 85
Jurassic-Cretaceous volcanic terrain 88
Porphyry Copper deposits 93
Cenozoic volcanic rocks 95
Veins, faults, shears 97

THORIUM IN ARIZONA 101

CONTENTS (continued)

INDIVIDUAL COUNTY LISTINGS 103

Apache 104
Cochise 135
Coconino 141
Gila 165
Graham 190
Greenlee 195
Maricopa 196
Mohave 202
Navajo 216
Pima 228
Pinal 237
Santa Cruz 241
Yavapai 247
Yuma 256

APPENDIX A - Production Tables and Histograms
Table 2 - District total production table 264
3 - Arizona uranium production histogram 265
4 - County production table, year-by-year 266
5 - County listing of number of occurrences and producers . . . 267
6 - Monument Valley production histogram 268
7 - Orphan Lode production histogram 269
8 - Carrizo Mountains production histogram 270
9 - Lukachukai Mountains production histogram 271
10 - Cameron district production histogram 272
11 - Recent exploration trends in Arizona 273

APPENDIX B - Synopsis of History and Mining
Early history and AEC involvement 274
Carrizo Mountains 275
Lukachukai Mountains 277
Monument Valley 279
Cameron 279
Orphan Lode 281
Other parts of Colorado Plateau 283
Basin and Range country 283

REFERENCES CITED 285

CONTENTS (continued)

ILLUSTRATIONS

Plates (under separate cover)

NTMS Maps (1:250,000)

Plate 1. Ajo
2. Flagstaff
3. Grand Canyon
4. Holbrook
5. Kingman - Las Vegas
6. Lukeville - El Centro
7. Marble Canyon
8. Mesa
9. Nogales
10. Phoenix
11. Prescott
12. Salton Sea - Needles
13. Shiprock - Gallup
14. Silver City - Douglas
15. St.Johns - Clifton
16. Tucson
17. Williams

District Maps

Plate 18. Carrizo Mountains
19. Lukachukai Mountains
20. Cameron
21. Sierra Ancha

under separate cover

FIGURES

Figure 1. Physiographic Provinces and uranium districts of Arizona 8
1A. Stratigraphic correlation chart for Arizona 9
2. Salt Wash Member facies and Isopach map 15
3. Lukachukais, stratigraphic cross section 16
4. Lukachukais, Mesa I, I¼, I½ Mines 17
5. Lukachukais, Mesa I¾, II, II', III Mines 18
6. Lukachukais, Mesa, IV, IV¼, IV½, V, VI Mines 19
7. Lukachukais, Frank No. 1 Mine 20
8. Lukachukais, Camp Mine 21
9. Northwest Carrizos, Saytah Wash Mines 22
10. Northwest Carrizos, Martin, Saytah, George Simpson Mines 23
11. Northwest Carrizos, Plot 6 (Rattlesnake) Mines 24
12. Northwest Carrizos, Rattlesnake Incline cross section 25
13. Eastern Carrizos, Oak Springs-Gravel Top (Cap) Mines 26
14. East Carrizos, RF&R, Hazell, Valley View, VCA Plot 11 Mines . . 27
15a. Carrizos, Cove Mesa Mines, northern half 28
15b. Carrizos, Cove Mesa Mines, southern half 29
16. Monument Valley area, Shinarump channels 34
17. Monument No. 2 Mine, geology and development 36
18. Jack Daniels No. 1 pit, Cameron 37

CONTENTS (continued)

19. Ramco pits, Cameron 38
20. Lee's Ferry - Vermilion Cliffs area - Shinarump channels 39
21. Claim 28 Mine, Black Mesa 42
22. Breccia pipes, Grand Canyon region 47
23. Hack Canyon Mine, cross section 48
24. Orphan Lode, cross section 49
25. Orphan Lode, 245 and 400 levels, plan views 50
26. Hopi Buttes, Morale Mine 53
27. Apache Group stratigraphic section 62
28. Apache Group, paleogeographic N-S cross section 63
29. Sierra Ancha, N-S cross section 64
30. Apache Group, outcrop map 65
31. Red Bluff Mine, Sierra Ancha 66
32. Hope workings, Sierra Ancha 67
33. Duranium Mine, Santa Rita Mountains 69
34. Pliocene lacustrine rocks, 111 Ranch, Graham County 73
35. 111 Ranch, White Bluffs claim 74
36. Anderson Mine, Date Creek basin geology 79
37. Anderson Mine, cross section 80
38. New River area, Miocene dolomites 82
39. White Oak Mine, general geology, Santa Cruz County 90
40. White Oak - Clark Mine maps 91
41. Squaw Gulch Granite, Santa Rita Mountains 92
42. Rincon Mountains, Blue Rock, Chance, and Roble Springs claims . 100

Tables

Table 1. NURE reports covering Arizona. 6
Table 1A. Uranium occurrences in Cenozoic sediments - examples 70
Tables 2 - 11, see Appendix A

ABSTRACT

Nine hundred and sixty-five natural radioactive occurrences of uranium, some containing thorium, are known for Arizona. Of these, 328 localities were the source of 18.1 million pounds of U_3O_8 between 1948 and 1970. About 43 million pounds of V_2O_5 were present in the uranium ores. Ninety-nine percent of Arizona's total production is from the Triassic-Jurassic sedimentary rocks of the Colorado Plateau, approximately half of which came from the Salt Wash Member of the Morrison Formation in the Carrizo and Lukachukai Mountains. Historically, only a small amount of uranium has been produced from the Basin and Range Province. However, recent exploration has shown significant uranium potential in late Tertiary sediments in this region.

Arizona's largest single uranium deposit has been at the Monument No. 2 Mine of Apache County. There, about 5.2 million pounds of U_3O_8 and nearly eleven million pounds of V_2O_5 were produced from a single channel deposit in the Shinarump Member of the Triassic Chinle Formation.

Eighteen major groupings of uranium occurrences are recognized in Arizona for the purposes of classifications; eleven on the Colorado Plateau portion of the State, and seven more in the Basin and Range-Transition Zone portion. These are summarized as follows:

Colorado Plateau:

1. Pennsylvanian-Permian Naco and Supai Formations
2. Permian Kaibab Limestone
** 3. Jurassic Morrison Fm., Salt Wash Member
** 4. Triassic Chinle Fm.
5. Triassic Moenkopi Fm., basal portion
* 6. Jurassic Kayenta Fm.
* 7. Jurassic Navajo Ss.
* 8. Cretaceous Toreva Fm., of the Mesaverde Group
9. Cretaceous Dakota Fm.
** 10. Plateau breccia pipes
* 11. Pliocene Hopi Buttes, fine-grained clastics and tuffs

Southern Arizona:

** 12. Precambrian Dripping Spring Quartzite
* 13. Cretaceous sandstone
* 14. Oligocene, Miocene, Pliocene, fine-grained clastics
15. Mid-Tertiary volcanic rocks
* 16. Jurassic-Cretaceous volcanics, southernmost Arizona
** 17. Laramide porphyry copper deposits
* 18. Vein/pegmatite/granite occurrences, usually involving Precambrian crystalline terrain

**past or current major source in Arizona
*past or current minor source in Arizona

INTRODUCTION

Purpose and Scope

This report describes all known naturally anomalous radioactive occurrences in Arizona. Any locality where uranium mineralization was reported or radioactivity is two times or greater than background is considered anomalous. The major emphasis is placed on descriptions of geology, location, mineralogy, and radioactivity; less emphasis is placed on the history and detailed development of these occurrences.

Many uranium occurrences are concentrated in groups or districts, indicating a possible common genesis within the district. The first part of the report discusses sequentially each of these occurrence types, touching upon aspects of the relevant geology, and gives one or more examples of past uranium sources considered diagnostic of each type of occurrence.

The second part of the report lists in an abbreviated format the details of what is known about each of the 965 radioactive occurrences in the State.

All known data on pre-1971 uranium production is summarized and included. Post-1970 production data is not publicly available, but nevertheless is insignificant as compared to the pounds of U_3O_8 produced from Arizona before 1971. All production data to January 1, 1971, was compiled from official ore receipts (except for Monument Valley area) and supplemented by other Department of Energy (DOE) data.

Radioactive occurrences are listed alphabetically, county by county, and alphabetically within each county. The locations of occurrences, if known to within a section, are plotted on NTMS (1^ox 2°) quadrangle maps. Four district maps for the Carrizo Mountains, Lukachukai Mountains, Cameron Area and Sierra Ancha Mountains, show the location of occurrences too numerous and concentrated to be plotted on the NTMS maps. Poorly located occurrences are not plotted but general description directions to these localities are provided.

The authors and/or the Arizona Bureau of Geology will appreciate receiving any additions or corrections to the data presented herein. Any information acquired after the publication of this report will be on file along with the data and reports from which this report is derived, at the Geological Survey Branch, Arizona Bureau of Geology, and available for public inspection. These files include details of past production and geology not found in this report.

Previous Work and Sources of Information

Most uranium mineral occurrences were prospected in the late 1940s and 1950s. During this time the Raw Materials Division of the U.S. Atomic Energy Commission identified many of the occurrences and monitored production from the active mines. Reconnaissance work by the A.E.C. and USGS geologists was documented in their brief preliminary reconnaissance reports (PRR). AEC and USGS geologists and others also compiled more detailed data on selected Arizona uranium occurrences and districts. These reports include those with

the following prefixes: TM's, RME's, RMO's, TEI's, and TEM's listed with the references.

More recent information is being accumulated by the U.S. Department of Energy (DOE) National Uranium Resource Evaluation (NURE) program. These reports (GJBX prefix) on aerial gamma ray and magnetic reconnaissance, hydrogeochemical and stream sediment analyses, special study areas and NTMS quadrangle evaluations are becoming available to the public as they are open-filed. The DOE has also open-filed many of the old AEC reports and preliminary maps of the Carrizo Mountains, Lukachukai Mountains and Cameron uranium mining districts. Published and unpublished open-file reports and declassified data files at the Grand Junction Office (Colorado) of DOE were examined for this report. See Table 1 for new NURE Arizona reports.

In 1970, Stanton Keith reported on 408 Arizona uranium occurrences in Arizona Bureau of Mines Bulletin 182 by Peirce and others. The Arizona Bureau of Geology and Mineral Technology (formerly Arizona Bureau of Mines) in cooperation with DOE has undertaken this new evaluation of uranium occurrences because significant additional information is now publicly available from formerly classified data and through the NURE Program. Arizona uranium occurrences are also summarized in Arizona Bureau of Geology Reports by Peirce and others (1977), and Scarborough and Wilt (1979) a commercial report by Waechter (1979), plus USGS open-file report on the Hopi Buttes Uranium Occurrences, scheduled for publication in 1981.

For this report, we depended heavily on the PRR's, open-file reports and maps, DOE data files, pre-1971 production records, and Arizona Bureau of Geology data files. Information was also obtained from individual mining companies, and both USGS and NURE geologists. Reconnaissance field trips to the Sierra Ancha Mountains, Lukachukai Mountains, Carrizo Mountains, Fredonia region, Cameron area, Grand Canyon, Date Creek Basin, New River area, San Pedro Valley, Whetstone Mountains, Santa Catalina Mountains, Safford area, Ruby-Arivaca area and Santa Rita Mountains helped to up-date information on many occurrences.

Acknowledgments

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Jenny Laber and Kenneth Matesich drafted the many figures for the report under the watchful eye of Mr. Joe LaVoie. Elizabeth Learned, DOE Grand Junction, compiled production histogram data and other related material. Review was provided by Bill Chenoweth, H. Wesley Peirce, and Anne Candea. Bob O'Haire kindly provided some identifications on puzzling mineral species.

Key to Individual County Listings

Descriptions of all radioactive mineral occurrences in Arizona are listed alphabetically by geographic location and by county. A state-wide alphabetical listing is provided in the index. Aliases for the occurrence names are included in both county descriptions and index.

The descriptions of occurrences in this report are brief summaries of available pertinent data. Obviously, not all data could be included. For some occurrences the information is very limited or held confidential by companies. See also page 103 for instructions on use of the individual listings.

The descriptions contain the following information:

1) Name

Name of occurrence, associated claims, and aliases. A name in parenthesis indicates that is the name under which the information for that property is listed.

2) Location

Location as Section, Township and Range or as latitude and longitude for unsurveyed areas. If there was any question concerning the location of an occurrence within the section or if the occurrence location was defined by U.S. Bureau of Land Management protracted Township and Range, the word approximate (Approx.) precedes the given location. Geographic location, i.e. mountain range, is also provided. Descriptive directions are taken from the PRR's for poorly located occurrences. Locations were field checked when possible. PRR locations were not always correct. Every effort was made to provide accurate locations to within a section. The NTMS and district maps show the distribution of most occurrences. Poorly located occurrences are not plotted.

3) Quadrangle

The names of the appropriate 7½' and/or 15' USGS topographic and 1° X 2° (NTMS) maps are provided.

4) Development

A short description of the type and extent of prospecting and mining at the site.

5) Production

Tons and grade of ore are from official ore receipts. Tons are calculated on moisture-free basis, and uranium-vanadium contents are based on assays before mill processing.

6) Radioactivity

The maximum radioactivity at the site is expressed as times background. All sites with radioactivity 2X or greater than background are listed.

7) Analyses

The sample analyses represent a summary of the radiometric and chemical assays provided in the various reports. When radiometric and chemical assays are given for the same sample, they are listed together on the same line, with the letter "e" preceding the U_3O_8, indicating that the value was determined radiometrically. No "e" indicates a chemical assay. Disequilibrium between uranium and its radioactive daughter products is indicated by a discrepancy between radiometric and chemical assays.

8) Geology

This is a brief summary of the host rock, mineralogy, stratigraphy, alteration, and structure. Not all information could be provided for some occurrences.

9) References

A short citation format is used for the sources of information in the individual listings. Full reference citations are provided in the listing of references. Two numbers may accompany referenced PRR's. The first is the file number recorded on the PRR when it was made. The second, in parenthesis, is a hand-posted number used by the Bendix library at Grand Junction, sequenced county by county.

10) Mine Maps and Geologic Cross Section

Mine maps and geologic cross sections are provided for some occurrences and are located in the general discussion sections occupying the first part of the report.

Table I

NURE REPORTS COVERING ARIZONA

2° Quad	HSSR*	Early Air	Air*	Other*
Shiprock	143(80)		116(79)	
Marble Canyon	--		16(80)	
Grand Canyon	142(80)		35(80)	
Las Vegas	123(78)		59(79)	
Gallup	186(80)		116(79)	
Flagstaff	--		157(79)	
Williams	71(79)		59(79)	
Kingman	122(78)		59(79)	44(76)[1]
St. Johns	191(80)		126(79)	69(78)[2]
Holbrook	--		--	--
Prescott	122(79)		59(79)	72(79)[3]
Needles	--		114(79)	86(80)[4] 164(80)[5]
Clifton	69(78)	GJO-1643	23(79)	
Mesa	81(80)	GJO-1643	23(79)	
Phoenix	--		12(80)	
Salton Sea	113(80)		12(80)	
Silver City	69(78)	GJO-1643	23(79)	
Tucson	--	GJO-1643	23(79)	
Ajo	--		12(80)	
El Centro	--		12(80)	
Douglas	69(78)	GJO-1643	23(79)	
Nogales	--	GJO-1643	23(79)	102(79)[6]
Lukeville	--		12(80)	102(79)[6]

*GJBX prefix

[1]HSSR Roach Lake (in Nevada)

[2]HSSR portions of Douglas, Silver City, St. Johns, Clifton

[3]Artillery Peak HSSR; 164(80)

[4]Date Creek Drilling

[5]HSSR Date Creek Basin

[6]Papago Indian Reservation HSSR

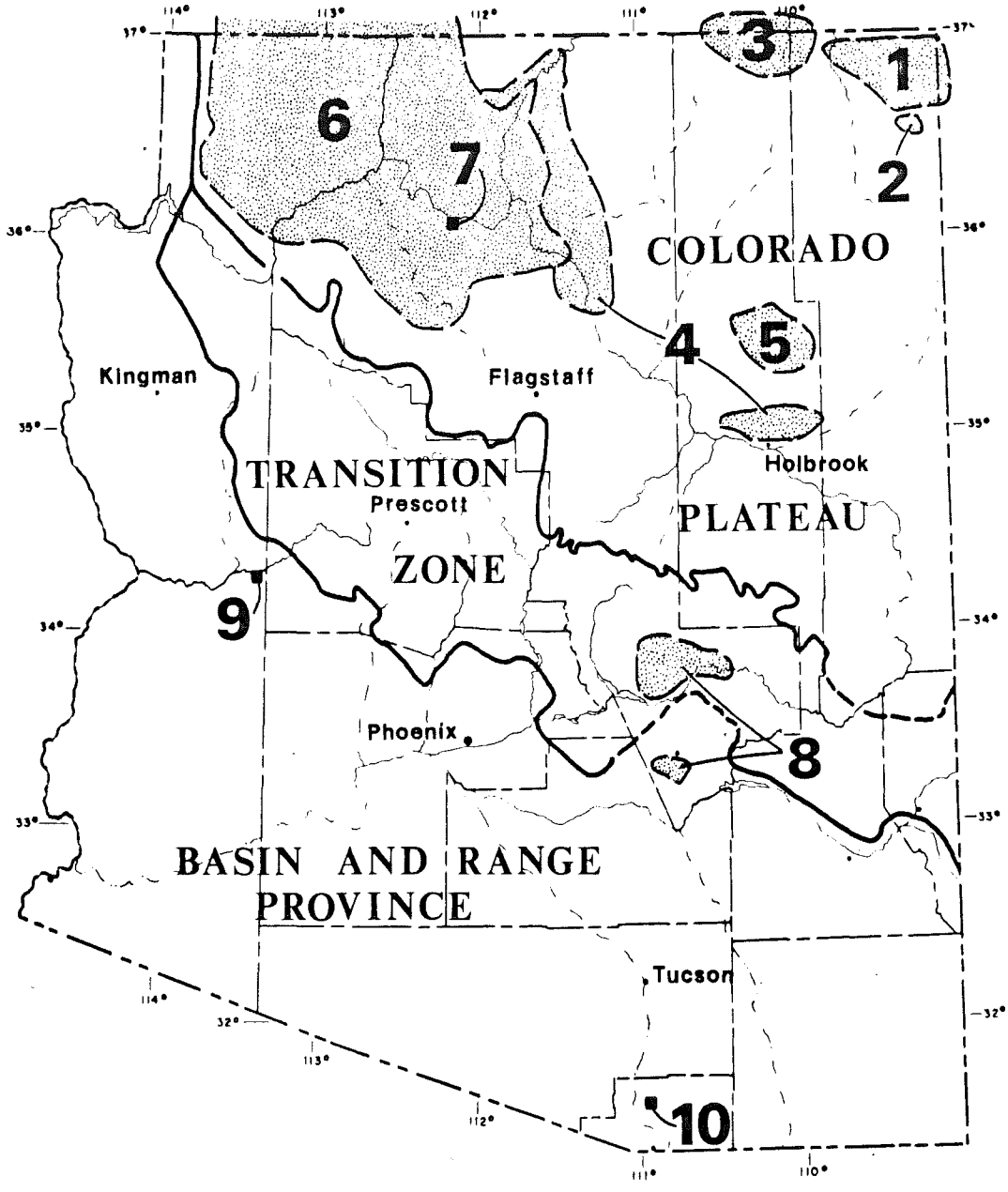
URANIUM OCCURRENCES IN ARIZONA

The first part of this report presents general discussions of the major uranium producing districts and environments in Arizona. For the sake of organization, the discussions are divided into two sequences, the Colorado Plateau, and Southern Arizona (in that order), based upon the physiographic division of the State adopted in Figure 1. Southern Arizona here is taken to be the totality of the Basin and Range Province and the Transition Zone Province. This two-part breakdown of uranium occurrences in the State follows logically from the very different geology and types of uranium host rocks found in the two regions. The Colorado Plateau occurrences are divided between Mesozoic-aged stratabound deposits and breccia pipe deposits. Southern Arizona occurrences also consist of some stratabound deposits in Cenozoic, Cretaceous, and Precambrian sedimentary host rocks, but in addition include vein-type and crystalline host rock types. Figure 1 also illustrates the districts with significant past uranium production. Notes concerning thorium occurrences in Arizona are given after the uranium discussions.

The Colorado Plateau portion of Arizona consists of a relatively complete and continuous flat-lying sequence of Paleozoic and Mesozoic cratonic sediments, rather gently deformed by a series of folds and monoclines. In contrast, the Basin and Range portion of the State consists of an extremely fragmented, faulted record of Proterozoic basement rocks overlain by locally preserved Paleozoic, Mesozoic, and Cenozoic sedimentary and volcanic rocks. This sequence is chopped up along a series of late Cenozoic-aged, quasi-parallel NW-SE trending faults which have in effect created discontinuous elongate mountain ranges and adjacent broad wide valleys that represent horst and graben blocks. Intense orogenies during Mesozoic and Cenozoic times, culminating with the Basin and Range disturbance described above, have served to fragment Basin and Range geology into a very incompletely understood record.

The physiographic province called the Transition Zone is a long narrow region that displays certain structural and stratigraphic properties of each of the two adjacent provinces.

Figure 1A illustrates a simplified State-wide stratigraphic correlation chart. It includes approximate stratigraphic positions for the most prominent uranium deposits and occurrences in the State.



Colorado Plateau Province

1. Carrizo Mountains
2. Lukachukai Mountains
3. Monument Valley
4. Cameron region
5. Hopi Buttes volcanic field
6. Plateau breccia pipes
7. Orphan Lode

Southern Arizona

8. Dripping Spring Quartzite
9. Anderson Mine
10. Duranium Mine

PHYSIOGRAPHIC PROVINCES AND MAJOR URANIUM DISTRICTS IN ARIZONA

Figure I

[The stratigraphic nomenclature and age designations used in this chart do not necessarily follow the usage of the U.S. Geological Survey but follow the usage of authors who have described the several parts of the State. Terms in italics refer to informal rock stratigraphic units. Rock units known only in subsurface marked by asterisk (*). Arrows indicate known or possible wide range in age of named unit or that unit may be younger or older than indicated by position on chart.]

Geologic time units		Southeast (Includes Mexican Highland section)	Southwest (Includes Sonoran Desert section)	Central (Includes Tonto and Flagstaff sections)	Northwest (Includes Grand Canyon and Mohave sections)	Northeast (Includes Navajo section)
Cenozoic	Quaternary	*Alluvial deposits, basalt*	*Alluvial deposits, basalt*	*Alluvial deposits, basalt*	*Alluvial deposits, basalt*	*Alluvial deposits, basalt*
	Tertiary: Pliocene	Gila Conglomerate *	*Basin fill deposits*	Verde Formation, Gila Gr. *; Hickey Formation	Muddy Creek Formation *	Bidahochi Formation *
	Tertiary: Miocene	*Volcanics*	*Volcanics*	*Volcanics* * *	*Local volcanics and sediments* *	Chuska Sandstone
	Tertiary: Oligocene	Whitetail Cgl.--Pantano Fm. *	Helmet Fgl.--Locomotive Fgl.			
	Tertiary: Eocene					
	Tertiary: Paleocene					
Mesozoic		*Andesites and rhyolite*	*Andesites and rhyolite*	*Andesites*	*Andesites* *	
		Local sedimentary formations *				
	Cretaceous	Pinkard Formation (north)	*Locally named sedimentary, volcanic, and metamorphic rocks of poorly understood or unknown age relations*	*Local sedimentary rocks*		Mesaverde Group, Mancos Shale, Dakota Sandstone *
		Bisbee Group (south), *Local volcanics (south)* *				
	Jurassic	*Local volcanics* *			breccia pipes *	Morrison Fm., Bluff Sandstone, Summerville Fm., Todilto Limestone, Entrada Sandstone, Carmel Formation, Cow Springs Ss. *
					Carmel Formation	
					Navajo Sandstone	Navajo Sandstone *
	Triassic	*Local red beds*			Kayenta Formation, Moenave Formation	Kayenta Formation, Moenave Formation *
		Local volcanics			Chinle Formation, Moenkopi Formation *	Wingate Sandstone, Chinle Formation, Moenkopi Formation *
Paleozoic	Permian	Bainvalley Formation, Concha Limestone, Scherrer Formation, Epitaph Dolomite, Colina Limestone, Earp Formation	Concha Limestone, Scherrer Formation, Epitaph Dolomite, Colina Limestone, Earp Formation	Kaibab Limestone, Coconino Sandstone, Supai Formation *	Kaibab Limestone, Toroweap Formation, Coconino Sandstone, Hermit Shale, Supai Formation *	De Chelly Ss., Supai Fm., Cutler Fm., Rico Fm.*
	Carboniferous: Pennsylvanian	Horquilla Limestone, Black Prince Limestone (local)	Horquilla Limestone	Naco Formation	Callville Limestone	Hermosa Fm.*, Molas Fm.*
	Carboniferous: Mississippian	Paradise Formation (east), Escabrosa Limestone	Escabrosa Limestone	Escabrosa Ls. or Redwall Ls.	Redwall Limestone	Redwall Ls.*
	Devonian	Martin Formation	Martin Formation	Martin Formation	Temple Butte Limestone or Martin Formation	Ouray Ls.*, Elbert Fm.*
	Silurian					
	Ordovician	El Paso Limestone (east)			*Unnamed dolomite*	
	Cambrian	Abrigo Formation, Bolsa Quartzite	Abrigo Formation, Bolsa Quartzite	Tapeats Sandstone	Muav Limestone, Bright Angel Shale, Tapeats Sandstone	Tapeats(?) Ss.*
Precambrian	Late Precambrian	Troy Quartzite, Apache Group *	Apache Group	Troy Quartzite, Apache Group: *Basalt*, Mescal Limestone, Dripping Spring Qtzt., Pioneer Shale *	Chuar Group, Unkar Group: Nankoweap Formation, Bama Formation, Dox Sandstone, Shinumo Quartzite, Hakatai Shale, Bass Limestone, Hotauta Cgl.	
	Early Precambrian	Pinal Schist *	*Metamorphic rocks*	Mazatzal Quartzite, Yavapai Series: Alder Group / Ash Creek Group *	Brahma Schist, Vishnu Schist *	*Metamorphic rocks*

from Arizona Bureau of Mines Bulletin 180, (1969), p. 40-41.

* major producers for a region

* major occurrences, some with minor production

Figure 1A. Simplified stratigraphic correlation chart for Arizona. Included are approximate stratigraphic positions of important uranium deposits and occurrences.

COLORADO PLATEAU REGION

MORRISON FORMATION

In the Four Corners area the Morrison Formation of Upper Jurassic age is a regionally dominant source of uranium, with production from Utah, Colorado, and New Mexico far outweighing that of northeastern Arizona. The lowest member, the Salt Wash, is the sole source of Morrison ore in Arizona, while stratigraphically higher members, the Recapture, Westwater Canyon, and Brushy Basin, contain ores in the adjacent states. As well, these upper members contain volcanogenic beds which are hypothesized by some as uranium source beds.

For descriptions of Morrison Formation geology, see Mullens and Freeman (1957), Chenoweth and Malan (1975), and Galloway (1979). For uranium-related geology, refer to Masters (1955), Chenoweth (1955 and 1967), Stokes (1954), Wright (1955), and Dare (1961). For district maps, see DOE (ERDA) Preliminary Map No. 23.

Salt Wash Member ores in Apache County, Arizona supplied 815,100 tons of ore which contained 0.236% U_3O_8 (3,850,000 lbs) and 1.098% V_2O_5 (17,900,000 lbs) between 1948 and 1968. In addition, minor uranium was recovered from mill tailings from early Carrizo vanadium mine workings operated during 1942-1944. Total production from Salt Wash ores may be divided between the Lukachukai Mountains (724,800 tons of ore @ 0.24% U_3O_8 and 1.02% V_2O_5 in 1950-1968 from 53 properties) and the Carrizo Mountains to the north (90,300 tons of ore @ 0.20% U_3O_8 and 1.75% V_2O_5 in 1948-1966 from 71 properties.)

Radioactive ores in the Salt Wash Member of the eastern Carrizos were first mined in about 1920 and sent to Colorado for extraction of radium content. During 1942-1944 Salt Wash ores were mined in the Carrizos by the Vanadium Corporation of America and Wade, Curran and Company for vanadium and mining for uranium in these same deposits began in 1948. Mining continued in the Carrizos and Lukachukais until 1968. See Dare (1966) and Chenoweth (1980 a and b) for historical development of mining in the Carrizos and Lukachukais.

Studies of the Salt Wash Member by Craig and others (1951), Mullens and Freeman (1957), Masters (1955), and Peterson (1977) in Utah, Colorado, Arizona, and New Mexico indicate that these sediments were deposited by a proximal aggrading braided stream system on a massive alluvial fan and a more distal delta distributary system, the upstream apex of which was near what is today Lee's Ferry on the Colorado River. See Figure 2 for the fan geometry. Distributary channels in eastern Utah flowed generally northeasterly, while those in northeast Arizona and northwest New Mexico flowed easterly. In detail, the Salt Wash Member of northeast Arizona and northwest New Mexico is considered a separate eastern lobe of the main Salt Wash fan system of Utah and Colorado. The Lukachukais are near the thickest part of this lobe (Mullens and Freeman, 1957, Figure 4). Similarly, the Grants mineral belt is on the most southerly lobe of the Westwater Canyon fan system whose apex is somewhat south of Window Rock, Arizona (Galloway, 1979, Figure 2).

In northeast Arizona the Salt Wash beds, resting on a scoured surface cut on predominantly eolian Jurassic Bluff Sandstone (Figure 3), range in thickness

from 100-180 feet. They are overlain by about 400 feet of Recapture Member fluviatile beds. All Mesozoic units in northeast Arizona as young as Cretaceous Dakota Sandstone are involved in folding (see the district maps of this report) and are beveled and overlain by the non-folded Eocene (?) Chuska Sandstone of the Chuska and Lukachukai Mountains. The Salt Wash Member in Northeast Arizona consists mainly of lenticular, gently cross-bedded sandstones, with minor pebbly sandstones, mudstones and claystones as discontinuous partings between the sandstone beds. The units weather to resistant ledges and cliffs, and cap broad benches and mesas. Most beds are between 6 and 30 feet thick. Fossil logs are common, and fragmental carbonized plant debris forms seams along bedding planes, and finer fragmental material is disseminated through the sandstones.

Only sparce uranium-vanadium occurrences are known in northeastern Arizona in units directly above or below Salt Wash outcrops. In the Lukachukai Mountains, several sub-ore grade uranium occurrences are known from the overlying Recapture Member fluvial beds (Chenoweth, 1967, p. 82). And in the underlying Bluff Sandstone, Chenoweth and Fergusson (PRR ED:R-263, 1954) describe an interesting vanadium occurrence which lacks appreciable uranium. In a reentrant near the crest of the Rattlesnake anticline, a short distance east of the Sweetwater T.P. road, vanadium staining is found 10 feet above the base of the Bluff Ss in a horizonal showing, with darkest coloration following individual cross-bed laminations. Uranium assays are negative. Clearly, vanadium has migrated without attendant uranium.

Lukachukai Mountains

In the Lukachukai Mountains, uranium ore is most common in trough cross-stratified sandstone that fills scours and channels in under-lying mudstones. The ore bodies are elongate and lenticular, consisting of one or more pods surrounded and separated by protore. Ore trends parallel paleostream directions, but often trend along a locally prominent joint set, suggesting some remobilization of uranium minerals (Stokes 1954; Nestler and Chenoweth, 1958; Chenoweth, 1967; Chenoweth and Malan, 1975).

Ore bodies occur some 30-80 feet above the base of the Salt Wash Member. All of the significant deposits (99.6% of total Lukachukai production) are located in a well-defined belt which trends nearly north-south across the southeast end of the mountains (Chenoweth and Malan, 1975). They lie on the shallow-dipping southwest limb of the Chuska syncline and are confined to a favorable interbedded sandstone-mudstone facies of the Salt Wash (see enclosed Lukachukai district map).

Tyuyamunite, the most common uranium-vanadium mineral, is irregularly disseminated through sandstone beds, and is concentrated in lenses, or distributed in bands. It fills sandstone voids, coats sand grains, and replaces calcite and carbon. Some uraninite replaces carbonaceous matter and fills sandstone voids in some incompletely oxidized ore bodies. Hence, a question arises as to the nature of the originally precipitated uranium species. Are the tyuyamunite deposits to be viewed as alteration products of pre-existing uraninite deposits? Calcite is found as a cement in the sandstone ore bodies, and probably moved in with the uranium (Chenoweth and Malan, 1975). Limonite staining, halos, and bands are common in ore-grade material.

Figures 4, 5 and 6 show outline maps of the Lukachukai Mesas I - VI mines. Figures 7 and 8 portray outline maps of the Frank No. 1 and Camp mines, respectively, which are typical of Lukachukai mines.

Carrizo Mountains

The general aspect of the Carrizo Mountains uranium deposits is very similar to the Lukachukai deposits, with some notable variations. The ore horizons in the Salt Wash tend to be in lower parts of the unit toward the northwest from the Lukachukais, such that in the northwest Carrizos they are in the basal 40 feet of the unit (Chenoweth and Malan, 1975, table 2). The ore bodies tend to be smaller than in the Lukachukais, and they have vanadium-uranium ratios near 9:1, as compared with 4:1 ratios in the Lukachukais. Also, ore rolls are more common in the Carrizos.

The main mass of the Carrizos consists of a series of Laramide-aged laccoliths (68 m.y. on one unit, Armstrong, 1969) which have intruded rocks as young as the Dakota Sandstone. No obvious large-scale redistribution of Carrizo Salt Wash uranium ores are known to have taken place as a result of this heating event. And at the Zona mine in the northeastern Carrizos, intrusion of the sills fractured, faulted, and silicified typical Salt Wash ore horizons, providing the only evidence in Arizona that the uranium mineralization event is pre-Laramide in age (Chenoweth and Malan, 1975, p. 147).

Figures 9-15 are in the Carrizo Mountains area. Figures 9 and 10 depict the Tsitah (Saytah) Wash area with the Martin, Saytah, and George Simpson mines. Figures 11 and 12 show mines of the Rattlesnake group and the Hoskie Henry mine of the northwest Carrizos. Figures 13 and 14 show the Oak Springs and RF&R-Hazell-Valley View mines of the eastern Carrizos. Figures 15a and 15b cover the productive Cove Mesa area of the southern Carrizos.

Black Mesa

Salt Wash sediments are well exposed on the northeast flank of Black Mesa. Fourteen miles north of the Black Mountain uranium mines in the Toreva Formation, two properties located north of the Rough Rock Trading Post in the Salt Wash Member (Tom Wilson and Tom Klee, Apache County) shipped 123 tons of ore averaging 0.75% U_3O_8 and 0.03% V_2O_5 between 1951 and 1958 (DOE (AEC) Map No. 31, 1973). The Salt Wash Member here consists of about 130 feet of interbedded fine-grained gray to gray-brown sandstone and gray, green and reddish-brown siltstone and mudstone. Secondary uranium minerals are associated with carbonaceous fossil logs and other disseminated carbonized plant debris, in sandstone lenses 10 to 40 feet above the base of the Salt Wash Member (DOE Map No. 31 data). Abundant calcite crystals associated with the logs produced an average of 31% $CaCO_3$ in the ore shipments.

Morrison Mineralization - Timing and Source

The prevailing opinion on the time of uranium mineralization in the Morrison Formation in Arizona is that it was shortly after deposition of Salt Wash beds, perhaps still in Morrison time (F. Peterson, pers. comm., 1980) or perhaps during Cretaceous or Early Tertiary weathering and erosion marked by a pre-Dakota Sandstone or pre-Chuska Sandstone erosional unconformity (W. Chenoweth, pers. comm., 1980), but, at any rate, was pre-Laramide in age. Uranium series age dating of uranium ores in the Grants mineral belt by Brookins (GJBX 16-76 and 141-79 reports issued by DOE) indicate ages of mineralization of about 138 $\pm$ 10 m.y. at Ambrosia Lake, and 110-115 m.y. in the Jackpile-Paguate area. Authigenic montmorillonite from both these areas was dated at 145 $\pm$ 10 m.y. (last half of upper Jurassic), and may represent either the time of initial diagenesis of Morrison beds or time of ore deposition at Grants.

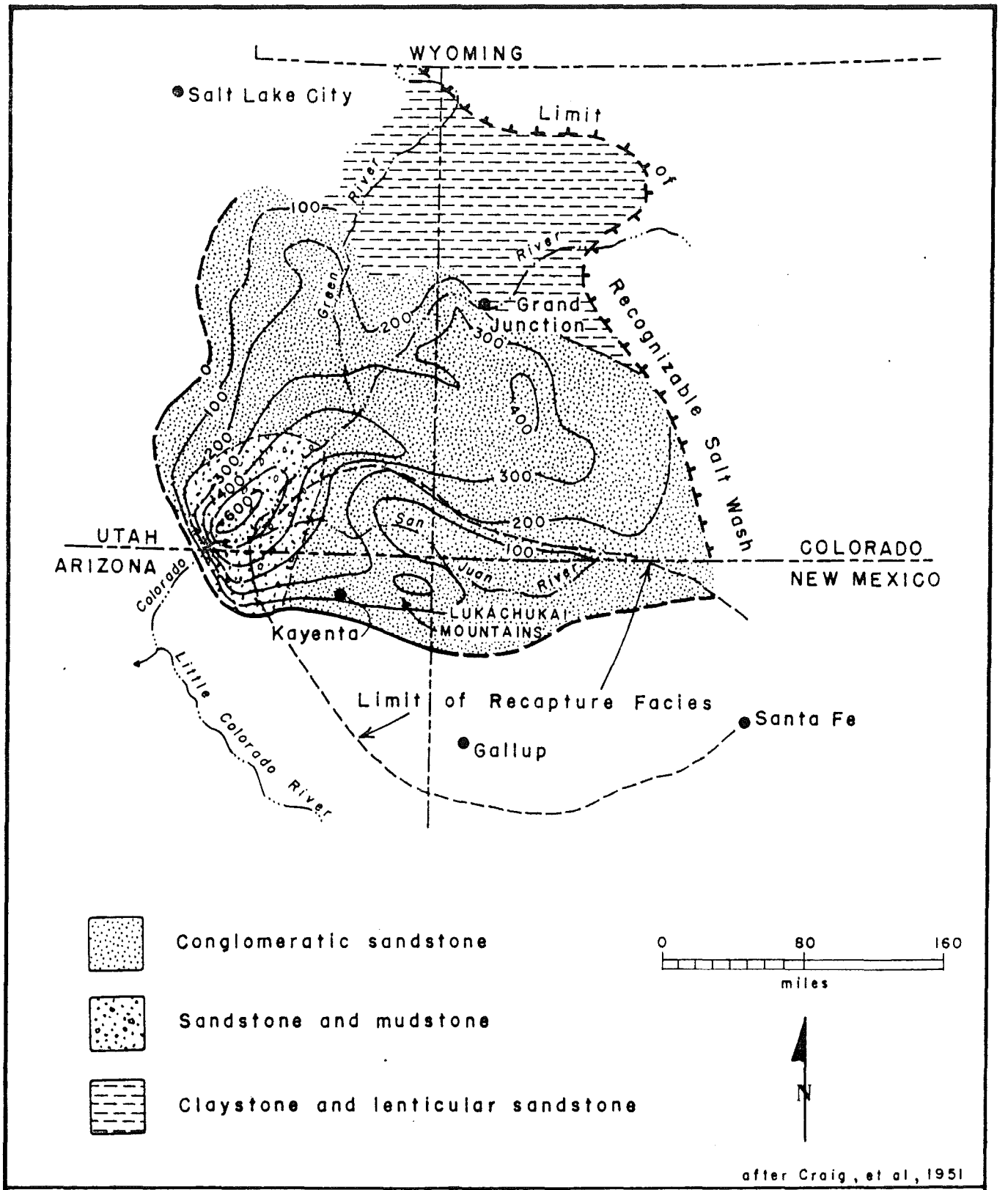
Uranium in the Salt Wash could have been derived from sources such as volcanic detritus in the overlying Brushy Basin Member during the pre-Chuska erosion in the area (Nestler and Chenoweth, 1958, p. 53). However, a more regional picture, assembled with the help of plate tectonic theory, indicates the existence of a volcanic arc starting in late Permian time along the west coast of North and South America, temporally related to the formation of the modern Atlantic Ocean. This arc volcanism is the most probable source of volcanic debris and ash beds of the Mesozoic sediments of the Colorado Plateau, and is probably tied in with the tectonics which formed the "Mogollon highlands" of southwest Arizona and points west (Malan, 1968; Repenning and others 1969; Hamilton, 1978). Hence a model for Salt Wash mineralization is volcanogenic sources in the Mogollon highlands supplying uranium-vanadium-copper species for surface or underground aqueous transport downslope to areas of sedimentation where appropriate geochemical conditions caused precipitation. However, it is still not clear how the stratabound uranium-vanadium mineralization of the Salt Wash relates to mineralization of uranium-copper in the Plateau breccia pipes. Perhaps the pipes may be viewed as conduits or local sinks which trapped copper and some uranium while vanadium, most uranium, and many other elements continued to migrate eastward and northward onto today's Colorado Plateau where reduction and precipitation took place under appropriate conditions. The southern Utah uranium-copper association in some Shinarump paleochannels may be viewed as a hybrid case where ore-grade copper occurs in the sedimentary environment. Silver, et al. (1980) suggest the presence of a regional uranium anomaly in the Precambrian basement beneath the Colorado Plateau, based on uranium content of zircons extracted from igneous rocks. However, it is not clear how this basement anomaly may explain the numerous large-scale stratabound uranium deposits found at the top of the preserved Mesozoic units some distance above the basement.

Potential

Some potential remains for uranium in the Salt Wash Member in northeast Arizona. Ore deposits were located in the 1950's by exploiting mineralized outcrops, first by "gophering", and later by drilling behind the outcrops. Hence, all major mines are located very near cliffs exposing Salt Wash strata. Many of these cliffs are along stream valleys that dissect middle limbs of monoclines or steeper limbs of anticlines.

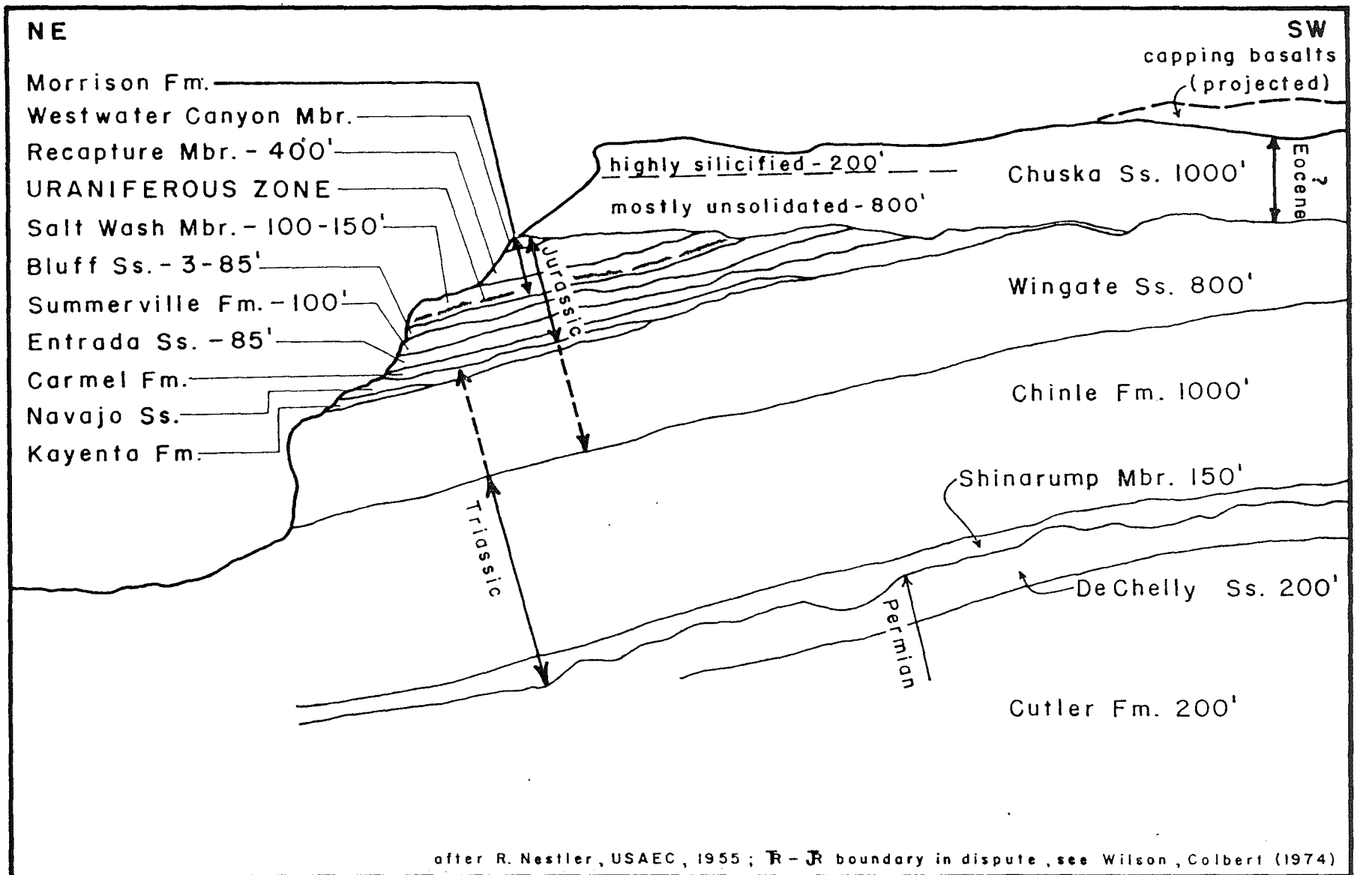
Future exploration must probably take one of two forms. First, reevaluation of the old mines could be undertaken by careful mine mapping and drilling, being careful to take note of the known ore trends in the area (see individual mine maps). Secondly, exploratory drilling on an arbitrary grid around old mines could prove successful. The Block K and George Simpson "1B" Mines of the northwest Carrizos and some of the Cove Mesa Mines (southern Carrizos), among others, were discovered in this fashion. The Block K Mine was discovered by a single AEC drillhole placed through valley fill which buries the north limb of the Toh Atin anticline. Since most of the Salt Wash mines of the northwest Carrizos were near the crest of this structure, and since the productive Rattlesnake Mine group (Figure 11) was north of the fold crest near the edge of onlap of valley fill, the AEC decided to test the Salt Wash to the north where it was buried. Block K resulted. The George Simpson "1B" Mine was discovered by a drilling program on the Mesa top due west of the old Martin Mine. That area was chosen because an east-west Salt Wash ore trend was thought to exist in the Martin. Mineralized Salt Wash was encountered in the

drilling and, during access tunneling driven from the Martin workings, an additional ore pod was discovered half way between the two areas. Similarly, George Simpson explored near the old Saytah Mine, just south of the Martin, and discovered additional ore nearby which was mined by the George Simpson "1A" and Incline Mines (Figure 10). Certainly, other situations similar to these still remain in the Carrizo and Lukachukai Mountains. The Salt Wash Member exposed around Black Mesa has been thoroughly explored with only three areas of mineralization noted, the Tom Wilson and Tom Klee shipments from north of Rough Rock Trading Post; the poorly located Blue Lake claim farther north; and one unrecorded occurrence somewhere around Kayenta (W. Chenoweth, pers.comm.,1981). The sparcity of Salt Wash mineralization in this southwest region may relate to a less favorable paleoenvironmental setting recorded as thinner individual sandstone beds and more dominant mudstone-siltstone lithologies as compared with the Carrizo-Lukachukai area. However, the mineralized logs in Salt Wash strata at Tom Wilson and Tom Klee indicate uranium moved through the strata, at least in the northeast Black Mesa region.



Isopach and Facies Map of Salt Wash Member, Morrison Formation, Utah, Colorado, Arizona, New Mexico

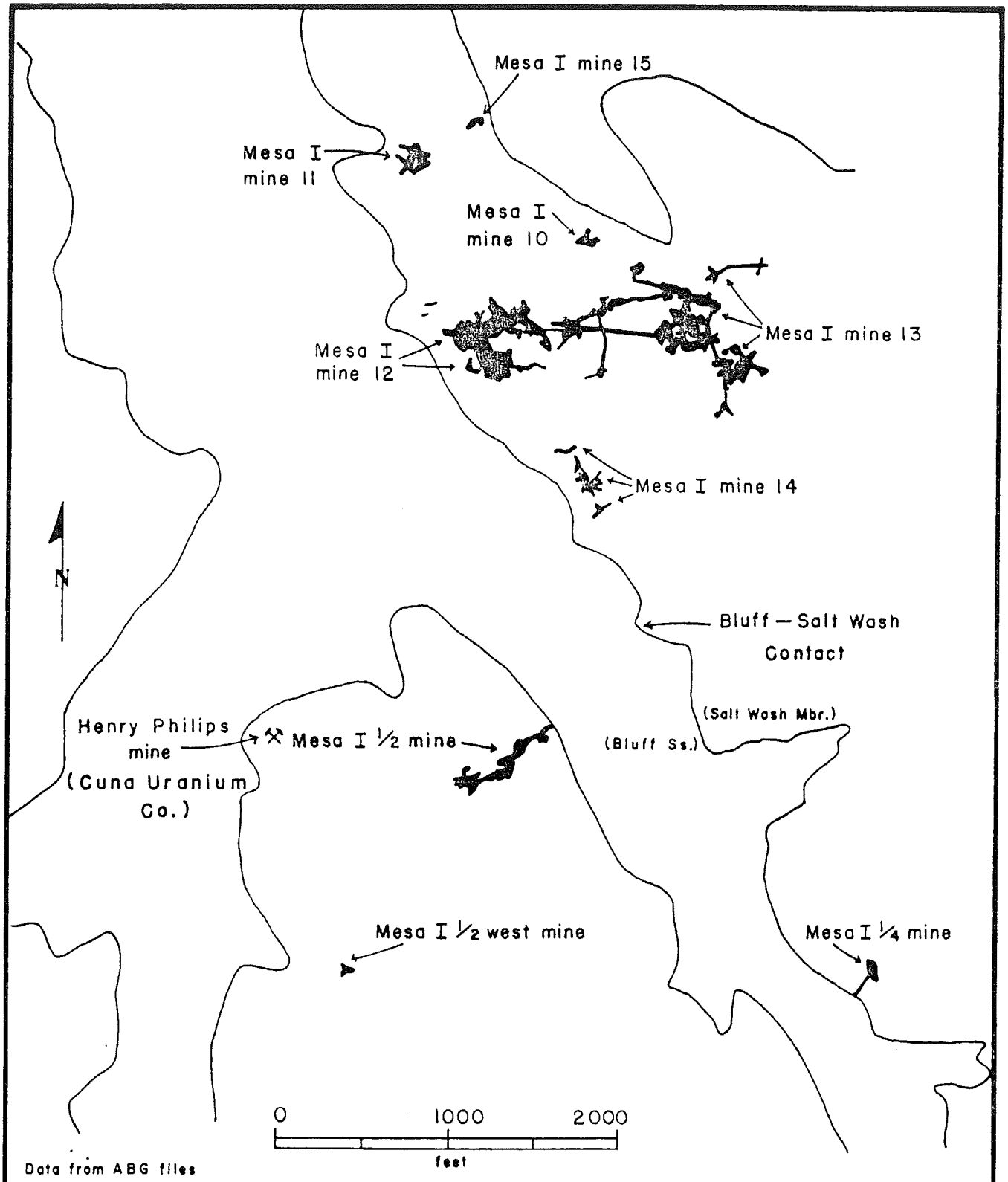
Figure 2



after R. Nestler, USAEC, 1955; TR – JR boundary in dispute, see Wilson, Colbert (1974)

Generalized Geologic Cross Section across the Lukachukai Syncline, Lukachukai Mountains, Apache County

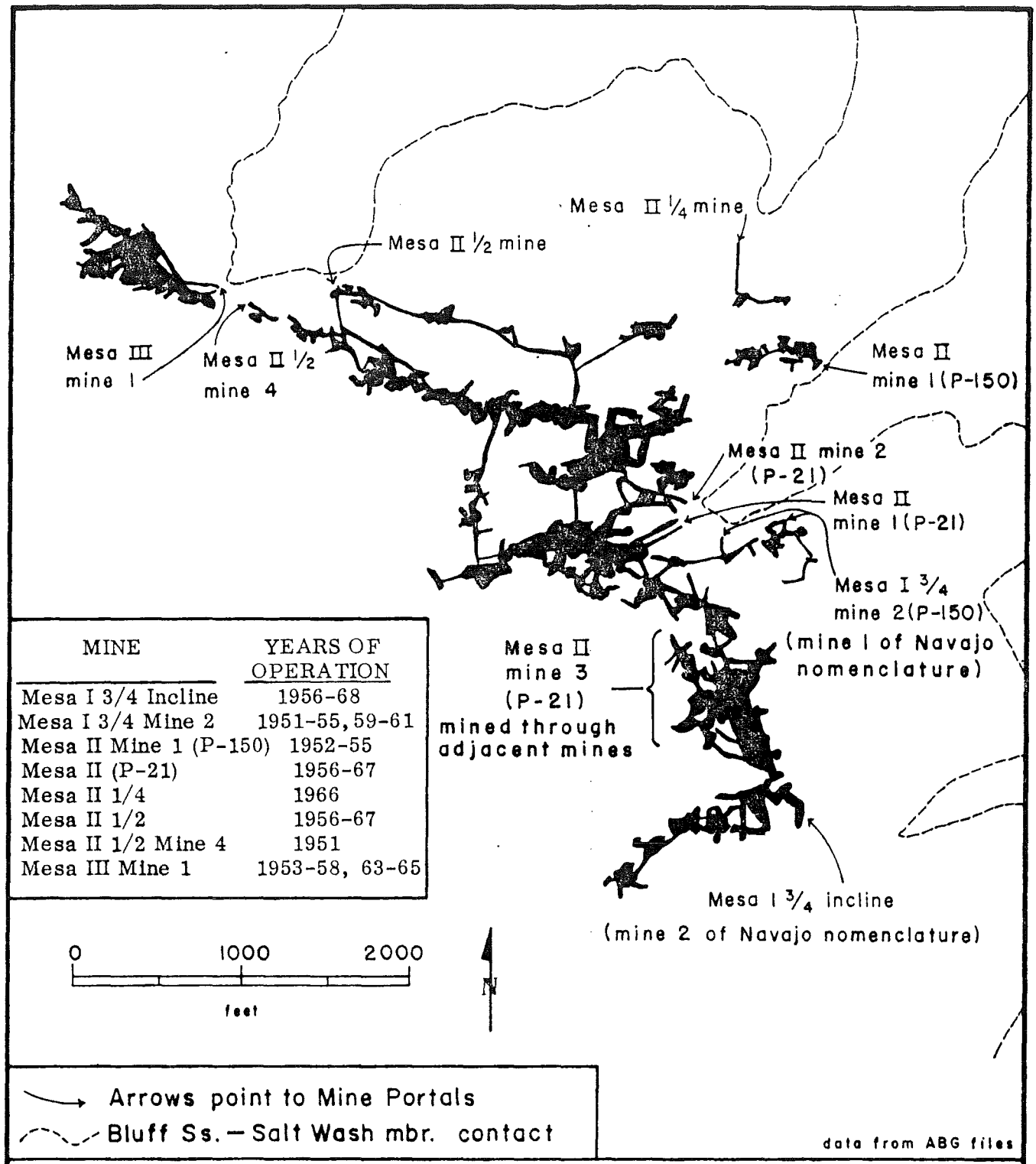
Figure 3



Kerr — McGee (Later VCA) Mesa I, I ½, I ¼ Mines

Lukachukai Mountains, Apache County

Figure 4

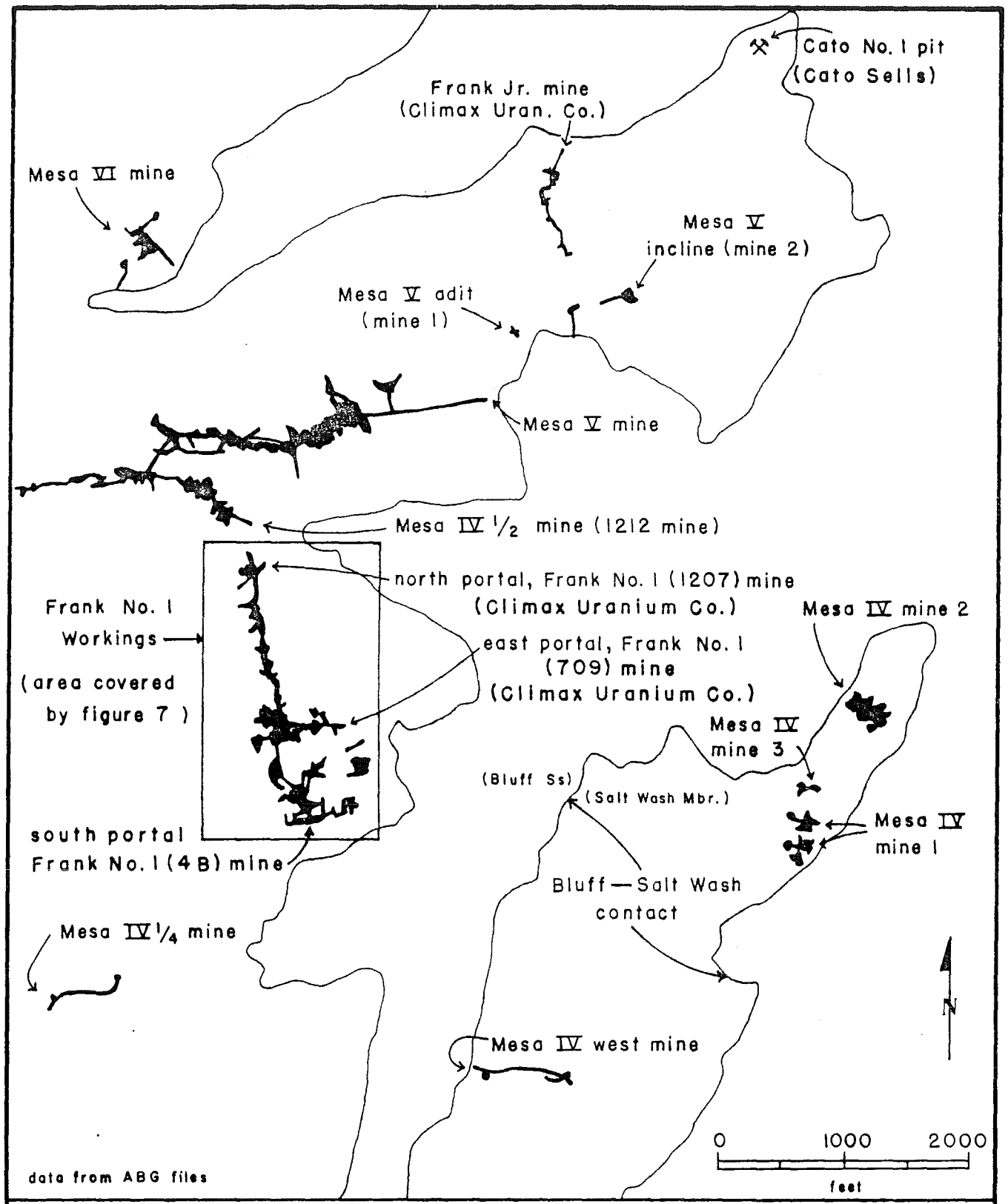


MINE	YEARS OF OPERATION
Mesa I 3/4 Incline	1956-68
Mesa I 3/4 Mine 2	1951-55, 59-61
Mesa II Mine 1 (P-150)	1952-55
Mesa II (P-21)	1956-67
Mesa II 1/4	1966
Mesa II 1/2	1956-67
Mesa II 1/2 Mine 4	1951
Mesa III Mine 1	1953-58, 63-65

Kerr-McGee (Later VCA) Mines, Mesa I¾, II, II½, III

Lukachukai Mountains, Apache County

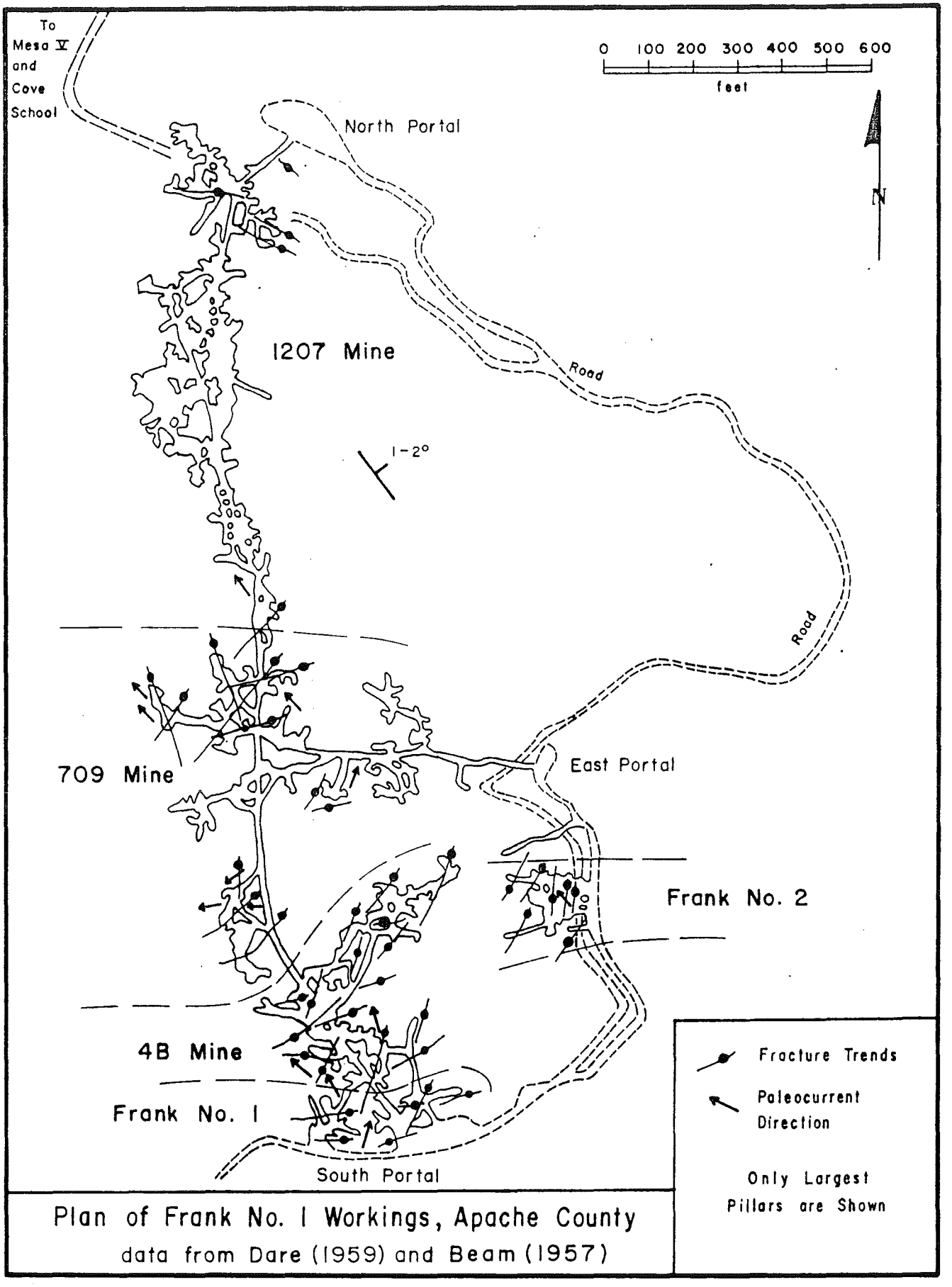
Figure 5



Kerr—McGee (Later VCA) Mesa IV, IV 1/4, IV 1/2, V and VI Mines

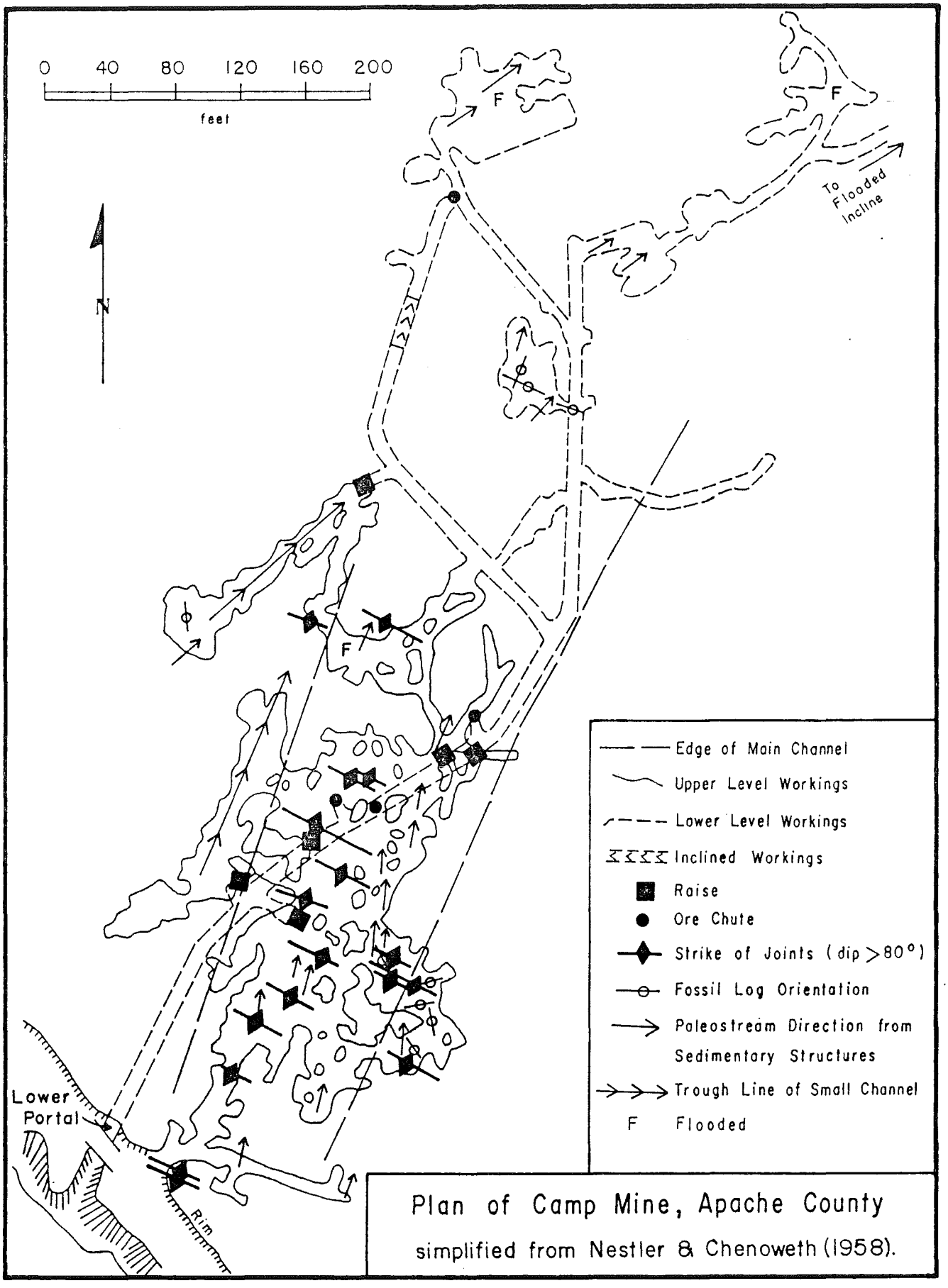
Lukachukai Mountains, Apache County

Figure 6



Plan of Frank No. 1 Workings, Apache County
data from Dare (1959) and Beam (1957)

Figure 7



Plan of Camp Mine, Apache County
simplified from Nestler & Chenoweth (1958).

Figure 8

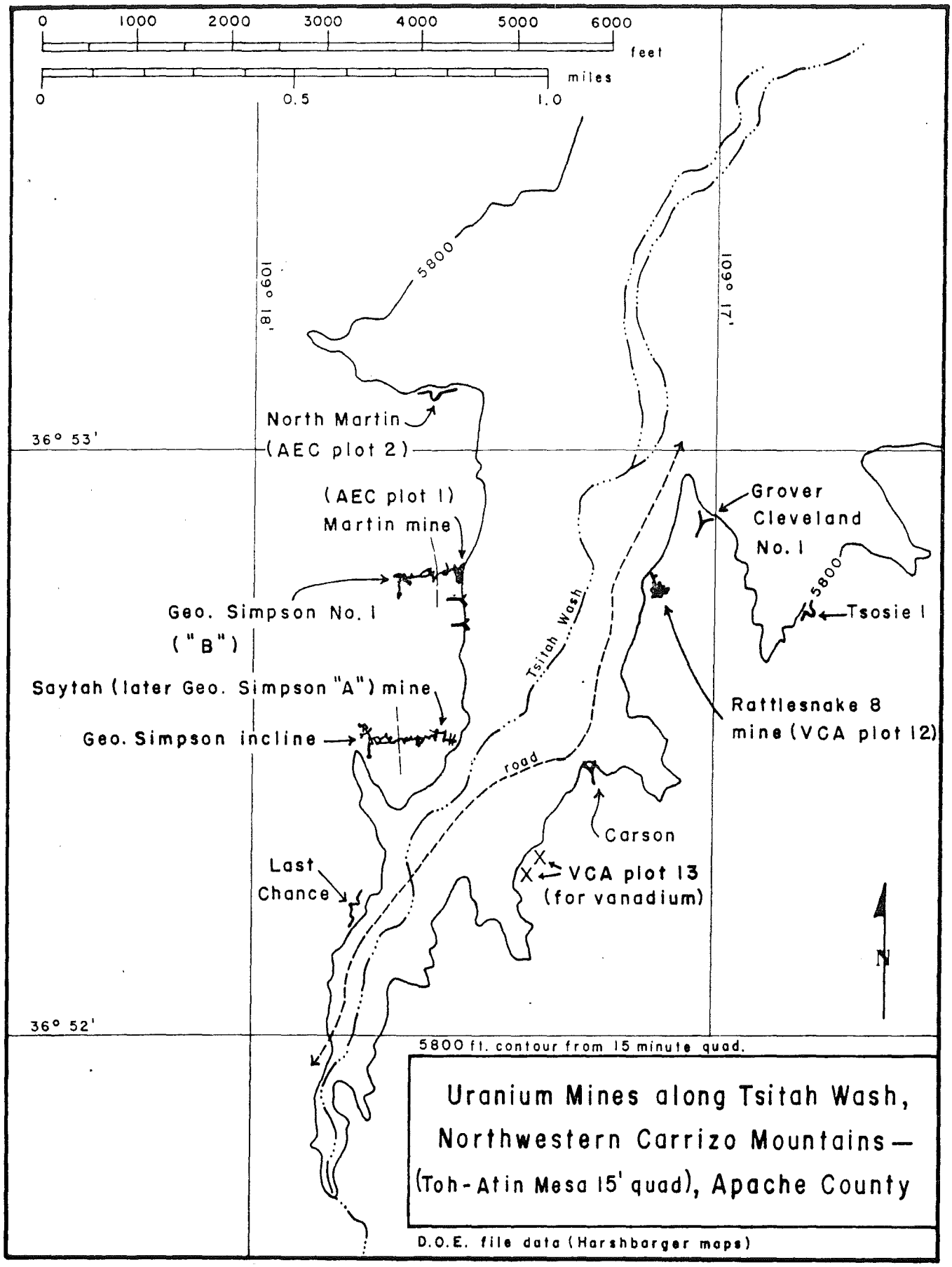
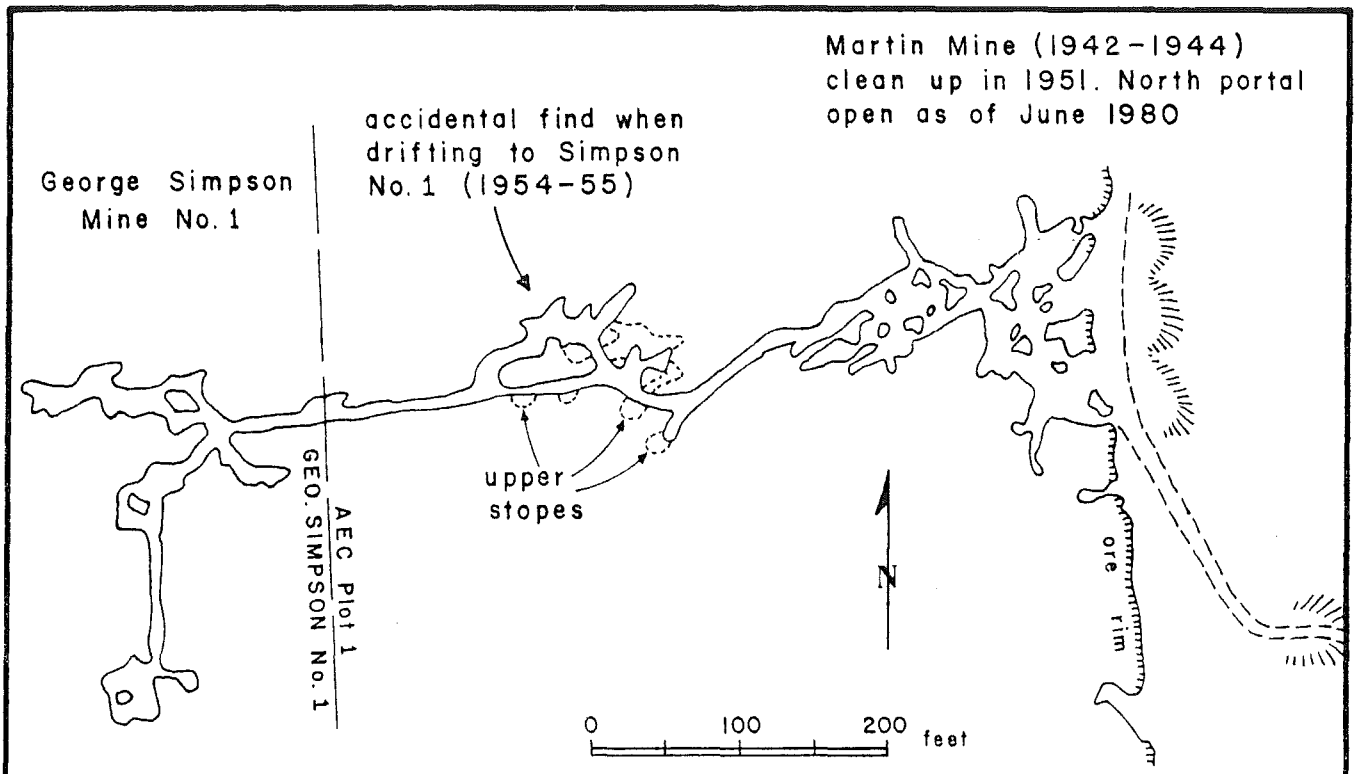
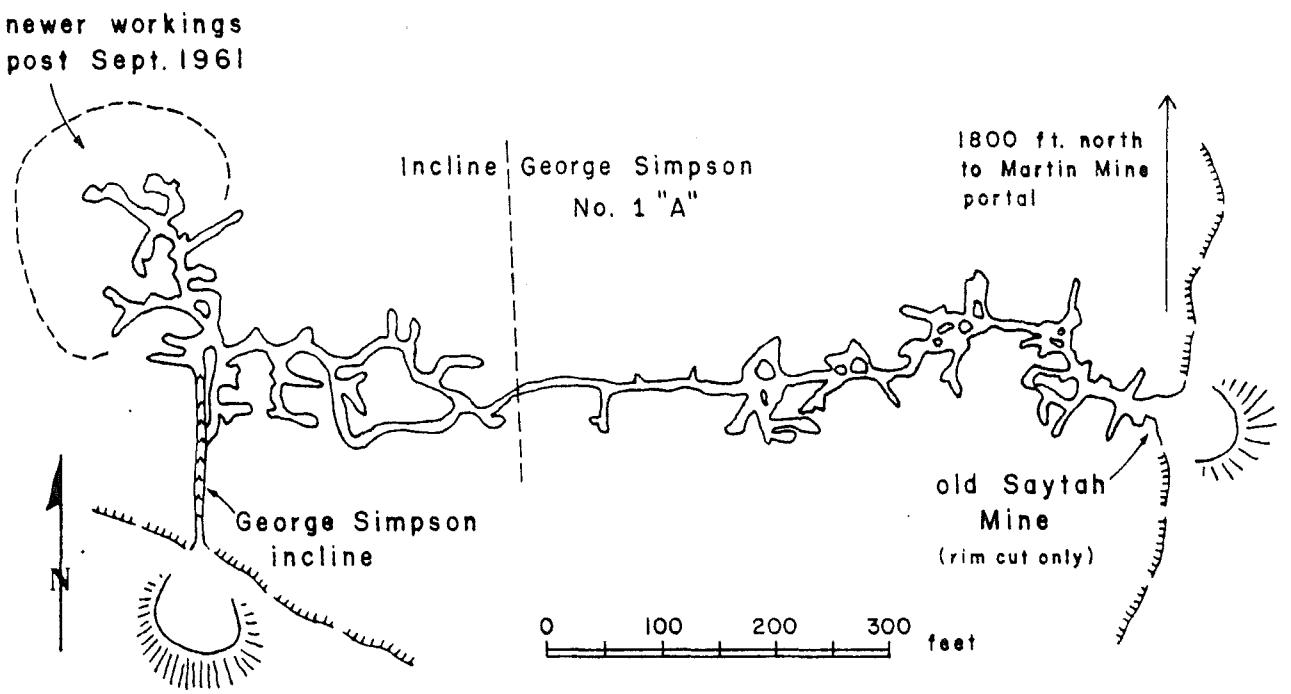

0 1000 2000 3000 4000 5000 6000
feet
miles
0 0.5 1.0
5800
109° 18'
109° 17'
36° 53'
36° 52'
North Martin
(AEC plot 2)
(AEC plot 1)
Martin mine
Geo. Simpson No. 1
("B")
Saytah (later Geo. Simpson "A") mine
Geo. Simpson incline
Tsitah Wash
road
Grover
Cleveland
No. 1
5800
Tsosie 1
Rattlesnake 8
mine (VCA plot 12)
Carson
VCA plot 13
(for vanadium)
Last
Chance
N
5800 ft. contour from 15 minute quad.
Uranium Mines along Tsitah Wash,
Northwestern Carrizo Mountains—
(Toh-Atin Mesa 15' quad), Apache County
D.O.E. file data (Harshbarger maps)

Figure 9



Mine Map — Martin (AEC Plot No. 1) & George Simpson No. 1 "B"
as of 1961

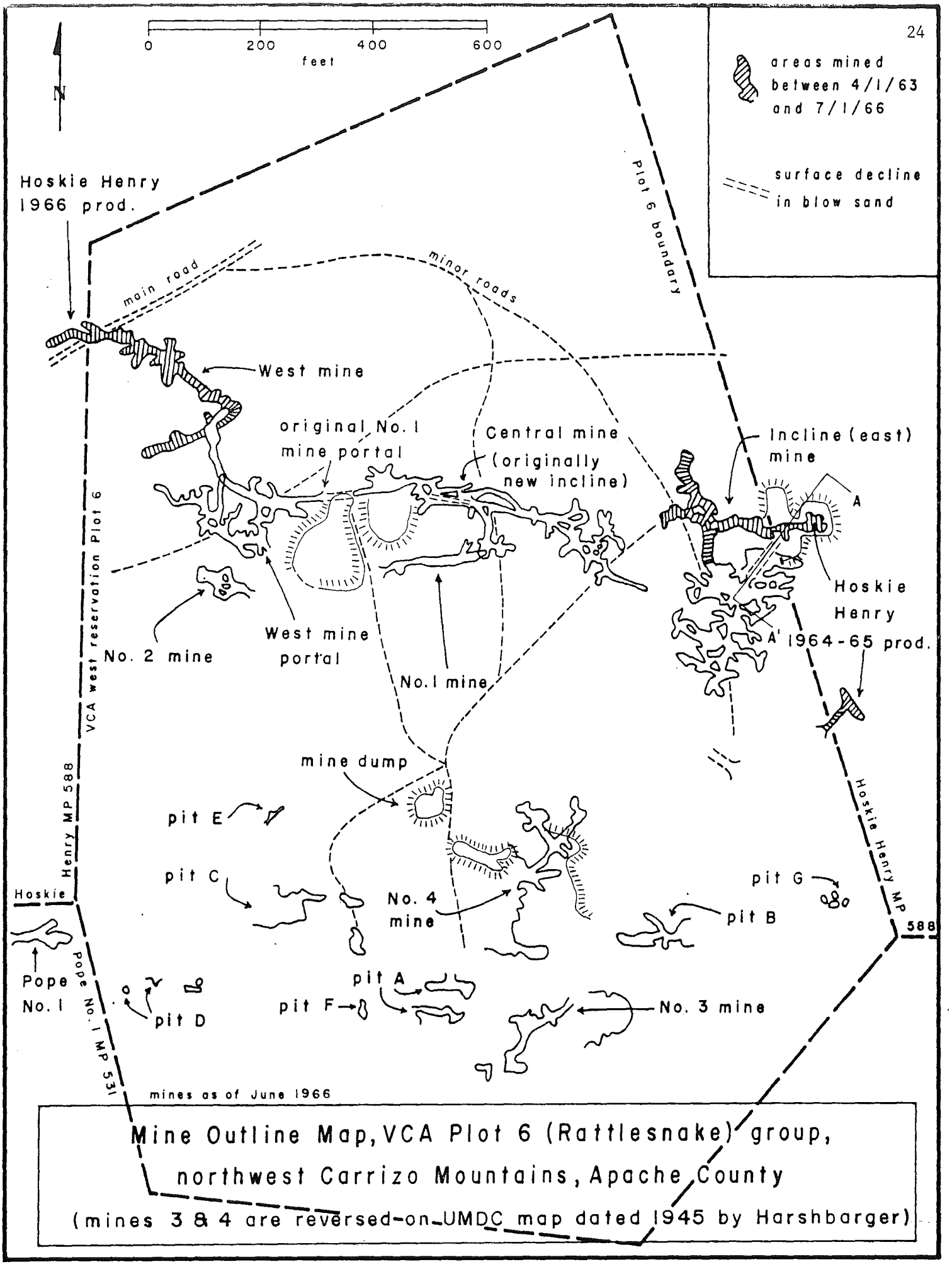
Data from DOE files



Mine Map — Saytah & George Simpson Incline and No. 1 "A"
as of Jan. 1962

Data from DOE files

Figure 10



Mine Outline Map, VCA Plot 6 (Rattlesnake) group, northwest Carrizo Mountains, Apache County

(mines 3 & 4 are reversed on UMDC map dated 1945 by Harshbarger)

Figure 11

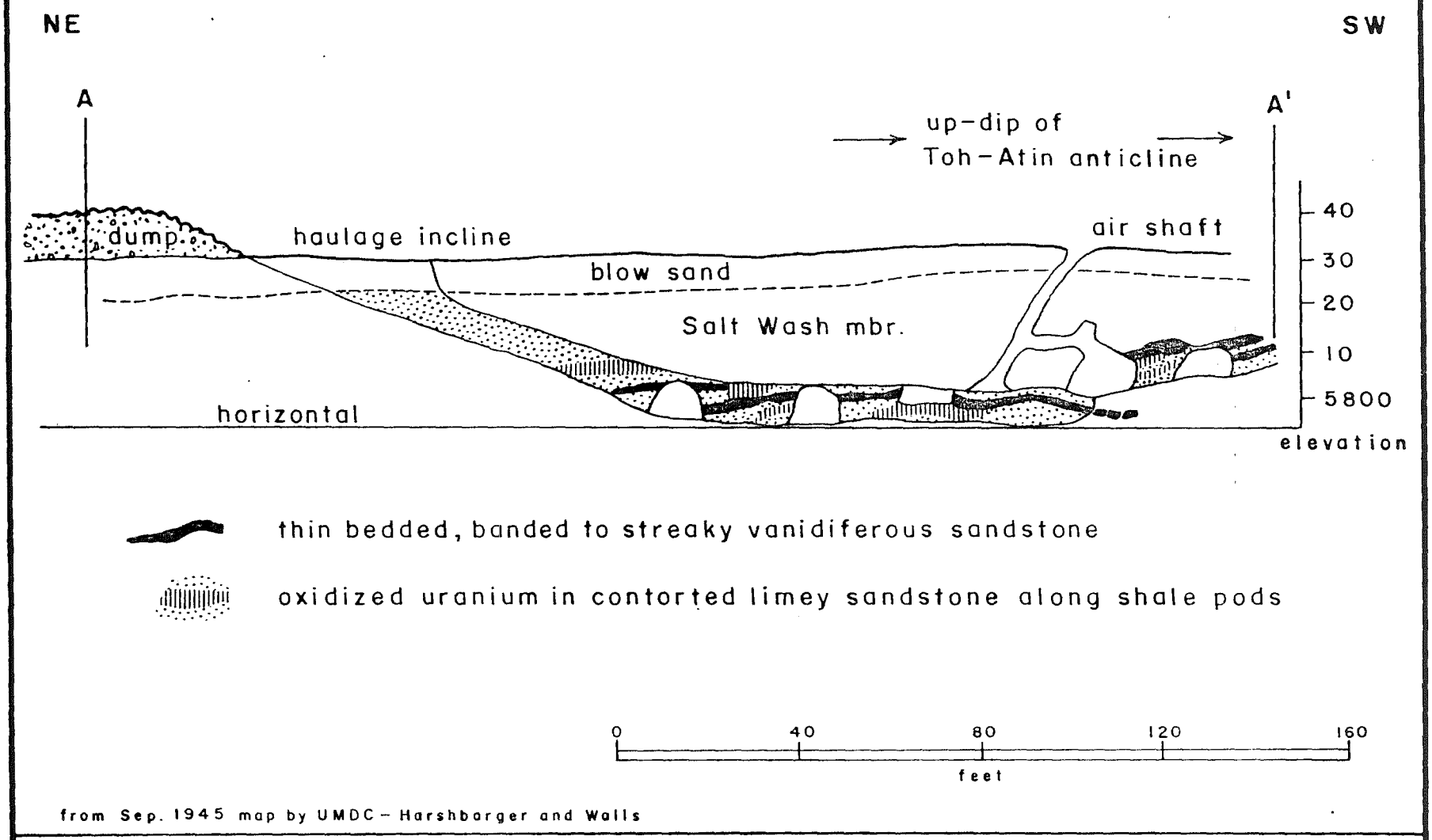
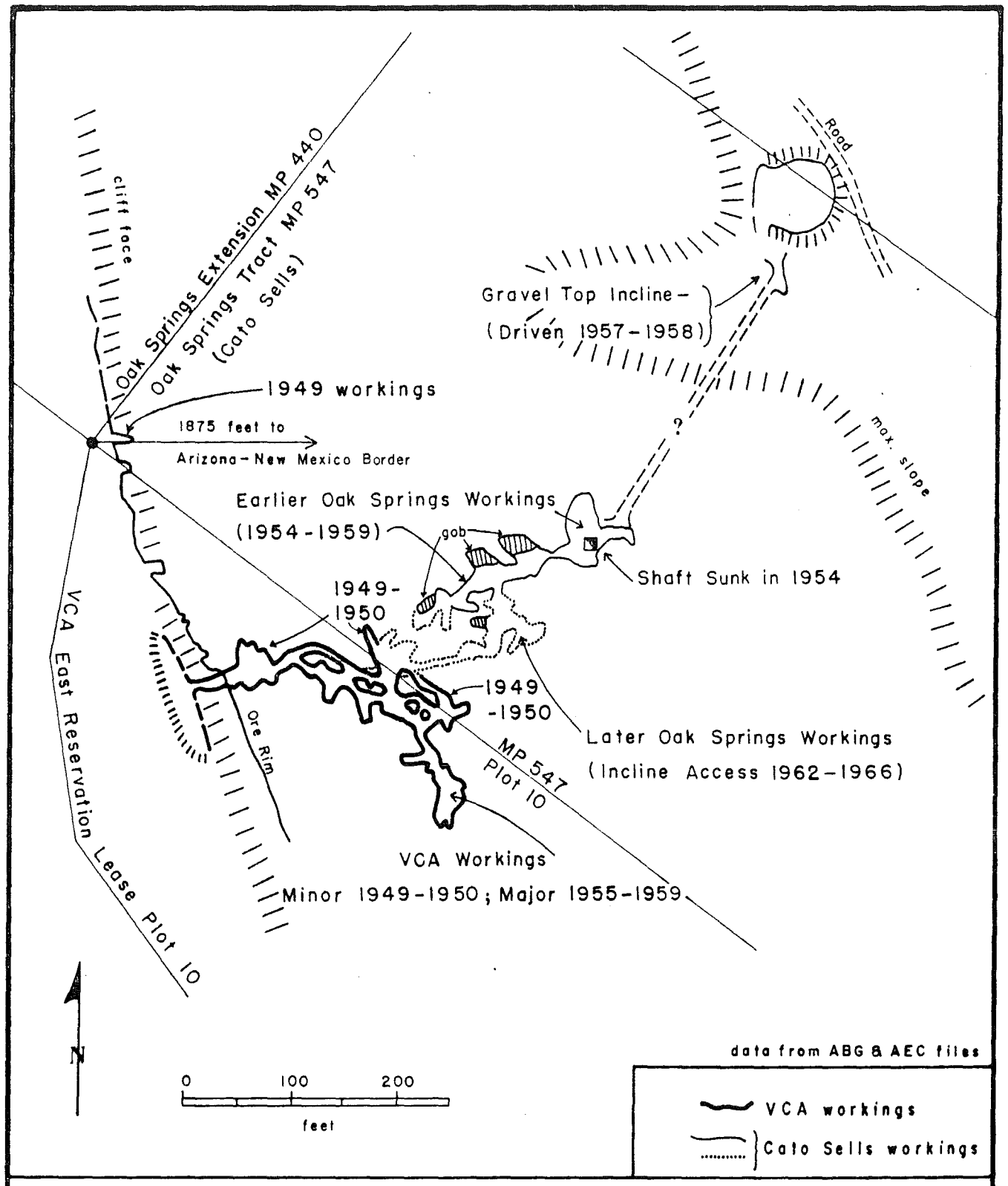


Figure 12

Cross section of Rattlesnake incline (east) Mine

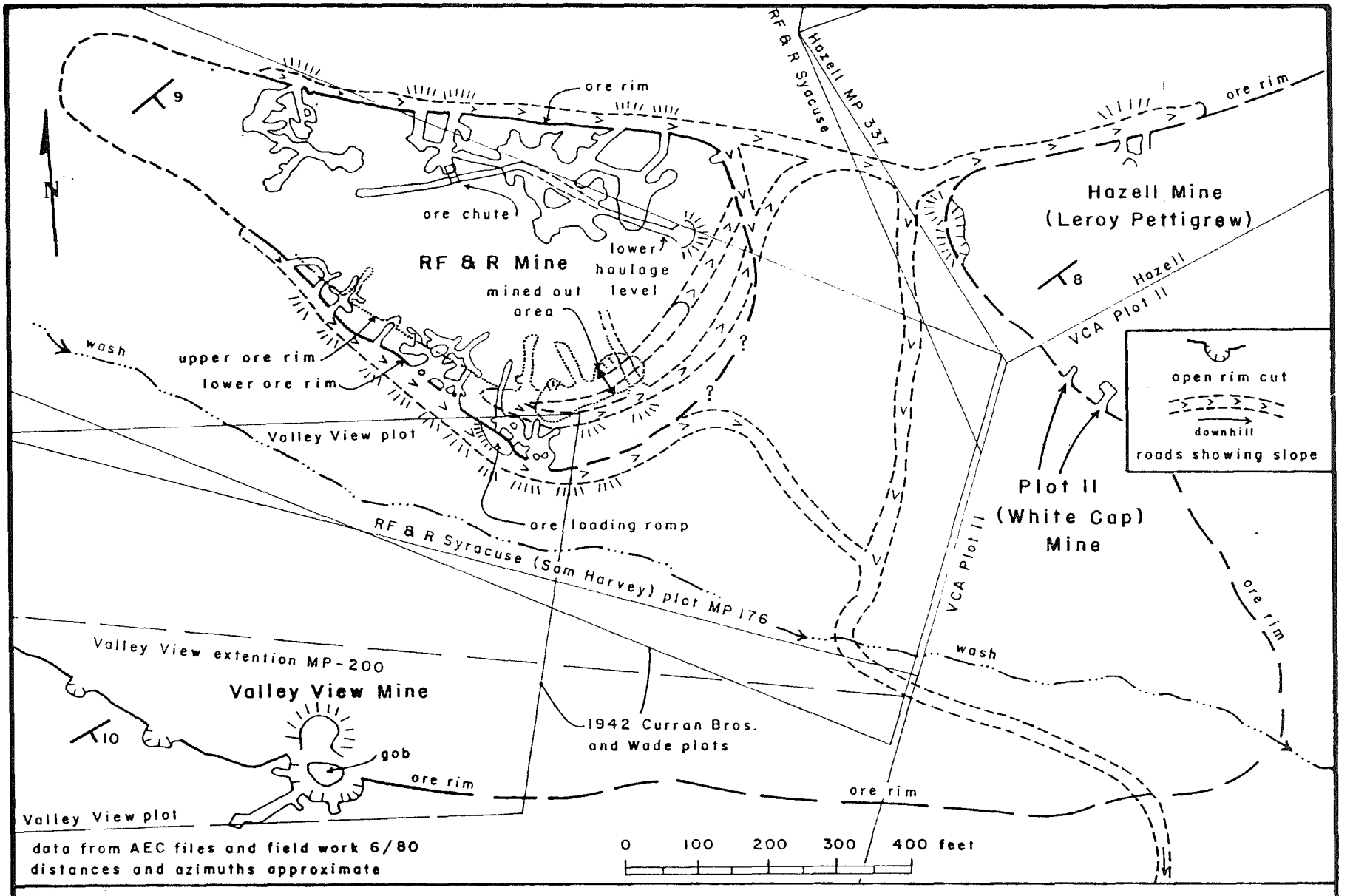
(VCA west reservation plot), Carrizo Mountains, Apache County



Oak Springs (Gravel Top) — VCA East Reservation Plot 10

Composite Map, Carrizo Mountains, Apache County

Figure 13



Composite sketch map of RF & R (Syracuse) Mine, VCA Plot II, Hazell Mine and Valley View Mine, east Carrizo Mountains, Apache County

Figure 14

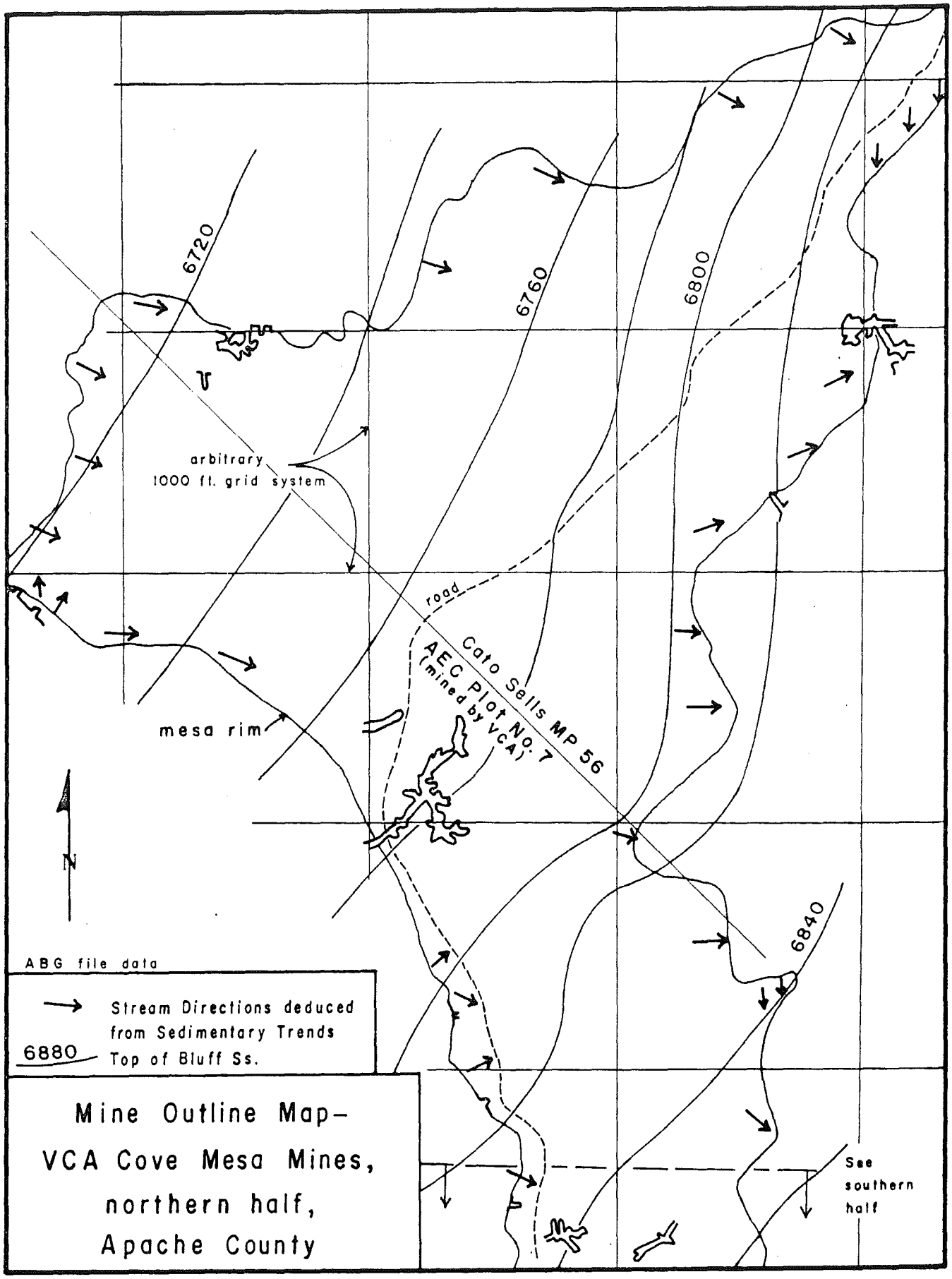

6720
6760
6800
6840
arbitrary
1000 ft. grid system
road
Cato Sells MP 56
AEC Plot No. 7
(mined by VCA)
mesa rim
N
ABG file data
Stream Directions deduced
from Sedimentary Trends
6880
Top of Bluff Ss.
Mine Outline Map-
VCA Cove Mesa Mines,
northern half,
Apache County
See
southern
half

Figure 15a

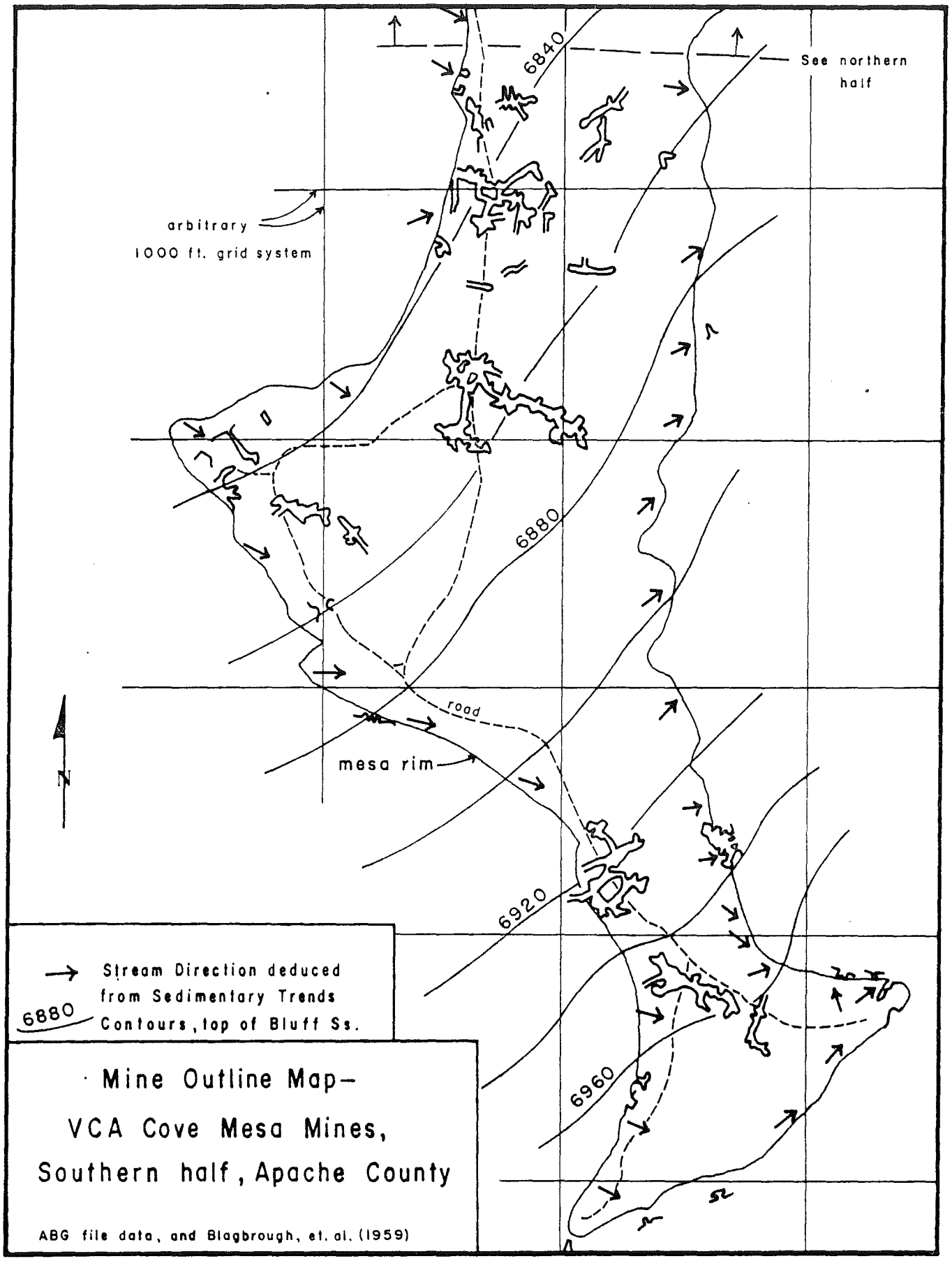

6840
See northern half
arbitrary
1000 ft. grid system
6880
road
mesa rim
N
6920
6960
Stream Direction deduced from Sedimentary Trends
6880
Contours, top of Bluff Ss.
Mine Outline Map–
VCA Cove Mesa Mines,
Southern half, Apache County
ABG file data, and Blagbrough, et. al. (1959)

Figure 15b

CHINLE FORMATION

Monument Valley

Uranium was first noted in the Monument Valley region by Gregory (1917) in an area which was later to become Arizona's largest mined uranium deposit, the Monument No. 2 mine. Mining by the Vanadium Corporation of America during 1942-1944 for vanadium was superseded in 1948 by uranium recovery.

Monument Valley uranium ores are found predominantly in paleochannels of the Shinarump Member of the Upper Triassic Chinle Formation, and to a much lesser extent in the underlying Meoenkopi Formation. Shinarump channels were cut into the Triassic Moenkopi and Permian DeChelly Sandstone and filled with muds, sands, and gravels, now represented by 10-250 feet of resistant ledges which cap many of the prominant mesas and buttes of the region. About 800-950 feet of overlying soft Chinle shales have been removed by later erosion of the north-south elongate Monument Upwarp, of which Arizona's Monument Valley is the southernmost flank. (See Mitcham and Evensen, 1955, Figure 1.)

Total production figures from 73 Monument Valley properties indicate the mining of 1,322,000 tons of ore averaging 0.33% U_3O_8 (8,670,000 lbs) and 0.92% V_2O_5 (24,361,400 lbs) between 1948 and 1969. During 4 years, 1953, 1954, 1958, and 1959, the amount of U_3O_8 from the district exceeded 750,000 lbs/year. Much allied production came from equivalent Shinarump paleochannels (Figure 6) in adjacent Utah.

Monument Valley uranium occurrences are discussed by Mitcham and Evensen (1955), Finnell (1957), Evensen and Gray (1958), Witkind (1961), Witkind and Thaden (1963), Young (1964), Malan (1968), and Chenoweth and Malan (1973).

Uranium ores have been mined from the lower parts of the Shinarump channels, especially from scours where the channels are cut especially deep into underlying sediments. The Monument Valley Shinarump channels are filled mostly with pebble conglomerates and sands with abundant woody plant trash and fossil logs. They commonly contain only one ore-bearing scour. In a few mines ore extends beneath the scour bottoms as much as 15 feet into underlying beds. Ore bodies tend to be cigar-shaped and horizontal, parallel to the main channel trend. Length to width ratios vary from 5:1 to 50:1 (Chenoweth and Malan, 1973).

The deposits contain variable amounts of vanadium and copper. V_2O_5 grades range from 0.2 to 0.9% and copper ranges from 0.2 to 2.5%. There is a tendency for vanadium contents to decrease and copper contents to increase from east to west. Further, calcium carbonate is present in the ores as cementing material in sandstone host rock, ranging in content from 1.4 to 10.3%. There is an inverse relationship between calcium carbonate and vanadium contents, but no relationship is apparent between calcium carbonate and copper (Chenoweth and Malan, 1973).

Mitcham and Evensen (1955) list 27 guides to ore positions in Monument Valley Shinarump channels. They suggest that the best ores are confined to low scours, or are found at or downstream of meander bends in channels. Regional structures may influence ores in so far as the lower portions of limbs of regional anticlines and monoclines are more likely to contain ore deposits than higher portions.

Example - Monument No. 2 Mine

Production from this mine started as several different underground-open pit operations, several of which eventually merged, as seen in Figure 17, into a single open pit. Between 1948 and 1967, mines of this group are credited with 767,000 tons of ore averaging 0.34% U_3O_8 and 1.42% V_2O_5 with very low copper values. This makes the Monument No. 2 mine, with about 5.2 million lbs of U_3O_8, the largest uranium mine in Arizona to date. The overall V_2O_5:U_3O_8 ratio is slightly greater than 4:1.

The Monument No. 2 Shinarump paleochannel scour extends for at least 2 miles in a north-south direction within a wider depression or scour about 50 feet deep cut into underlying Moenkopi and DeChelly units. A narrow, inner scour is another 30 feet deep and 700 feet wide. Drilling along scour projections to the north and south indicates the paleochannel does not exist because of post-Shinarump erosion.

The best Monument No. 2 ores are in typical "cigars" or "rods" up to 8 feet in diameter and 100 feet long. Ore is both unoxidized (uraninite, coffinite, montrosite, corvisite, minor iron-copper sulfides, etc.) and oxidized (tyuyamunite, carnotite, hewettite, navajoite, etc.) types which impregnate sandstone voids, replace quartz grains, clay particles and abundant fossil plant debris, and fill vertical fractures which extend beneath the scour base. This latter observation led Finnell (1957) to suggest a hydrothermal source for the ores which rose from depths along en echelon fractures produced in Laramide time. Most other workers, however, subscribe to the groundwater-style ore emplacement hypothesis that envisions movement of ore solutions along Shinarump channelways during the Mesozoic, prior to erosional removal of much of the Shinarump.

Production from the mine was enchanced between 1955 and 1964 by a mechanical ore upgrader situated near the mine which separated a higher grade mud product (0.24% U_3O_8 and 2.6% V_2O_5) from lower grade sands (0.02% U_3O_8, 0.18% V_2O_5) that were discarded. Additional ore was recovered in 1964-67 by heap leaching of the sand residue and some low grade ores.

Cameron-Holbrook Region

Uranium production from 99 properties around Cameron, Coconino County, from the lower part of the Chinle Formation of Triassic age accounts for about 295,100 tons of ore averaging 0.21% U_3O_8 and 0.03% V_2O_5, mostly between 1954 and 1963. This total includes twenty properties in thin sandstone beds in the Chinle Fm. just north of Holbrook, which are credited with 2685 tons of ore (1% of the Cameron total) averaging 0.149% U_3O_8 and at least 0.14% V_2O_5 between 1953 and 1960. This total makes the Cameron region and 4th largest uranium production district in Arizona.

Most of the ores of the Cameron area have been produced from the Chinle Formation, although initial discovery and first production from the area (both in 1950) came from the Ward Terrace (Hosteen Nez) property in the stratigraphically higher Kayenta Formation. Two mines in lower Kayenta beds (Ward Terrace and Yellow Jeep) in the Cameron area produced 182 tons of ore averaging about

0.15% U_3O_8 and about 0.40% V_2O_5 between 1950 and 1957. In the Cameron area, sixty-seven mines in the lower part of the Petrified Forest Member yielded 1,177,500 lbs of U_3O_8, while 27 deposits in the underlying sandstone and siltstone member account for about 62,500 lbs. of U_3O_8 production (Chenoweth and Malan, 1975).

For general references on the Cameron area, see Wright (1955), Bollin and Kerr (1958), Austin (1964), Repenning, Cooley, and Akers (1969), Chenoweth and Malan (1975), Spirakis (1980), and AEC Preliminary Map No. 20.

Repenning, Cooley, and Akers (1969) divide the Chinle Formation around Cameron into (in ascending order) the Shinarump, sandstone and siltstone, Petrified Forest, and Owl Rock Members. The uraniferous units around Cameron are the lower part of the Petrified Forest Member and, to a minor extent, the sandstone and siltstone member (Chenoweth and Malan, 1973). The exact stratigraphic context of the Holbrook area uranium mines is not known, although the mines are in strata above the Shinarump, and beneath the Sonsela Sandstone.

The Petrified Forest ores are within elongate fluvial channelways filled with fine-to medium-grained sandstones containing reworked clay pellets, carbonaceous matter, and silicified-carbonized fossil logs occasionally reaching lengths of 50 feet or more. Ore consists chiefly of secondary uranium-vanadium minerals filling pore spaces in the sandstones and in fossil logs. Within the channelways, the ore tends to occur in abrupt depressions of the channel bottom or at meander bends, and tends to associate with carbonaceous layers. Most ore bodies are encased in an alteration halo composed of bleached sandstone and mudstone (Chenoweth and Malan, 1975). Jack Daniels, and Huskon 4 - Paul Huskie 3 are the largest Cameron deposits in the Petrified Forest Member.

The sandstone and siltstone member mines were developed in thin-bedded, cross-stratified fine-to medium-grained sandstone with abundant carbonaceous trash and fossil logs, in the upper 30 feet of the unit. The Huskon 11 mine is the largest source in the Cameron area from this member.

Figures 18 and 19 illustrate pit outlines of Jack Daniels and the Ramco pits, respectively. These represent the most productive open pits at Cameron. Mining methods at Cameron consisted of open pits to depths of about 150 feet, with small amounts of underground mining from the pit walls to recover additional ore (Chenoweth and Malan, 1975).

Concerning the mineralogy of the Cameron ore bodies, Austin's (1964) detailed mineralogical study states that most ore consists of oxidized uranium species, but fossil logs are found in various states of oxidation. As logs are exposed to oxidizing conditions, pyrite and marcasite alter to hematite, limonite, and iron sulfates, while uraninite and coffinite alter to uranophane, zippeite, boltwoodite, schroeckingerite, and uranocircite. Where primary pyrite and calcite have filled skrinkage cracks in carbonaceous material, they are found replaced by sulfates, especially gypsum and barite (Austin, 1964, p. 75). He accounts for mineralogical "double halos" around some oxidizing logs at certain deposits by a complex oxidation history involving ground water and possibly the downcutting history of the Little Colorado River (p. 76-84). However, with only local exceptions, the Cameron ores are in chemical-radioactive equilibrium.

Austin suggests that the main chemical elements related to the uranium ore zones are U, Ca, Mn, Cu, Mo, Co, Pb, Cd, Ni, and V (Zn notably absent). The best mineralogical guides to uranium ore are the presence of a) blue molybdenum oxide fracture films, b) calcite-gypsum-barite gangue minerals, and c) bleaching of country rock from gray to a yellow or buff color due probably to oxidation of sulfides in protore halos. The Huskon No. 10 and 11 mines contain notable trace amounts of molybdenum and cobalt-bearing minerals.

There are numerous collapse structures recognized around Cameron (Chenoweth and Blakemore, 1961; Barrington and Kerr, 1963), but only one, the Riverview mine, has recorded uranium production (508 tons of ore @ 0.38% U_3O_8). Curiously, the ore came from a peripheral shear zone and blocks of downfallen lower Chinle clastics within the pipe, a structural situation resembling the Orphan Lode. Also curious is the resemblance of the ores (high U, high Cu, very low V) to the Orphan ores much more than the other Cameron ores (intermediate U, intermediate V, some Mo, Cd). Barrington and Kerr (1963) describe in detail some silicified "plugs" intruding the Moenkopi Formation northwest of Cameron which contain bleached halos in Moenkopi beds and peripheral radioactive pyrite-copper anomalies, containing signs of argillic (kaolin to illite) alteration.

The Cameron district has potential for additional uranium deposits, especially east of the Little Colorado River where broad channels in lower Petrified Forest beds can be expected, and in lesser oxidized channelways at slightly greater depth in lower Chinle strata (Chenoweth, pers. comm., 1980). Drilling in 1977-1980 in the area has provided encouraging results for further exploration. Spirakis (1980) suggests that the Cameron district contains additional uranium potential based on a model of subsidence during Petrified Forest time and preservation of abundant organic matter in the sediments due to burial beneath ground water tables, prior to uranium emplacement.

Vermilion Cliffs - Lee's Ferry

Minor production is recorded from the Chinle Formation in the Vermilion Cliffs-House Rock Valley area astride the Colorado River near Lee's Ferry. Production is from both Shinarump paleochannels cut into the Moenkopi Formation, and from the Petrified Forest Member of the Chinle Formation.

Four mines in Shinarump paleochannels (El Pequito, Jimmy Boone, Sun Valley, and Vermilion No. 1) yielded 1212 tons of ore averaging 0.20% U_3O_8 (4759 lbs of U_3O_8), and six mines in lower Petrified Forest sand and mud channel fills (Big Blue, June, Red Wing, Sam, Thomas No. 1, and Tommy) produced 312 tons of ore at 0.22% U_3O_8 (1367 lbs of U_3O_8). Total production from the area is 1524 tons @ 0.201% U_3O_8 between 1954 and 1957. The geology of the ore deposits is very similar to the other Shinarump and Petrified Forest ores from Cameron and Monument Valley. Channel trends in the Shinarump and lower Petrified Forest indicate flow directions toward the NW - NNW (Phoenix, 1957, 1963). Uranium ores from the Sun Valley mine contain very unusual concentrations (to 0.07%) of a water soluble rhenium salt (Peterson and others, 1959).

Figure 20 shows outcrops of Chinle beds and some of the mines and occurrences in the Lee's Ferry area.

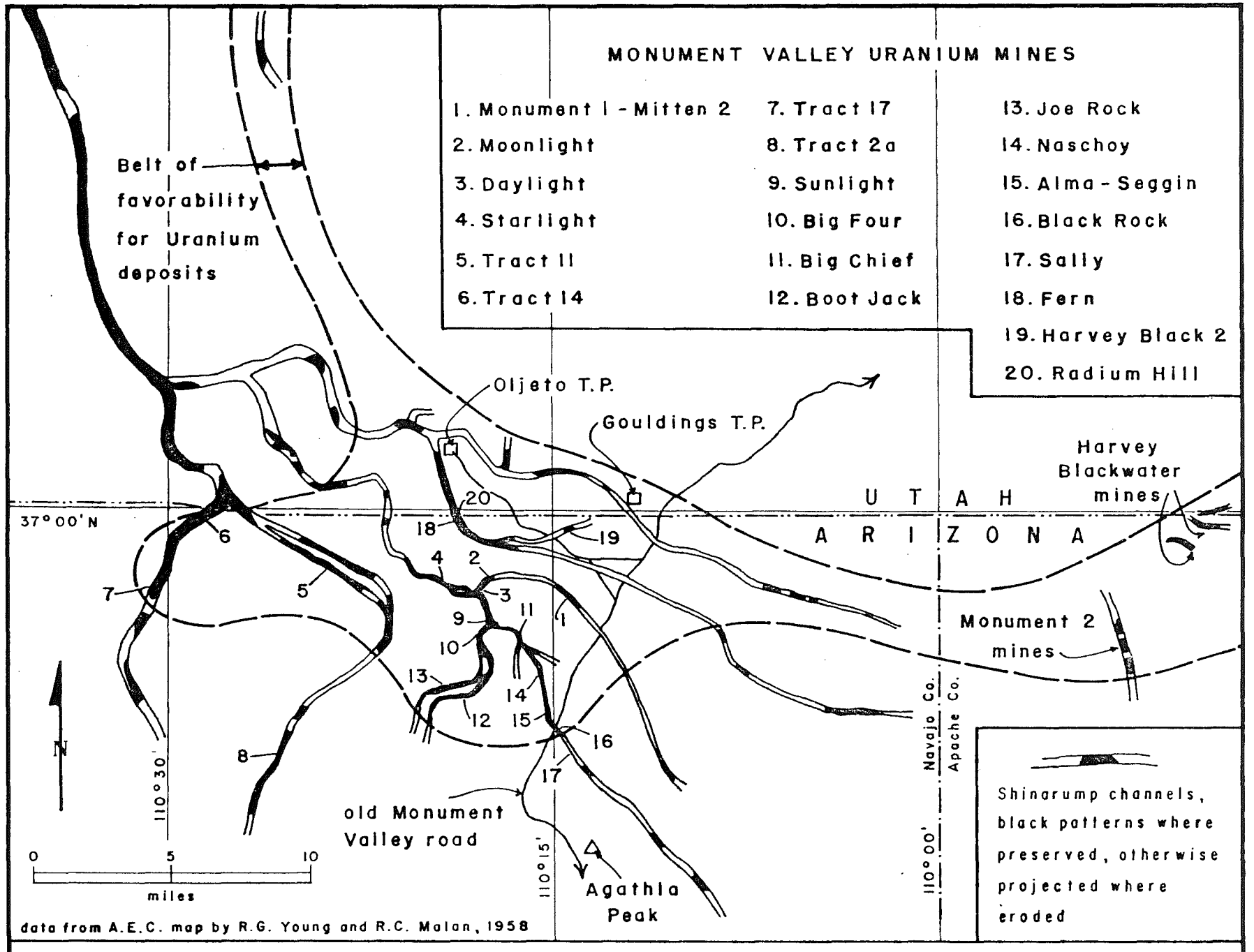


Figure 16

Shinarump Channels and Uranium Mines, Monument Valley Area

to be released as DOE Preliminary Map No. 34 by Young and Malan

Explanation for Figure 17, Monument No. 2 mine

Qd	dune sand
Tcs	Shinarump Member, Chinle Fm.
Tm	Moenkopi Fm.
Tmh	*Hoskinnini tongue of Moenkopi Fm.
Pd	*DeChelly Sandstone

*For new nomenclature see Vaughn (1973), p. 99.

Structural contours drawn on base of Monument No. 2 channel.

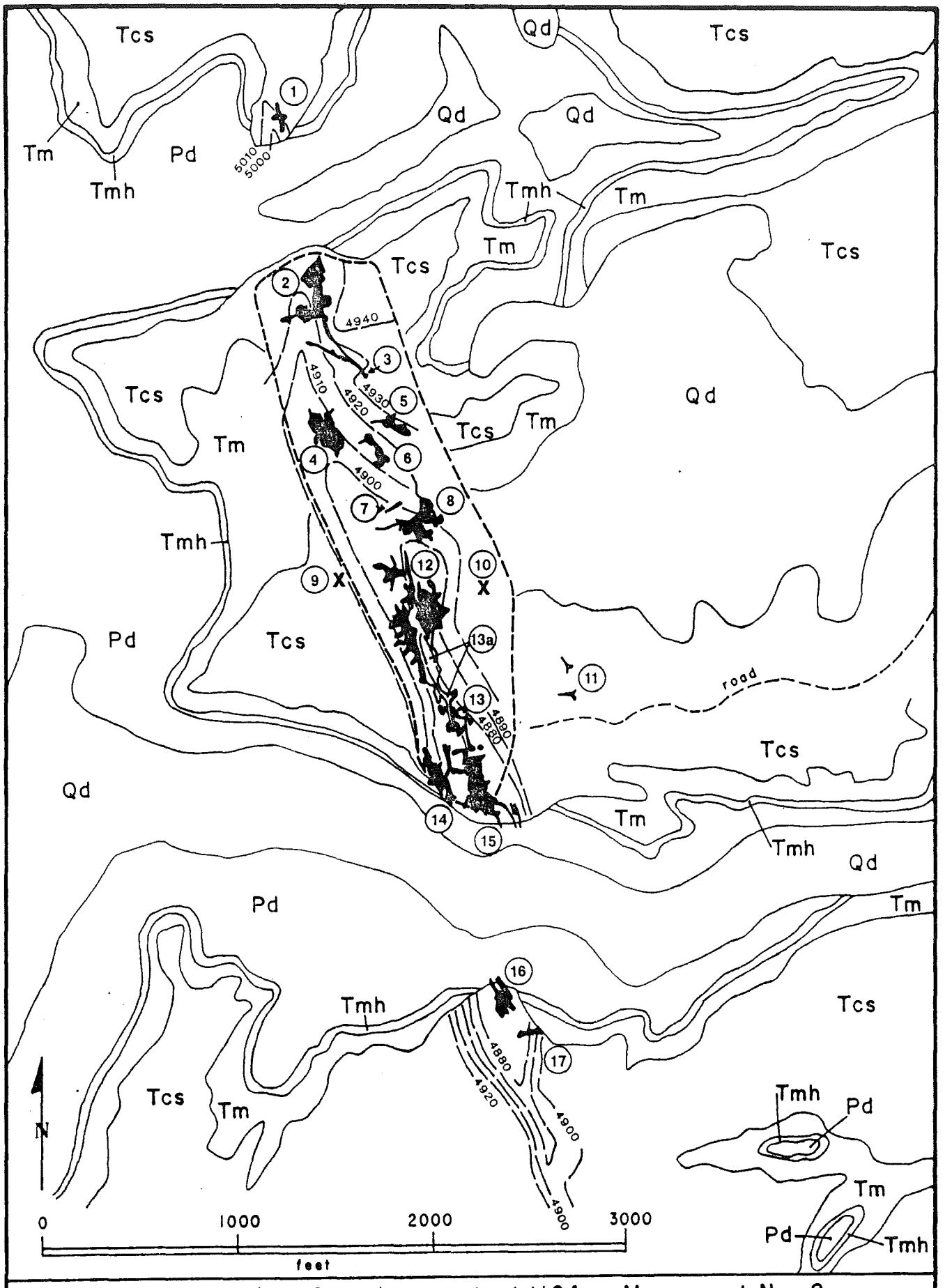
blackened areas are upper level workings
clear areas are lower level workings

open pit mine

Mine Names

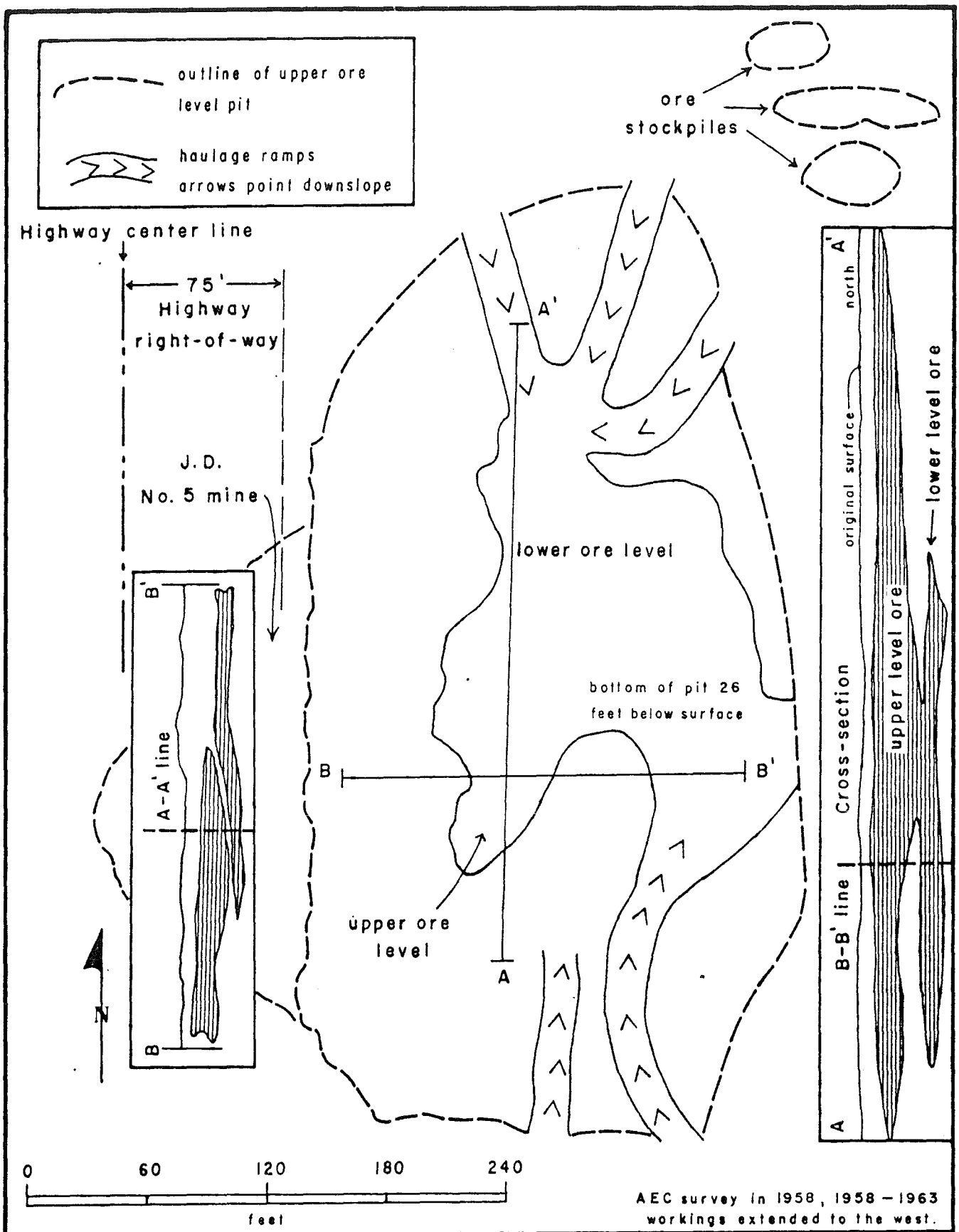
1 John M. Yazzie Mine
2 North workings, Monument No. 2
3 North drifts, Monument No. 2
4 West Red Oxide workings, Monument No. 2
5 East Red Oxide workings, Monument No. 2
6 South red oxide workings, Monument No. 2
7 Incline No. 3, Monument No. 2
8 Central workings, Monument No. 2
9 Cato Sells tract 2
10 Cato Sells tract 1
11 Black and Blackwater mine
12 Incline No. 1, Monument No. 2
13 Incline No. 2, Monument No. 2
13a Incline No. 2, lower workings
14 Bobcat workings, Monument No. 2
15 South workings, Monument No. 2
16 South extension, Monument No. 2
17 Cato Sells tract No. 1 south

Geology and underground workings from Witkind and Thaden (1963).
Open pit outline from AEC guidebook RME-141, p. 2-63.



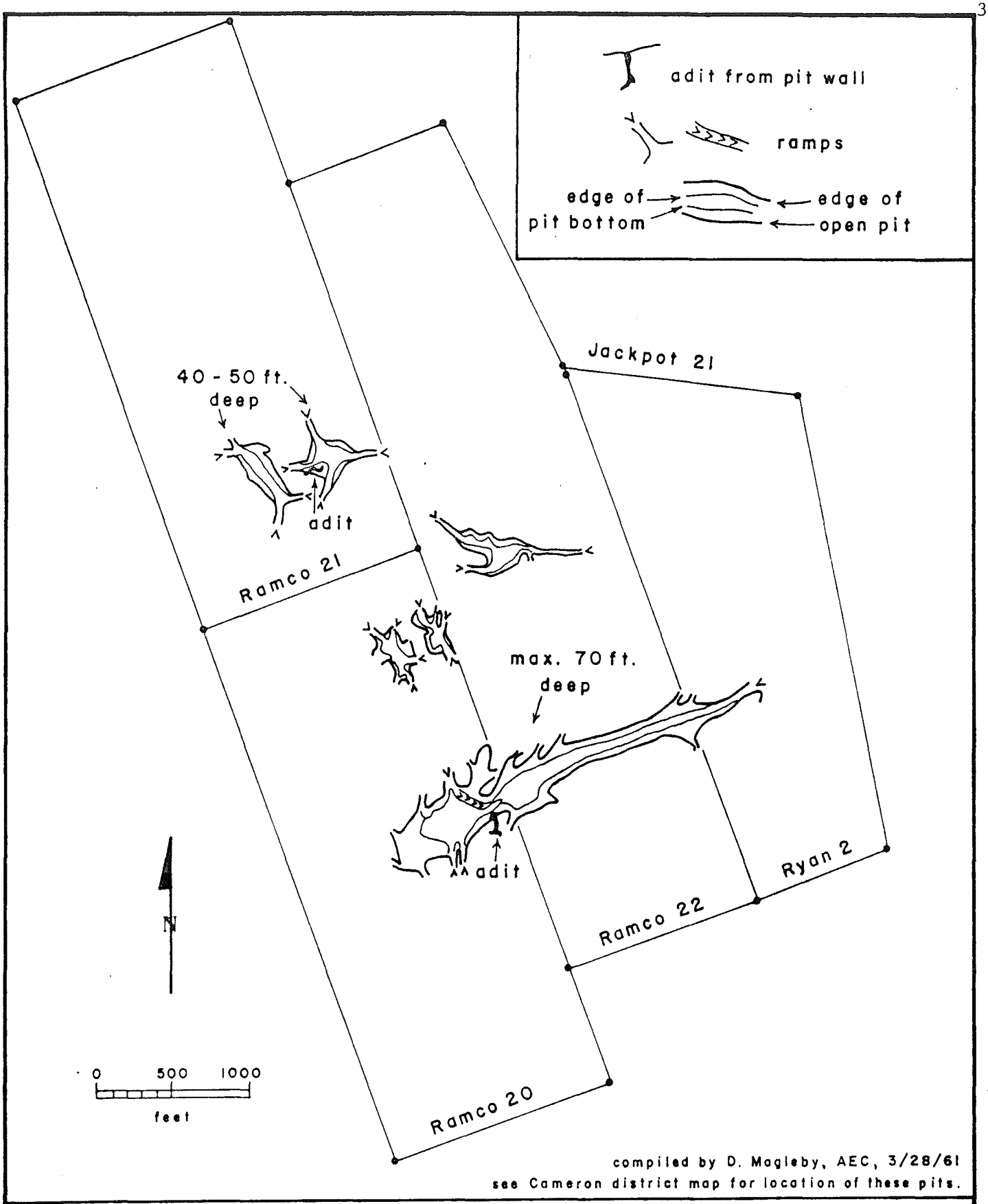
Geology and Mine Development at VCA s Monument No. 2 Mine, Apache County

Figure 17



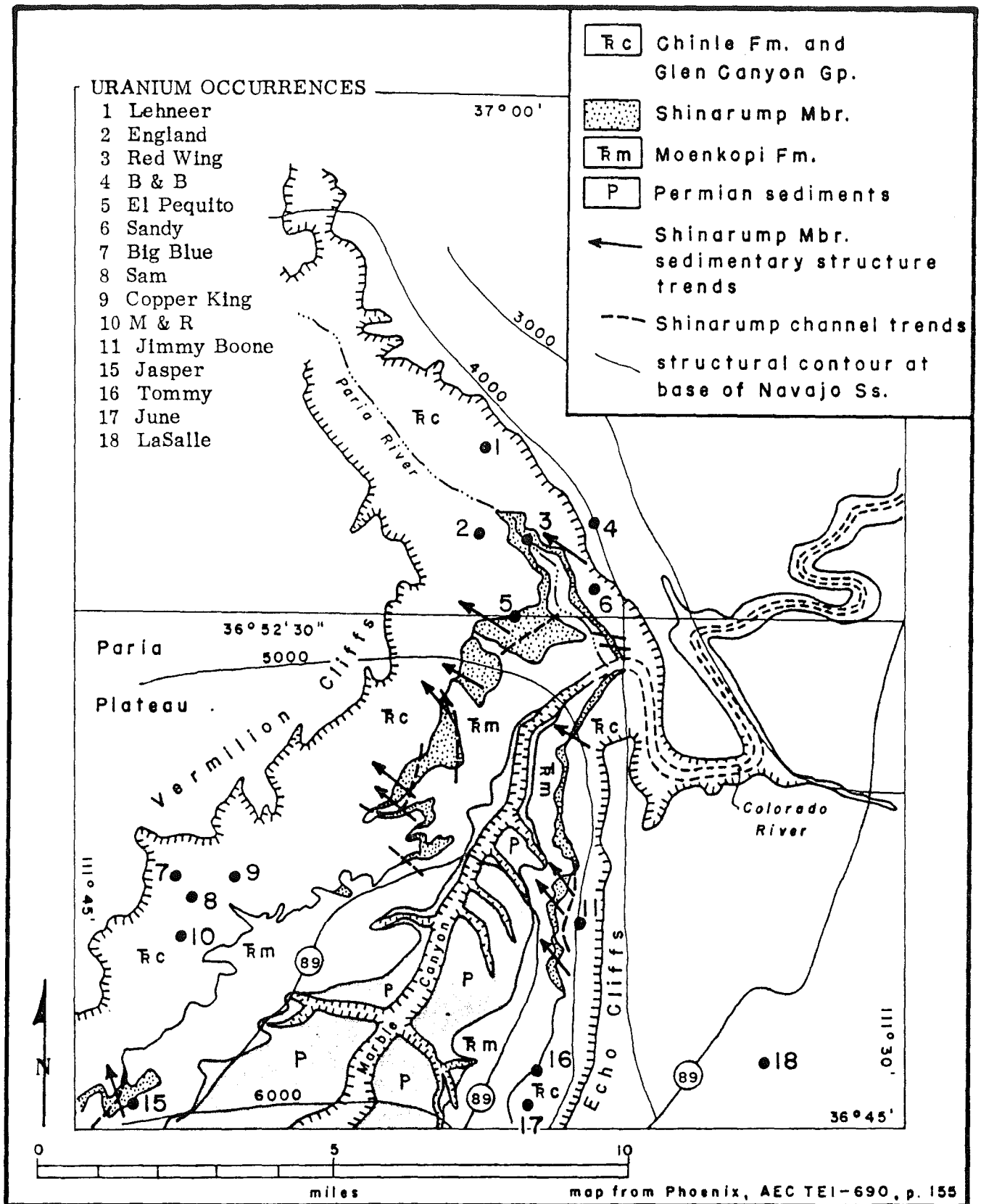
Jack Daniels No. 1 Pit, Coconino County

Figure 18



Pit Outlines, Ramco Pits, Cameron Area, Coconino County

Figure 19



Shinarump Channels, Lee's Ferry-Vermilion Cliffs area
Coconino County

Figure 20

TOREVA FORMATION

Thirteen mines in the upper Cretaceous Toreva Formation (Mesaverde Group) of eastern Black Mesa produced 16,781 tons of ore averaging 0.166% U_3O_8 between 1954-1958 and 1964-1968. An additional 123 tons was produced from two mines in the Salt Wash Member of the Morrison Formation a few miles north of Rough Rock trading post and were included in the Black Mountain-Rough Rock production figures on DOE Preliminary Map No. 31 of 16,903 tons @ 0.17% U_3O_8. Assays for vanadium on the Toreva ores were incomplete, but best indications are of a 1:1 U_3O_8:V_2O_5 ratio for the ores (Chenoweth and Malan, 1975).

General references on this area include DOE Preliminary Map No. 31, Clinton (1956), Repenning and Page (1956), Repenning and others (1969), O'Sullivan and others (1972), and Chenoweth and Malan (1973).

Uraniferous outcrops around Polacca Wash were brought to the attention of the AEC in January 1954. Subsequent ground and aerial surveys in 1954-1956 identified about 25 radioactive anomalies in the Lohali Point-Yale Point area, many of which were subsequently developed into mines. A few anomalies were caused by thorium-bearing heavy mineral placer accumulations in Upper Cretaceous intertidal sand deposits, discussed subsequently by Houston (1956), and Houston and Murphy (1977), who recognized these in association with the Cretaceous seaway throughout the Cordilleran region. See also Bingler (1963) for some northern New Mexico analogs.

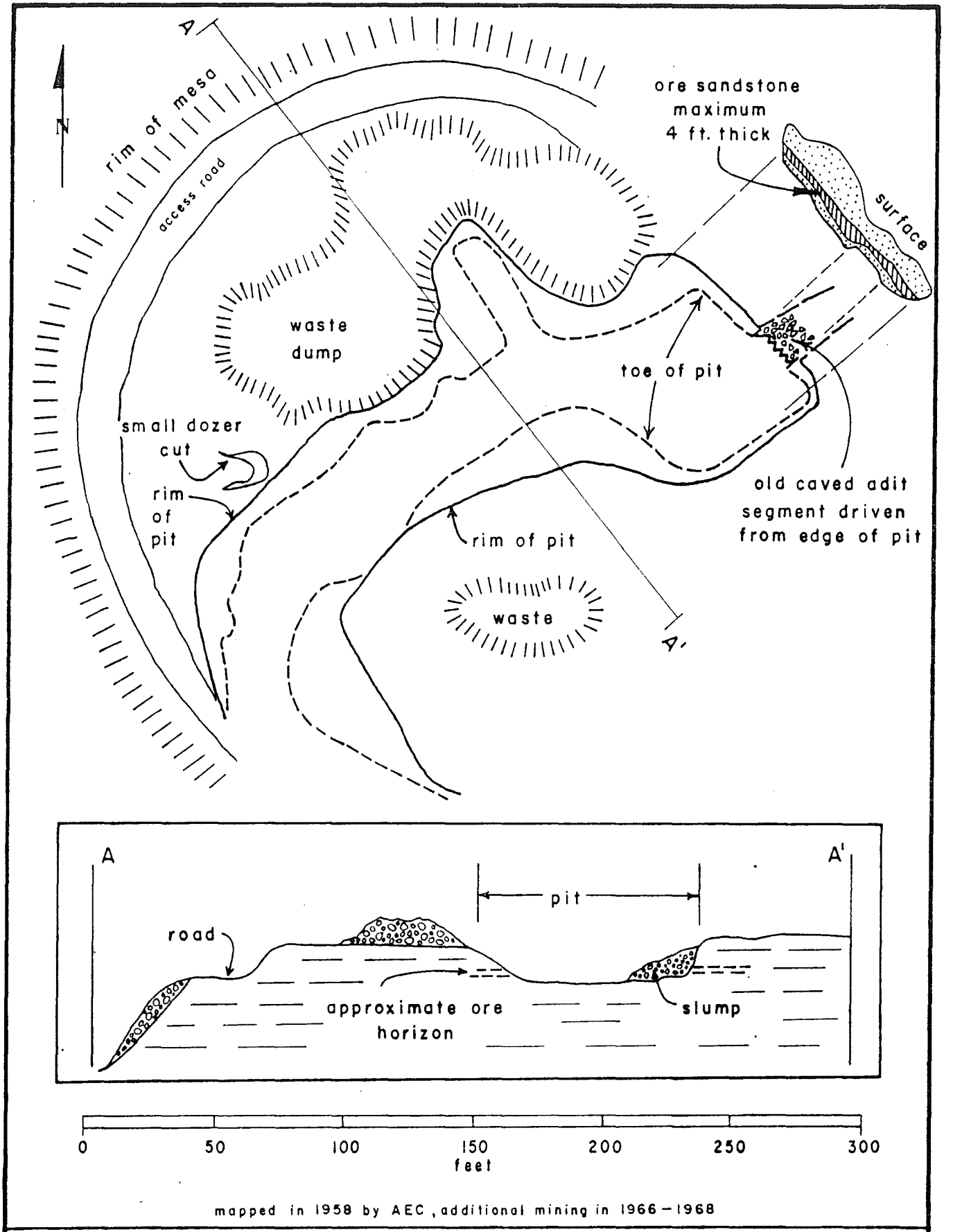
Repenning and Page (1956) subdivided the Upper Cretaceous Mesaverde Group rocks of Black Mesa into three formations. They are, in ascending order, the Toreva Formation, Wepo Formation, and Yale Point Sandstone. These formations represent a complex intertonguing of marine and non-marine beds. See Cooley and others (1969, Figure 4) for a cross-section of Black Mesa stratigraphy and excellent geologic mapping. See also Beaumont and Dixon (1965) for additional geologic mapping in a part of the region.

The uraniferous horizons in the Toreva Formation occur in the "main ledge" sandstone, 140-170 feet of fine-to-medium grained noncalcareous sandstone, locally burrowed and micaceous, with lenses of coarse arkosic sandstone, coal, carbonaceous shale, and siltstone in the upper part. Most of the uranium occurs along bedding planes in low-relief channel sands in the upper 40 feet of the "main ledge," disseminated in the sandstone, quite often immediately below carbonaceous lenses. The host unit is described by Chenoweth and Malan (1973) as consisting of fining upward sequences interpreted as migrating point bar deposits with overlying abandoned channel-fill sediments. Facies relationships and channel cross-bedding measurements indicate a sediment source to the southwest, with a general NW-SE trend on paleo-shorelines in these beds. The NURE Gallup NTMS evaluation study concludes that these beds represent a delta-distributary system, one of the few of post-Dakota Sandstone age on the Colorado Plateau. The mined deposits consist of clusters of pods of ore-grade material surrounded by protore. Typical deposits measured 400 x 100 feet x less than 2 feet thick. Most ore was mined by shallow open pits, rim cuts, and in three places by underground methods (Rough Rock slope, Etsitty No. 1, and Claim 7). Uranium minerals include tyuyamunite and metatyuyamunite. Vanadium minerals include vanadium clays, metahewettite, and melanovanadite. Study of paragenesis

at Etsitty No. 1 mine (Clinton, 1956) suggests first the introduction of vanadium clays and $CaCO_3$ (to 0.8% by weight of rock) as cementing agents followed by replacement in the interstitial voids by tyuyamunite.

The three largest uranium producers from the Toreva Formation are, in decreasing order of production, Claim 28 (17,300 lbs of U_3O_8 assaying 0.21%), Claim 10 (15,600 lbs. of U_3O_8 at 0.15%), and Claim 7 (12,500 lbs of U_3O_8 at 0.14%). Together these account for 81% of the U_3O_8 production from the Toreva Formation. The two other most significant deposits are Todecheenie No. 1 (6,100 lbs at 0.22%) and Claim No. 3 (2200 lbs at 0.15%), which make up an additional 15% of the total U_3O_8 produced. Figure 21 is a mine map of the Claim 28 mine.

Clinton (1956) suggests the most significant ore controls in the Toreva Formation to be: a) micaceous or arkosic quartz sandstones in close proximity to lignites or carbonaceous lenses, in shallow relief channel-fill deposits in the general stratigraphic context of interfingering marine Mancos Shale and fluvial (deltaic or shorline) Toreva sands and lagoonal deposits; b) localization of ore bodies at the sharpest bends in paleochannel directions, as indicated by cross-bed directions; and c) a NW-SE trending zone that lies on the steepest-dipping portion of the NE limb of the Black Mountain anticline-SW limb of the Rim syncline structure. This last point resembles that of W. L. Stokes on the ore controls of the northwest Carrizo Salt Wash mines (USAEC RME 3102, 1951), where he suggests response of stream directions and gradients in Salt Wash time to structural movements on nearby anticlines. However, the method by which the structures in these two cases act as ore controls is not confirmed. There is yet no direct evidence that there was structural movement contemporaneous with Toreva sedimentation whereby control of channel directions or placement of point-bar deposits was actually localized with respect to the fold structures seen today. However, Peirce and Wilt (1970, p. 18) note that stratigraphic thinning of overlying Wepo beds on Black Mesa may be related to structural bowing of the Maloney syncline during Wepo time. An equally probable hypothesis, at least in the Toreva (and Morrison) situation, is that postmineralization folding of the strata and subsequent erosion and stream cutting has merely exposed the mineralized areas and made discovery easier. Much of the folding may be Laramide in age; some of it could be Oligocene-Miocene in age, based solely upon intense tectonism in the Basin and Range country to the south during this time.



Claim 28 Mine, Black Mountain area, Apache County

Figure 21

BRECCIA PIPES

Breccia pipes are perhaps the most enigmatic of the Arizona uranium occurrence types. Those occurring on the Colorado Plateau are approximately vertically oriented chimney-like masses filled with brecciated, heterogeneous assemblages of sedimentary rocks derived from strata which have been displaced downward into the breccia pipe. Nearly one hundred pipes are known in northern Arizona, but uranium has been produced from only five. Of these, all but one have had less than 10,000 lbs of U_3O_8 production (Chapel, Ridenour, Hack Canyon, and Riverview), while the fifth (Orphan Lode) has been a major Arizona producer with production totaling nearly 4.4 million lbs of U_3O_8. Orphan production is exceeded in Arizona only by the Monument No. 2 Mine in Apache County. Because of the track record of the Orphan, exploration for more pipe uranium occurrences is continuing in the Grand Canyon-Arizona strip country. Certainly, many pipes contain radioactive anomalies, while perhaps the majority in this region are barren of mineralization at the surface. Methods such as detailed gravity surveying are being used to peer through superficial cover rocks in hopes of delineating buried pipes. Figure 22 indicates the geographic setting of the known pipes in the Grand Canyon region. Some of these are exposed in apparent WNW-trending groups or clusters where the Grand Canyon erosion event has stripped away cover rocks to expose the Coconino Sandstone-to-Redwall Limestone stratigraphic interval. Almost certainly, other pipes remain hidden in adjacent areas. The majority of the Grand Canyon pipes are found in the sedimentary units above the Mississippian Redwall Limestone. Frequently, their presence is indicated on aerial photographs by a bleaching to very light colors of red or red-brown clastic sediments. Barrington and Kerr (1963) describe analogous structures in the general Cameron area.

The only association of Plateau breccia pipes and attendant Cu-U minerals with any volcanic rocks known to this author is at the Copper House No. 2 claim of Mohave county, where a basalt dike underlies a gossen or iron-stained breccia zone which in turn is related to bleached radioactive Supai beds. The basalt is likely late Cenozoic in age, and may or may not postdate the Cu-U mineralization here.

Exploration continues for buried pipe structures, especially in the region north of the Grand Canyon. In December 1980, Energy Fuels Nuclear announced (Paydirt, No. 498, published at Bisbee, AZ) the discovery of a new breccia pipe about a half mile west of the Hack Canyon mine (Figure 23) in Mohave county. Drilling results indicate a possible 500,000 tons of uranium-copper ore in pipe fill. With a conservative grade of 0.3% U_3O_8, this represents 3 million pounds of U_3O_8. Ore shipments from the new Hack mine are going to Blanding, Utah starting in December 1980.

During 1979-1980, radioactivity associated with copper staining of surficial Kaibab Limestone in the Willaha-Anita area between the Grand Canyon and Williams (Coconino county) received some drilling attention, with the ultimate targets probably being buried breccia pipes such as the Orphan Lode. At least three companies have drilled an estimated two dozen holes. A strict Orphan Lode model would place major mineralization in Supai and Hermit beds, perhaps 1200 feet below the surface. This Kaibab surficial mineralization may also indicate that the breccia pipe phenomena of the region affected rocks at least as young as Kaibab limestone.

Example - Orphan Lode Mine

Many published reports have dealt with the complex origin and mineralization at the Orphan Lode, located near the tourist center along the south rim of the Grand Canyon. See Magleby (1961), Granger and Raup (1962), Kofford (1969), Gornitz and Kerr (1970), Bowles (1977) and Boyden (1978). Figuer 24 is a cross-section through the Orphan pipe, showing its approximate known vertical extent and overall mine development. Figure 25 shows plan views of the 245 and 400 foot levels in the mine. The following discussion is taken from the above sources.

The Orphan Lode claim was located in 1891 for surficial copper showings and was prospected intermittently for copper until about 1910. There may have been no actual production of copper from the mine. The claim was patented in 1906, with the papers being signed by President Theodore Roosevelt. The Grand Canyon was made a National Monument in 1909. In 1953, Golden Crown Mining Company acquired mining rights on the property, following the discovery of uraniferous minerals at the mine by H. Granger of the USGS in 1951. The company constructed an aerial tramway from the pipe outcrop to the canyon rim in 1955. Regular production began in 1956. Production was limited by the 1,000 ton/month capacity of the tramway. Late in 1959 first ore was removed by hoisting through a newly completed 1600 ft deep shaft and 1400 ft cross cut. A bill was passed by Congress in 1962 to allow the mining company (Western Equities since 1961) to mine newly found ore on National Park land, adjacent to the claim, in exchange for NPS ownership of the Orphan property 25 years hence, in 1987. Mining was continued from 1962 to 1967 by Western Equities, and 1967 through 1969 by the Cotter Corporation, which still controls mining rights. Most of the ore through 1969 was shipped to the Rare Metals mill in Tuba City.

The Orphan pipe surfaces in the lower Coconino Sandstone, 1000 feet below the rim of the canyon, and maintains a mean diameter of 230 feet down through the Hermit Shale. It then flares out symmetrically in the downward direction to a mean diameter of 400 to 500 feet in the upper Supai Formation. Vertical drilling suggests that the pipe bottoms near the middle of the Redwall Limestone, since lower units down to the Tapeats Sandstone beneath the mine appear undisturbed in a single deep drill hole.

Where mined, the materials filling the pipe were derived only from units above. Coconino Sandstone blocks have fallen as much as 275 feet below the Coconino base, and blocks of Hermit Shale beds have collapsed over 300 feet down to the 500 ft mine level. No volcanic material, Precambrian rocks, or lower Paleozoic rocks have been identified anywhere in the explored portions of the pipe, indicating only net downward transport of materials presumably due to some kind of collapse, perhaps provoked by solutioning of the underlying Redwall Limestone. Multiple collapse events appear to have occurred, since there are several "pipe within pipe" structures, separated by roughly concentric annular shear zones.

The pipe fill may be separated into breccia (containing blocks of recognizable Hermit, Coconino, and Supai lithologies), and massive sand fill, some of which has been partially calcified (calcite, with some dolomite and siderite filling intergranular spaces). Most of the loose sand fill was derived from the Coconino Sandstone.

The outer pipe wall is a sharp contact. Extensive color bleaching of the surrounding in situ rocks is noted for several feet beyond the pipe wall.

Briefly, there are two main types of ore occurrence in the mine, annular ring (includes "A" ore body of Figure 24) and interior pipe fill ("B" ore body). The "B" ore occurs in the highly fractured and brecciated central interior of the pipe. This ore extends from near the surface outcropping of the pipe to about the 450 ft level. Kofford believes the "B" body lies within an interior "pipe-within-pipe" which was displaced downward with respect to the "A" ore body. The annular ring ore is generally concentrated near the perimeter of the pipe, especially just below the level where the pipe constricts in the upward direction. It has been found downward to near the 550 ft level. In more detail, the annular ring occurs in (1) the shear zone marking the pipe boundary, especially above the Hermit-Supai contact, where it was mined as the high-grade "A" ore body, (2) the breccia just inside those shears, and (3) the disturbed and undisturbed rocks just outside the pipe in the Supai Formation. Outside the pipe, most of the annular ring ore is stratigraphically confined to certain sandy layers in a ring zone surrounding the pipe averaging 6-50 ft wide, and is controlled by placement of annular fractures surrounding the pipe. The annular ring ore appears to bottom out on top of a shale bed in the Supai Formation. In general, more ore occurs in areas having a greater intensity of shearing. High grade ore from the annular ring consists of uraninite intergrown with red earthy hematite, and fine-grained pyrite-chalcopyrite.

Uranium occurs chiefly as uraninite in interstitial intergranular fillings and veinlets following shear zones along with numerous other minerals of iron, copper, lead, zinc, nickel, and cobalt. Some molybdenum, arsenic, silver, maganesium, and barium minerals were also introduced. More than 60 minerals are reported for the mine.

Both sulfide and oxidized mineral assemblages are recognized. The detailed mineral investigations generally conclude that there was, in most part, a rapid, simultaneous precipitation of the sulfide components. The oxidized components may have been formed during the late Cenozoic Grand Canyon cutting event, and, more particularly, during the creation of the Esplanade surface inside the canyon (Bowles, 1977). This surface is a bench formed at the contact between the Hermit Shale above and the Supai Formation below.

Mineral zoning within the pipe is recognized, both in a lateral and vertical sense. The core of the pipe is mostly pyrite and uraninite, whereas the margins contain uraninite with a complex mixture of chalcocite, tennantite, various Ni-Co arsenides, and galena. The galena is of "common lead" composition (i.e., not recently separated from parent uranium) according to Miller and Kulp (1963). Although pyrite and marcasite are distributed throughout the vertical extent of the pipe, uranium content of ore generally increases upward in direct proportion to galena content. The sulfur in the sulfides has a highly fractionated isotopic composition which is much more similar to bacterially produced sedimentary sulfides than usual hypogene sulfide systems.

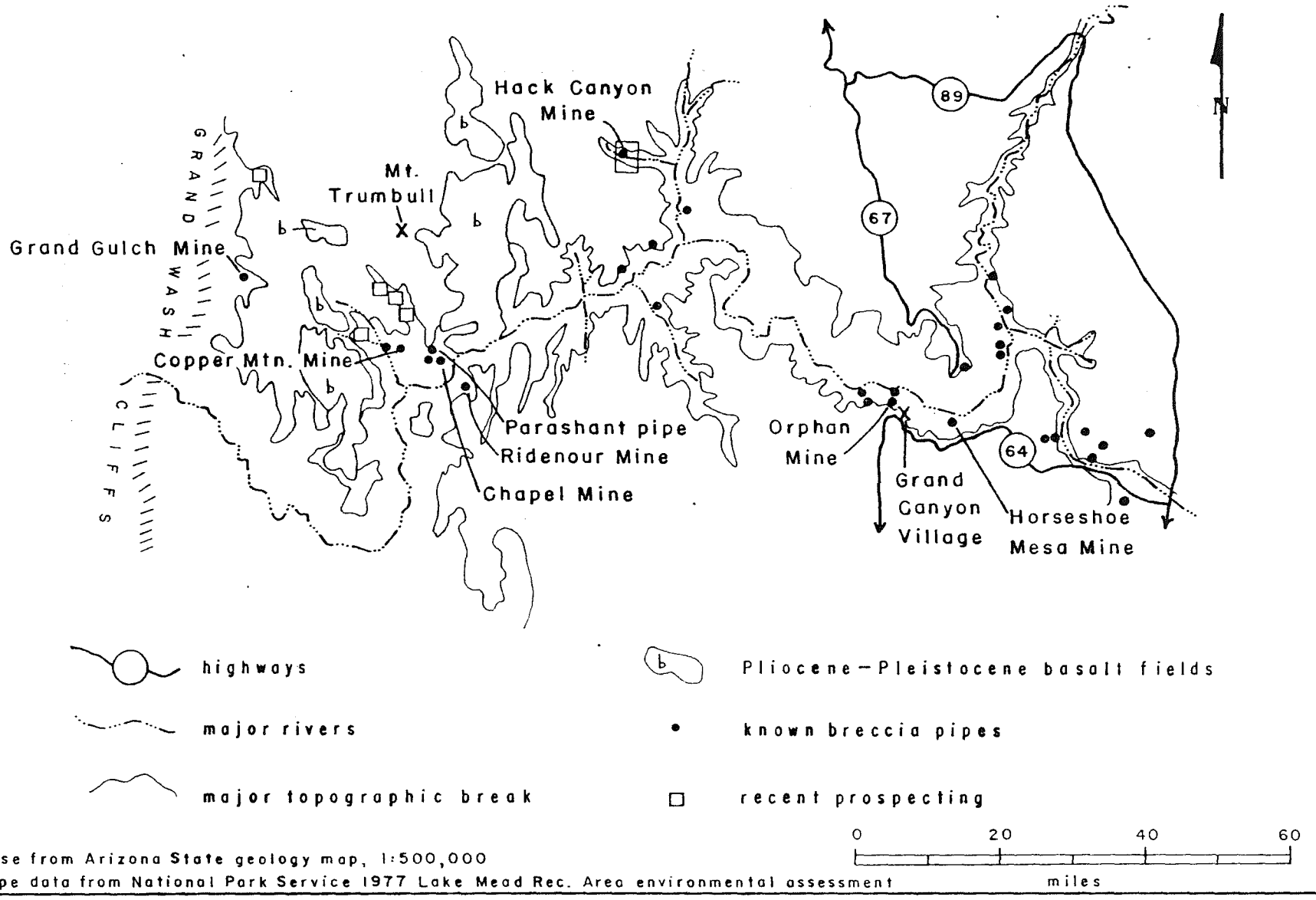
Kaolinite and illite (1 Md_1, minor 2 M_1) are the only clays associated with mineralization, and hence true arillic alteration may not be present

(Gornitz and Kerr, 1970). Fluid inclusion studies indicate temperature of formation of calcite in the pipe fill of 60-110°C. Miller and Kulp (1963) report sphalerite equilibration temperatures of not above 90°C.

Isotopic ages by various uranium-lead methodologies produce complex, discordant patterns for time of mineralization at the Orphan Mine. Gornitz and Kerr (1970) report age attempts of Miller and Kulp ranging from 87 to 402 m.y., with their best estimate for a minimum age of mineralization being 140 m.y. Miller and Kulp (1963) had originally reported "best" ages of 100-120 m.y. based upon their calculations of U-Pb systematics, including a hypothesized one or two-stage lead-loss model. Each lead loss episode hypothetically involves the dissolution and reprecipitation of "new" uraninite.

The origin of the Orphan ores remains enigmatic. We think that (1) the pipe formed by collapse into a solution cavity formed in upper Redwall Limestone, and (2) low-temperature copper-uranium mineralization was emplaced into permeable fissure systems and porous sandstone pipe fill, along with probably bacterially-derived sulfide sulfur, probably during the Jurassic-early Cretaceous time interval (120-140 m.y. ago). Major unanswered questions include the reason for the localization of the ores near the pipe constriction at the base of the Hermit Shale, the direction from which the mineralizing solutions came, the role in localizing uranium of carbonaceous materials found in the pipe (Kofford, 1969), and the thickness and lateral extent of Mesozoic cover rocks over the Grand Canyon at the time of mineralization.

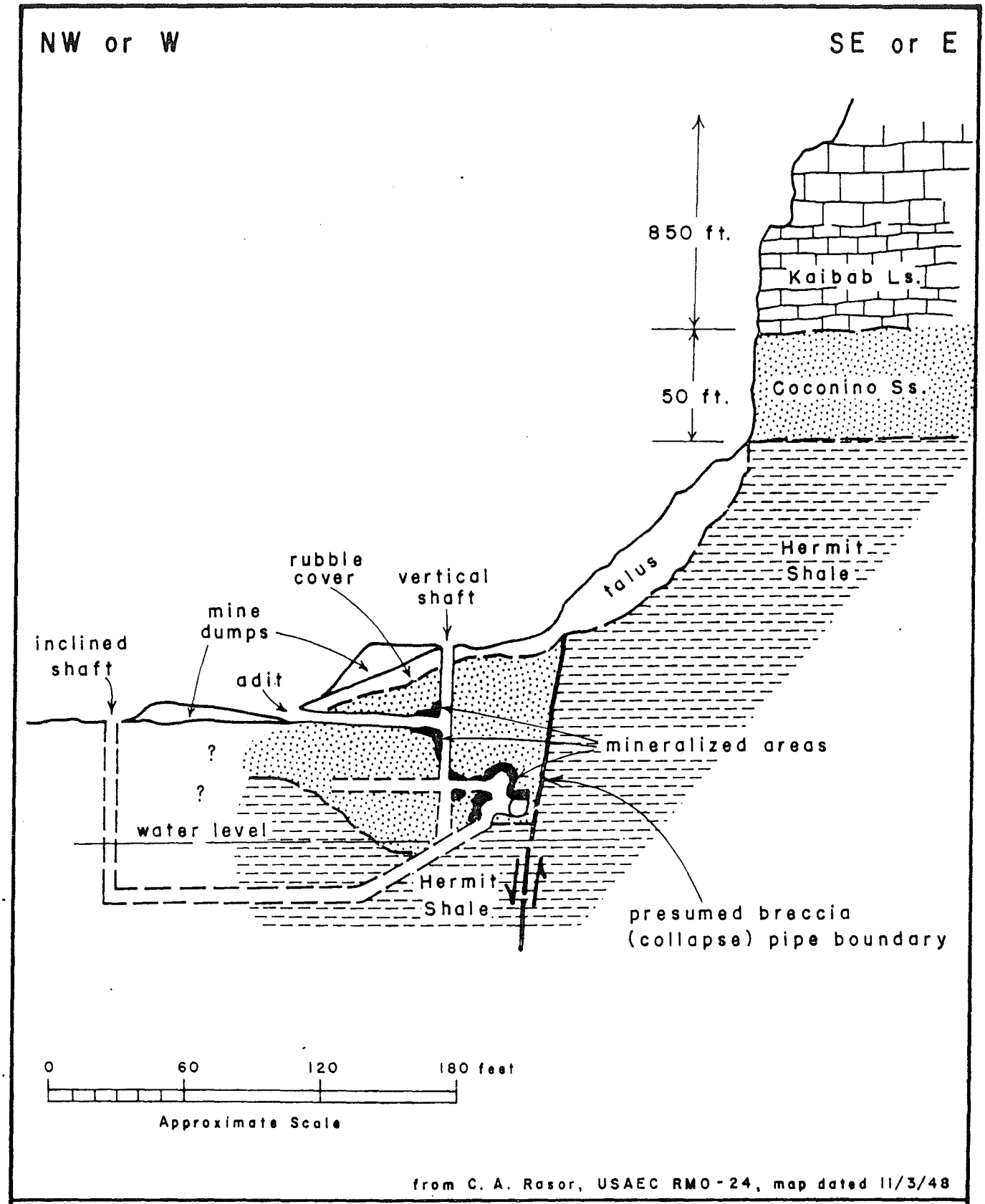
Finally, one might consider a possible relationship between uranium mineralization during the late Jurassic - early Cretaceous at the Orphan Lode (as deduced by uranium dating) and the large amount of stratabound uranium-vanadium ore in the late Jurassic Morrison Formation of the Four Corners region, which is known to have sediment source areas to the west and south, in the general direction of the Grand Canyon region. It is possible that chemical components of both the Orphan and Morrison ores were transported northeastward in groundwaters or supergene solutions derived from Mogollon highlands volcanic sources in Morrison time or pre-Dakota time, and subsequently chemically fractionated into Cu-U and V-U-Cu components and precipitated in their respective environments. In this model, the stratigraphic lid that overlies both these deposit types is the regional truncation surface that underlies the Dakota Sandstone.



base from Arizona State geology map, 1:500,000
pipe data from National Park Service 1977 Lake Mead Rec. Area environmental assessment

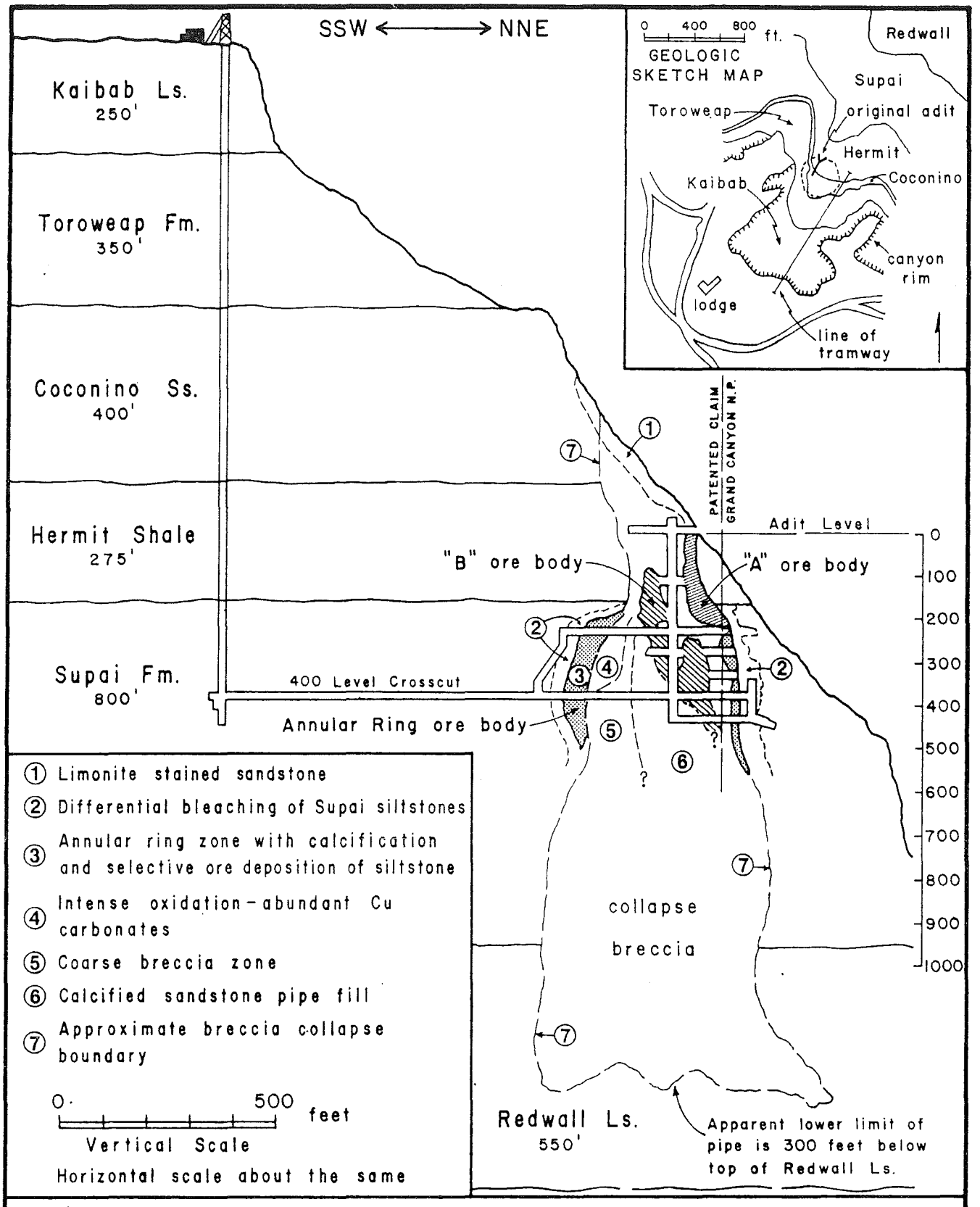
Location of breccia pipes in the Grand Canyon region, Coconino and Mohave Counties

Figure 22



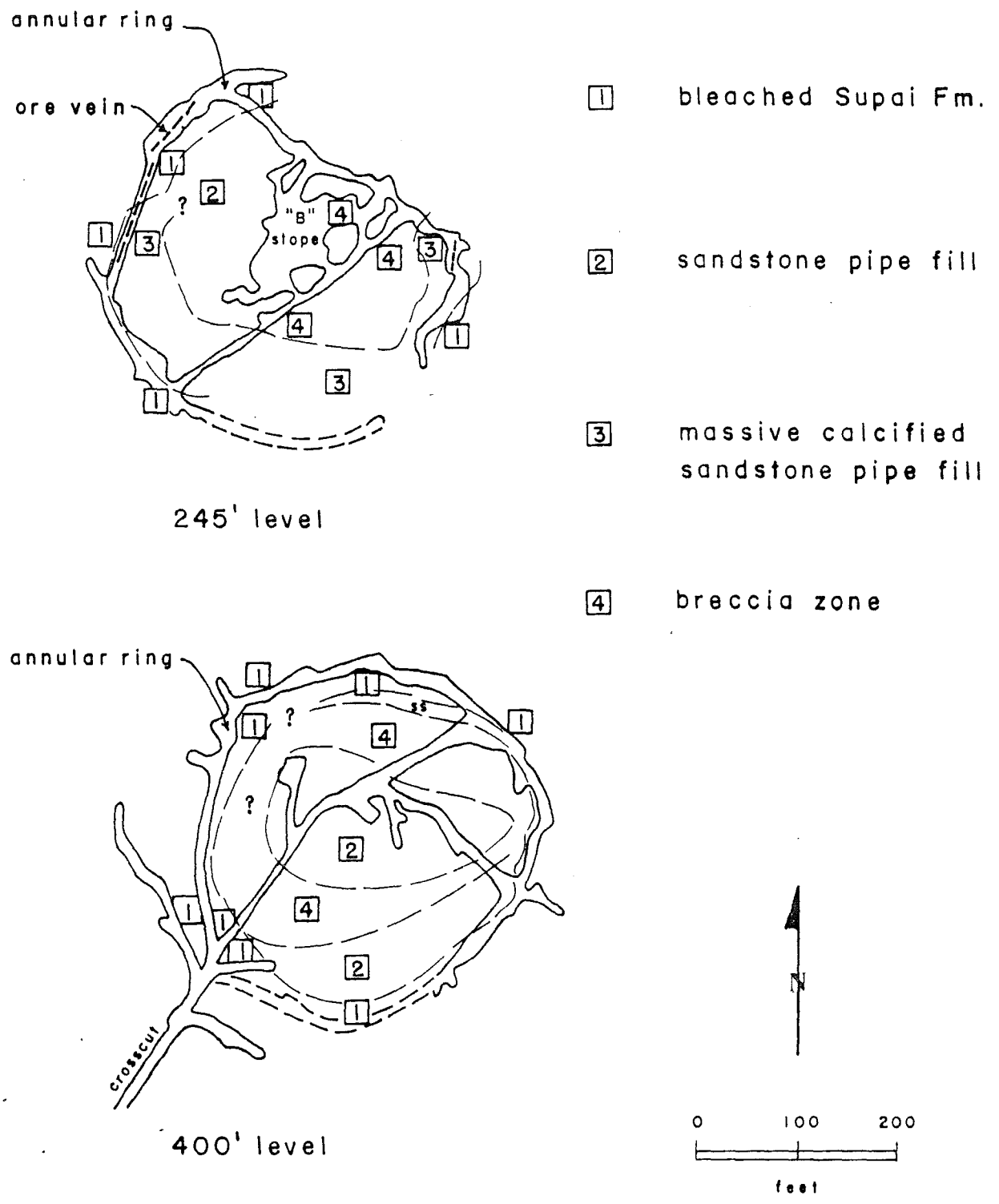
Generalized Cross Section through Hack Canyon Mine, Mohave County

Figure 23



Cross-Section of Orphan Lode, Grand Canyon National Park, Coconino County — composite of several published and unpublished maps, including Kofford (1969) and Gornitz and Kerr (1970).

Figure 24



Plan View of 245' and 400' levels, Orphan Lode from Gornitz and Kerr (1970)

Figure 25

HOPI BUTTES

Uranium was discovered in the Hopi Butte volcanic field of Navajo County in the early 1950s , with only one claim, the Morale, having yielded ore-grade material. Much uranium-related geologic work in the Hopi Buttes during the 1950s was discussed in open-filed USAEC TEI reports by Eugene Shoemaker, and summarized by Shoemaker, Roach, and Byers (1962). See also Lowell (1950). The USGS, in cooperation with the Bureau of Indian Affairs (BIA), did supplemental geology, petrology, and drilling studies during 1978-1980 which will appear in the NURE Flagstaff and Gallup NTMS folio evaluations (available for public inspection in Grand Junction as of January 1981). A summary of this work appears in Wenrich-Verbeek and Shoemaker (1980). The details below follow from these discussions.

The Hopi Buttes volcanic field consists of about 300 diatremes and associated flows and tuff beds contained in a circular field about 20 miles in diameter. The volcanic rocks of the field, where dated by K/Ar and paleontologic methods, range in age from 4 to 8 m.y. old. By all available evidence they erupted through a lacustrine environment which had already deposited varicolored lakebeds of the Bidahochi Formation in what is now called Hopi Lake. The diatremes and their associated tuffs and flows are seen to rest on top of these lakebeds. The uraniferous lakebeds are deposited inside the diatremes. The volcanics are depositionally overlain in the eastern part of the field by a fluvial (and aeolian?) sandstone (uppermost member of the Bidahochi Formation according to Shoemaker et al., 1962). The Bidahochi lakebeds rest upon Jurassic Wingate Sandstone in the southern part of the Hopi Buttes area, and upon younger Dakota Ss, Mancos Shale, and Mesaverde Group rocks of Upper Cretaceous age in the northern part.

Petrologically, the Hopi Buttes volcanic rocks are classified as limburgites and monchiquites, grading northwestward to minettes. These rocks have lower silica contents (<47%) and higher Na, K, Ti, and P contents as compared to "normal" continental alkali basalts of the southern Colorado Plateau. They also are notably high in Ag, Ba, Sr., Y, Zr, and U, with an average of 4 ppm U as compared with 1 ppm average for the continental basalts. They also generally contain primary $CaCO_3$, present as included masses and veinlets.

The diatremes are funnel shaped with sharp inward-dipping contacts with Bidahochi or older wallrocks. Spatter flows and coeval limburgite tuff distal facies compose the outer portion of the diatremes, with the diatreme interiors filled with brecciated debris produced from collapse and infilling following the phreatomagmatic diatreme-forming eruptions. This infill is composed of blocks of limburgite tuffs, flow rocks, and Wingate Ss and other older wall rock material. Precambrian clasts are uncommon except in local circumstances.

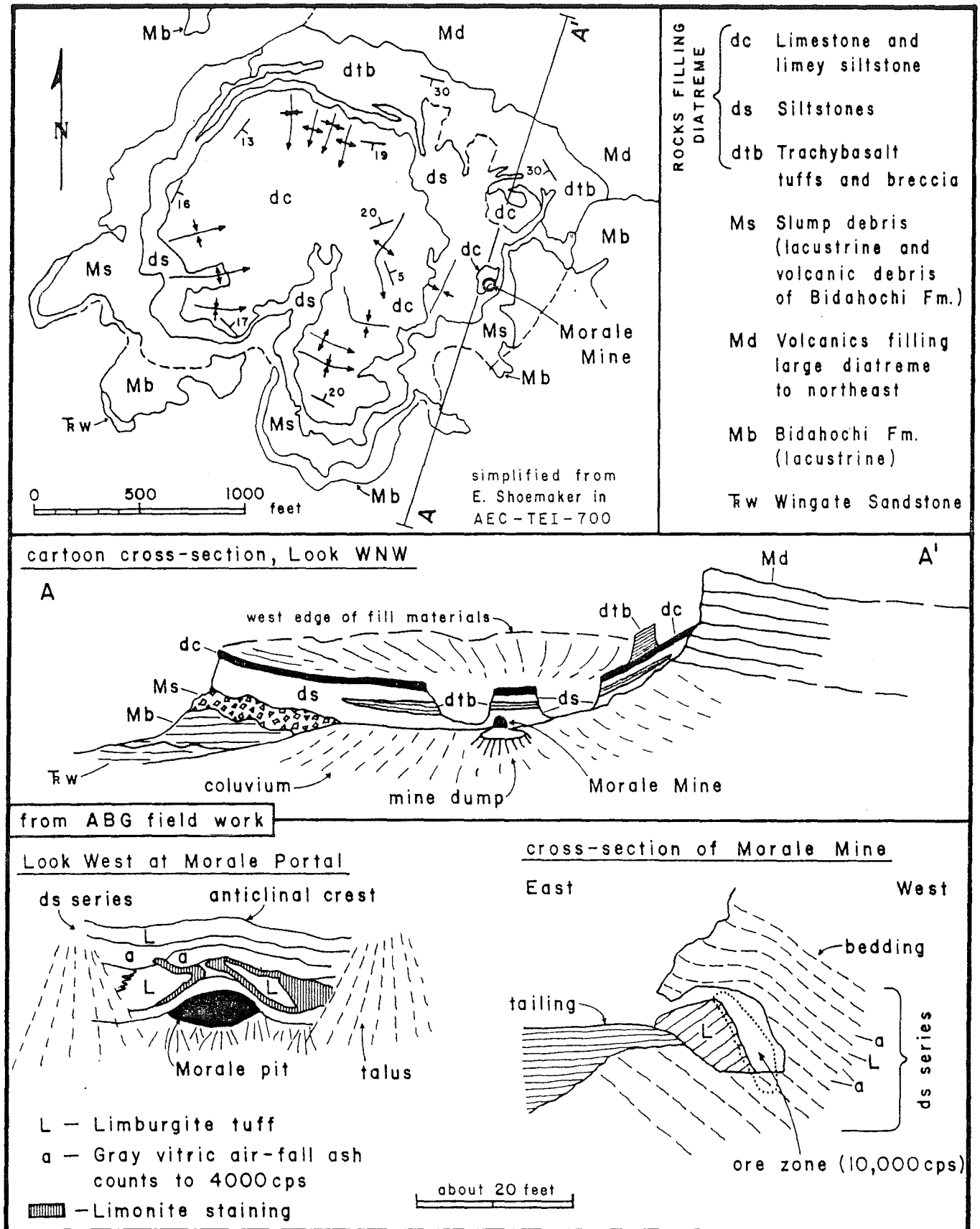
After explosion and collapse of the central vent, the diatremes stood with bowl-shaped depressions which filled with up to 200 feet of mudstones and travertine-like carbonate layers, along with some rhyolitic air-fall ash beds which were being erupted from vents in the Hopi Buttes field. However, it is not clear if these later sediments were also deposited outside the diatremes, perhaps in a still-extant Hopi Lake, and were later removed in all areas except atop the diatremes by the erosion event that left the Hopi Butte diatremes standing as resistant "plugs". Alternately, the sediments could have

been originally confined to individual ponds inside the diatremes, at a time when Hopi Lake was drying up. A question also arises concerning the origin of the bowl-style symmetrical inward dips of the sediments. They nonconformably overlie the volcanogenic collapsed infill and have flat dips near the center, and progressively steeper dips outward towards the diatreme margins. In places, 20-30° inward dips on shales (which at one place at Coliseum diatreme contain a fish fossil) suggest some post-sedimentation diatreme collapse may have occurred. If so, this post-sediment collapse could be a contributing reason for the preservation of these uraniferous sediments only inside the diatreme bowls, since only there were they protected from erosion because of resistant volcanic bowls surrounding them.

The "perched" diatreme infill sediments are the sole host for the 35 known uranium occurrences of the Hopi Buttes. Twenty of the occurrences in infill deposits contain radioactivity levels 5 times background. No anomalous radioactivity has been noticed at any Hopi Butte eruptive center that lacks these diatreme sediments. The most recent USGS work suggests that the limestone layers in the sediments resemble hot spring travertines and contain characteristic high concentrations of phosphate, sulfate, Ba, Sr, U, Se, Co, Ni, etc. These observations suggest a mineralization model involving thermal waters associated with the diatremes which supplied uranium to the diatreme sediments.

In detail, uranium is noted in two positions within the diatreme sediments. Both positions are noted at the Seth-la-kai diatreme, containing the Morale claim (see Figure 26). Uranium is stratigraphically confined to sandstone, mudstone, or limestone beds in the main mass of the sediments. And, at the Morale claim proper (Figure 26), uranium is concentrated (with assays to 0.50% U_3O_8) in lowermost permeable volcanic sandstone beds which are draped over blocks of limburgite tuff which protrude through the unconformity between the lower volcanic slump debris and the overlying diatreme sediments. Here, and elsewhere, there is a clear concentration of radioactivity near anticlinal crests in the younger sediments. Some radioactivity has been noted along fault boundaries at or near the diatreme margin, as well.

The recent USGS-BIA Hopi Buttes drilling program consisted of 24 holes through the diatreme sediment beds at Seth-la-kai diatreme and 6 holes drilled into Hoskie Tso diatreme. Based on this drilling, the USGS projects a content of nearly 400,000 lbs of U_3O_8 in an upper 50 foot interval at Seth-la-kai. Previous production from the Morale ore zone is listed as 576 lbs of U_3O_8 in grades of 0.15% U_3O_8 and 0.04% V_2O_5 between 1954 and 1959. Hoskie Tso diatreme drilling indicated very low uranium grades and thicknesses. Overall, however, assuming 30 diatremes to have similar uranium contents and ore volumes as Seth-la-kai, the USGS projects a content of 30,000,000 lbs of U_3O_8 in the Hopi Buttes, assuming average grades of 0.01% U_3O_8.



Geology of Morale Mine, Hopi Buttes, Navajo County

Figure 26

OTHER HOST ROCKS

Other Paleozoic and Mesozoic sedimentary rocks of the Colorado Plateau region are known to contain uranium anomalies. These strata include, in order of decreasing age, Naco-Supai Formations, basal Coconino Sandstone, the Kaibab Limestone, basal Moenkopi Formation, the Sonsela Sandstone of the Chinle Formation, the lower Kayenta Formation, and the Dakota Sandstone.

Radioactive clastic units near the contact of the Naco and Supai Formations, near the Pennsylvanian-Permian boundary, at Promontory Butte, Gila County have been explored by at least two drill programs in the 1970's. One shipment of less than 500 tons of low grade ore was made from the Neptune (Promontory Butte listing) in 1979. The host rocks consist of gray sandy shales associated with limestone pebble conglomerate lenses, both overlain and underlain by sandy redbeds (see Blazey, 1971; Peirce and others, 1977). The strata contain locally abundant carbonized plant remains. Uranium and copper carbonate mineralization are apparently loosely associated with the gray shales, contacts between various beds, and organic matter.

One occurrence of radioactive oxidized copper carbonates and iron-manganese staining is recorded at Saucer No. 1 claim, Coconino County, at the contact between the Hermit Shale and the Coconino Sandstone.

Radioactive oxidized copper occurrences in the Permian Kaibab Limestone are recorded at the following localities: In Coconino County at the Airport mine, Anita copper mine, Barranca de Cobre, Blue Bonnet, Copper No. 1, Packrat, National, Twin Tanks, and unnamed "B" occurrences, and at the School section claims of Mohave County. The Copper No. 1 claims shipped 29 tons of ore @ 0.10% U_3O_8 and 0.02% V_2O_5 in late 1956 under the name of the Doty Group.

The Kaibab occurrences are usually copper carbonates lining fractures, sometimes localized at crests of small tight folds. In the Willaha-Anita area north of Williams, some drilling was done in the early 1970s and again in 1979-1980 by at least three companies. The contemplation of a possible relationship between these surface copper-uranium shows and a possible buried pipe structure as represented by the nearby Orphan Lode, a major copper-uranium producer, is probably sparking this interest. Preliminary indications from the Willaha-Anita area are that pipe structures are present. If so, then this indicates that elements of pipe formation transgress upwards at least to the Kaibab Limestone, an observation not discernable at the Orphan Lode or at Hack Canyon because the pipes there top-out below the Kaibab.

Four radioactive occurrences with copper shows are recorded from the basal Moenkopi Formation: in Coconino County at the Clover Leaf mine No. 1 and at unnamed "C"; and in Mohave County at the Fredonia No. 1 and Little Three No. 1 claims.

Mineralization near the Sonsela Sandstone of the Petrified Forest Member of the Chinle Formation is found at the Mac No. 3 claims and the Ruth Mine of Navajo County. Stratigraphically, these grade downward into the numerous lower Petrified Forest Member ores around the Cameron-Holbrook district. The Ruth mine was the largest of the Holbrook area producers and is credited with small shipments in 1976 and 1978.

The lower Kayenta Formation yielded some uranium ore from the Cameron area (Coconino County) from two properties, Ward Terrace and Yellow Jeep during the 1950s.

The Navajo Sandstone (Jurassic? or Triassic?) contains three uranium-copper occurrences, in Coconino County at the Copper Mine Trading Post and at White Mesa copper claims, and in Apache County at the Bluestone No. 1 claims. Bluestone produced 53 tons of ore @ 0.22% U_3O_8 in 1956.

The Recapture Member of the Morrison Formation in the Lukachukai Mountains contains several anomalies which are noted in Chenoweth and Malan (1975). These are not plotted on the Lukachukai district map because of lack of location details.

Finally, the Cretaceous Dakota Sandstone contains one radioactive anomaly in Navajo County at the Fred Zahne Nos. 1-5 claims in a uraniferous lignitic coal bed.

COLORADO PLATEAU MINERALIZATION

SYNTHESIS

Many aspects of uranium mineralization in Colorado Plateau sedimentary rocks reccur in most host lithologies, irrespective of age. These have been noted by many previous workers including Finch, 1953; Stokes, 1954; Mullens and Freeman, 1957, Kerr, 1958; Peterson, 1977; and Galloway, 1979. The important themes are repeated here:

a) A primary lithologic characteristic of host rocks is interbedded sandstones and mudstones rather than sandstone-dominated units. The Lukachukai district map (Plate 19) shows this relationship very well. Auxiliary feldspar and mica grains are frequently mentioned.

b) Carbonized plant debris, present as mattes between sandstone-mudstone beds or disseminated in sandstones, or as fossil wood or log fragments, is ubiquitous in larger uranium deposits.

c) The recurring paleonenvironmental theme involves fluvial (stream) systems on alluvial fans, or delta distributary channel systems adjacent to lacustrine environments. No major Arizona Plateau sedimentary deposit is contained in any other paleonenvironmental setting.

d) Plateau uranium deposits are geochemically segregated - for unknown reasons - into either uranium-copper or uranium-vanadium associations (Finch,1953).

e) Plateau-type structural features are often noted to "accompany" uranium districts and mention is made of genetic relationships (Kerr, 1958; Stokes, 1954), the hypothesis being that the structures recognized today (monoclines, uplifts, etc.) had some movement history during sedimentation and hence somehow controlled favorable lithologies such as meander bend positions. At times, though, as in the Lukachukai Mountains, these effects may be very subtle, or even nonexistent. Overall, this aspect of the theme of Colorado Plateau uranium distribution may relate to the simple uncovering and erosion of the strata along flanks of uplifts or monocline middle limbs, making the mineralized strata discoverable.

f) The geochemically divergent mineral associations for the Plateau uranium deposits indicates complex, multiphase migration, chemical zonation, and fixing of uranium and related species (see Botinelly and Weeks, 1957). Paleothermometry measurements (Coleman, 1957) indicate low (55-115°C) temperature of mineralization. Bleached zones, liesegang banding, fracture control of some veins, and mineral zoning all indicate post-sedimentation, diagenetic movement of ore-related solutions at somewhat elevated temperatures. Radiometric dating of uranium minerals and authigenic clays suggest a Jurassic-Cretaceous age for mineralization, a result that agrees with field data.

g) The ultimate source of uranium is most probably the Mesozoic arc volcanism and plutonism along the west coast of North America. Malan (1968) suggests that the pyroclastic components of this volcanism could be a primary source of Colorado Plateau uranium. Deep-seated hydrothermal emplacement of the ore-bearing solutions has sparce supportive evidence for the Plateau deposits (see Finnell, 1957 and Kerr, 1958). An alternate source of uranium

could be Precambrian crystalline rocks present either in the Mogollon highlands or beneath the Colorado Plateau. Silver (1976) and Silver and others (1980) suggest the presence of a regional uranium anomaly in Precambrian basement rocks centered beneath the part of the Colorado Plateau that contains all the major producing uranium districts. Their work is based on uranium concentrations in igneous zircons.

SOUTHERN ARIZONA REGION

STRATABOUND OCCURRENCES

Dripping Spring Quartzite

During 1953-1960, a total of over 122,000 lbs of U_3O_8 concentrate has been produced from 18 mines in the Precambrian Dripping Spring Quartzite in Gila County, with an overall average grade of nearly 0.20% U_3O_8. The vanadium content of the ores from two properties amounted to 6500 lbs of V_2O_5.

Uranium was discovered in the Dripping Spring Quartzite in 1950 at the Red Bluff property and in 1953 along Workman Creek. In the spring of 1954 the AEC conducted a three-month low-level airborne gamma ray survey of the Sierra Ancha area, resulting in more than twenty new discoveries which were subsequently prospected. In July, 1955, an AEC ore-buying station was established at a railhead at Cutter (near Globe) primarily to purchase Sierra Ancha Dripping Spring Quartzite ores. It closed June 30, 1957, when the AEC determined that remaining ore volumes were too small for further economic consideration. Because this buying station also received other ores from southern Arizona, its operation essentially controlled uranium mining in the region.

Overall, uranium production in Dripping Spring Quartzite ores has been disappointing. Cutoff width of ore grade veins has often been one to two feet. Past that width, dilution of ore by low grade wall rock was a serious problem, especially since ore sorting was difficult by using geiger counters. Ore veins were quite limited in extent, typically measuring 2 ft thick, 10 to 20 ft in height, and 100 to 200 feet in length.

Major discussions of Dripping Spring Quartzite uranium occurrences are found in Williams (1957), Schwartz (1957), Walker and Osterwald (1963), and Granger and Raup 1969(a) and 1969(b). In addition, the NURE Mesa quadrangle evaluation report prepared by Bendix, in review as of February 1981 contains an appraisal of Dripping Spring Quartzite occurrences. See Granger and Raup (1964) and Shride (1967) for discussions of central Arizona younger Precambrian stratigraphy.

The Dripping Spring Quartzite is a member of the late Proterozoic-aged Apache Group, which consists in ascending order of the Pioneer Shale, the Dripping Spring Quartzite, the Mescal Limestone, and a capping basalt (Figure 27). The Apache Group sediments were deposited on a surface cut on Precambrian granites and metamorphic rocks that have age dates as young as about 1,380 m.y. The Apache Group is overlain disconformably by the Troy Quartzie. All of these sediments are intruded by massive diabase-syenite sills that have age dates ranging from 1,050 to 1,250 m.y. (all age data from Livingston, 1969). Apache Group rocks are approximate lithologic equivalents of the Unkar Group sediments of the Arizona Grand Canyon region (described by Breed and Roat, 1974), and are rough age equivalents of the middle Belt Carbonate unit of the Belt Group sediments of Idaho, Montana, Alberta, and British Columbia, as described by Harrison (1972). Curiously, as Harrison points out, anomalously high copper values

are found in many of the Belt terrain rocks, and are attributed to a syngenetic-diagenetic origin. Similarly, farther north in northern Saskatchewan, a moderate-size uranium deposit in quartzites of the Athabasca Formation (± 1,250 m.y. age) at McClean Lake is now being developed (anonymous, 1980). Here it is suggested that the uranium was hydrothermally derived from the underlying basement complex and precipitated in a reducing environment in the sandstones before their metamorphism to quartzites.

Carlisle and others (1980) describe uranium anomalies in the lower part of the Kingston Peak Formation of the late Proterozoic Pahrump Groups of southern California. These sediments, like the Apache Group, rest on 1400 m.y. crystalline rocks containing abundant uranium anomalies (World Beater complex). The Kingston Peak Formation is overlain unconformably by the Noonday Dolomite. Carlisle, et al, suggest derivation of uranium in the sediments from the eroding "islands" of older crystalline rocks during Pahrump time. Both quartz pebble conglomerates (Witwatersrand model) and pelitic schists containing unusual amounts of pyrite, chalcopyrite, and graphite are anomalously radioactive. It cannot be dismissed at this writing that the Pahrump and Apache Groups were part of the same sedimentary cycle, and as such may share information on origin of late Proterozoic stratabound uranium in the Western United States (see Carlisle and others, p.41-42 and 45). Studies reviewed in the Carlisle reference, based upon microfloras, and geologic relationships to diabase masses of presumed age indicate a possible pre 1.1 b.y. age for part, or all of the Pahrump Group.

Dickinson's (1977) Figure 1 shows the extent of known occurrences of sediments of this general age in North America. See also a general paper on the probable plate tectonic setting of the Apache Group rocks by Sears and Price (1978). Figure 28A from Shride (1967) is a north-south cross section through the Sierra Ancha, and suggests a pre-Troy warping and beveling event, and Figure 28B shows a post-Troy, pre-Devonian Martin block faulting event probably associated with the Antler Orogeny of Nevada. This is, in essence, the structural setting of the Apache Group rocks seen today in the Sierra Ancha, simplified as Figure 29. Figure 30, also from Shride (1967), shows all the known outcrops in Arizona of Apache Group rocks and the associated diabase. Outside of this region in Arizona the Apache Group rocks were apparently either not deposited or removed by erosional events ranging in age from late Precambrian to mid-Cenozoic. It is thought from drillhole information that the Apache Group rocks do not extend far to the north or east from the Sierra Ancha under the Colorado Plateau Paleozoic blanket. (H. Peirce, pers. comm., 1980). The Apache Group is not continuous with the Grand Canyon Unkar Group rocks under the Paleozoic cover of the Coconino Plateau because of either nondeposition on the Transcontinental Arch or extensive pre-Paleozoic erosion along this same feature, or both. Figure 29 suggests the southwest and northeast limits of the Apache Group rocks in the Sierra Ancha are, respectively, erosional removal in the Tonto Basin area and the burial of the section under Paleozoic cover east of the Canyon Creek fault.

Minor oxidized copper minerals occur at many of the deposits, though not in mineable quantities. See Granger and Raup (1969a, p.80) for a table listing ore and accessory mineral occurrences. Purple fluorite has been recognized only at the Hope 3, Sorrel Horse, Big Buck, and Tomato Juice deposits, and only in small amounts. The fluorite coexists with pyrite in thin veinlets in the central part of the radioactive vein zones.

Two theories exist to explain the origin of the uranium. Schwartz (1957) and Granger and Raup (1969a) favor the explusion of uranium-copper fluids from diabase differentiates and their subsequent incorporation into the favorable quartzite horizons along fracture channelways that formed adjacent to intrusive masses. They suggest that unidentified structural, mineralogical, or chemical properties of the gray unit made it very favorable as a receipient of the uranium mineralization (p.97). They note, however, that these sediments contain abnormally high carbon, and that iron sulfide contents could have contributed to a H_2S gas partial pressure that could have reduced mobile uranium species to UO_2. Granger and Raup (1969a, p.102) also note that at three deposits (Hope 1, Workman 1, and Red Bluff) uraniferous veins appear to end abruptly at contacts with diabase dikes and sills, as though the diabase had cut the mineralized veins.

Williams (1957) suggests, on the other hand, that the diabase, even with its alkalic differentiates, had less than one tenth the amount of uranium as the gray unit of the Dripping Spring Quartzite originally, and thus the latter is the more probable original source of the uranium. He subscribes, however, to the hydrothermal movement of the uranium into the fractures at the time of the diabase intrusions.

Granger and Raup (1969a, p. 76) list a series of uranium-lead age dates for five Dripping Spring uraninites. A series of single uranium-lead pair model ages range mostly from 900 to 1,300 m.y. with only four out of 15 determinations recording less than 900 m.y. In addition, one lead-lead determination on cognetic galena gave an age of 1,140 m.y. Concordia plots of the two isotopic systems produced two sets of curves which intersected at about 1,050 m.y. These numbers may minimally approximate the age of ore formation in view of the fact that on the whole, the dated Dripping Spring uranium minerals are in good radiometric equilibrium (Granger and Raup, (1969a, Figure 43). These ages are consistent with all known age relations of the Apache Group, and indicate that the mineralization is either syngenetic with Apache Group sedimentation or not appreciably younger than the diabase intrusion.

It is this author's opinion that Williams' (1957) suggestion is the more reasonable one, since a) other similar-appearing Dripping Spring Quartzite units are barren of mineralization, and b) the upper member nearly ubiquitously contains anomalous radioactivity in several mountain ranges, whether or not diabase intrusions are nearby. Shride's cross-section (Figure 28A) shows a gentle Apache Group-Troy Quartzite angular unconformity, a hiatus which could serve as a time during which mineralization could have occurred (H.W. Peirce, pers.comm.,1981).

Pyrometasomatic hematite-specularite mineralization bedded into the Mescal Limestone along Canyon Creek was earlier thought to relate genetically to the diabase intrusion. More recent suggestions by Moore (1968, p.27-29) discount this hypothesis.

Example - Red Bluff Mine

The Red Bluff claims, discovered in 1950, record the first uranium find in the Dripping Spring Quartzite. The deposit, seen in Figure 31, contains many characteristics of Dripping Spring occurrences. The mined deposits are in two main separate stratigraphic zones in a gently eastward dipping Dripping Spring Quartzite section on opposite sides of N20°E-trending Warm Creek Canyon, in the southern-most Sierra Ancha. Warm Creek follows a 150 foot-thick diabase dike that has intruded a fault zone with about 250 feet of apparent reverse, east side down movement. Mining has followed three separate stratigraphic zones, above and below the "barren quartzite" as seen in the cross section, and has also exploited a series of strong N70°W mineralized and limonite-filled fractures which strike at right angles to the large diabase dike. Within two miles to the southeast, as seen on the map, a series of large-scale shear zones with possible left-lateral offset also trend N70°W, but lack known mineralization.

Primary minerals at the deposit include uraninite, pyrite chalcopyrite, and galena, all disseminated in the quartzite host and often concentrated along bedding planes. Oxidation near the present land surface in recent times has produced metatorbernite, bassetite, uranocircite, and uraniferous hyalite as fracture coatings. These minerals also line bedding planes and are disseminated in leached, weathered host rock. Much of the Red Bluff uranium ore shows indications of recent uranium leaching, and has chemical uranium content that is 10-60% low when compared to radiometric uranium content (Kaiser, 1951, Table 1). As well, Granger and Raup (1969a, Table 5), indicate lower U-Pb age dates at Red Bluff than any of the other Dripping Spring localities. All these effects are probably related to the rapid modern weathering of the hilltops by the southward flowing streams in the area around the Red Bluff Mine.

Exploration at Red Bluff is continuing. Drilling and eastward extension of an adit in the eastern mine block by Wyoming Mineral Corporation (Exploration arm of Westinghouse Corporation) in the past several years has outlined 2.5 million pounds of low grade uranium ore that has undergone some metallurgical testing (Paydirt, Feb.1977 issue, p.64). Wyoming Minerals Corporation is also drilling as of late 1980 in the Workman Creek area.

Since 1977, Dripping Spring ores from the old Lucky Boy property of the Southern Pinal Mountains have been mined and heap leached by Pinal Minerals Corporation. Several shipments of a brine concentrate have been made from the mine.

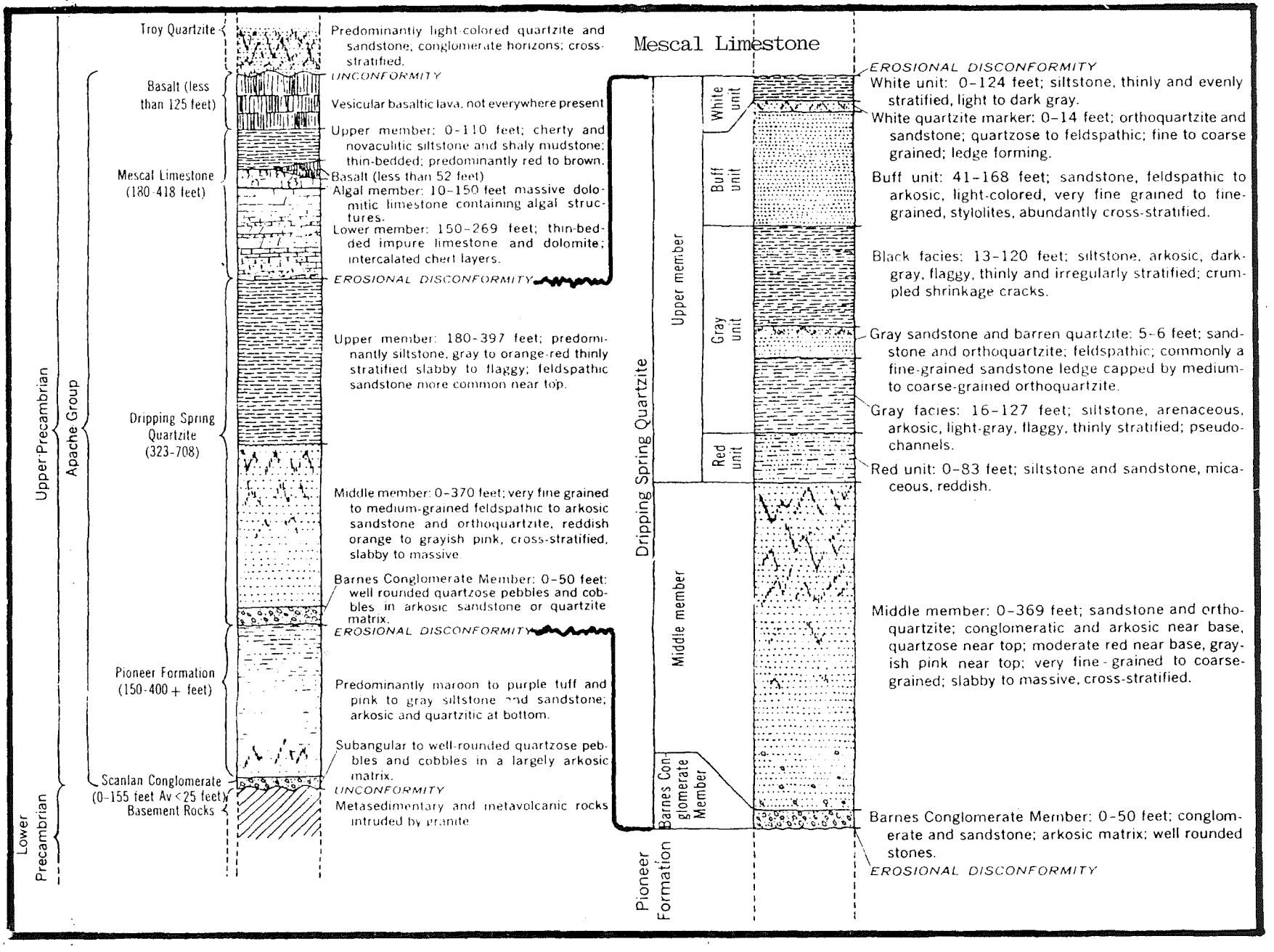
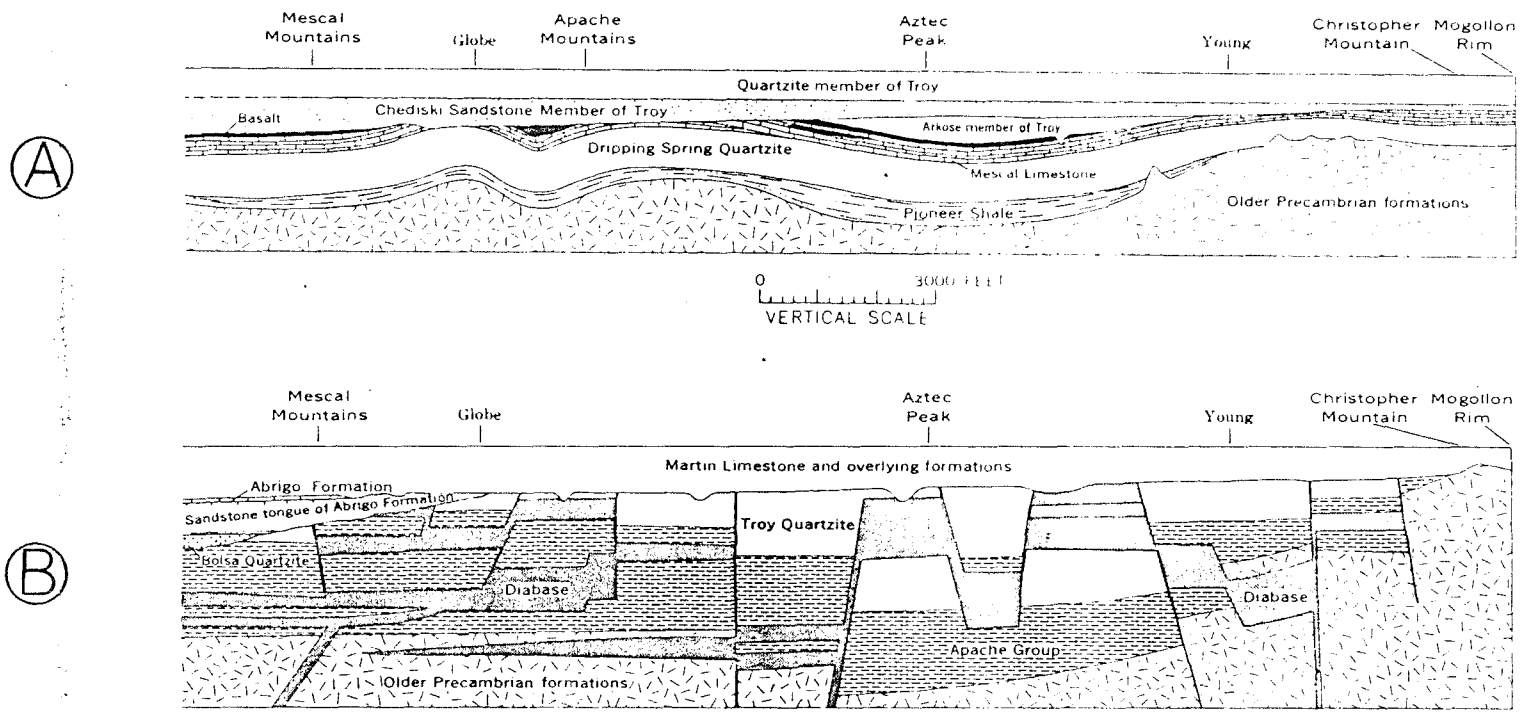


Figure 27. Apache Group-Dripping Spring Quartzite stratigraphic column, from Granger and Raup (1964).

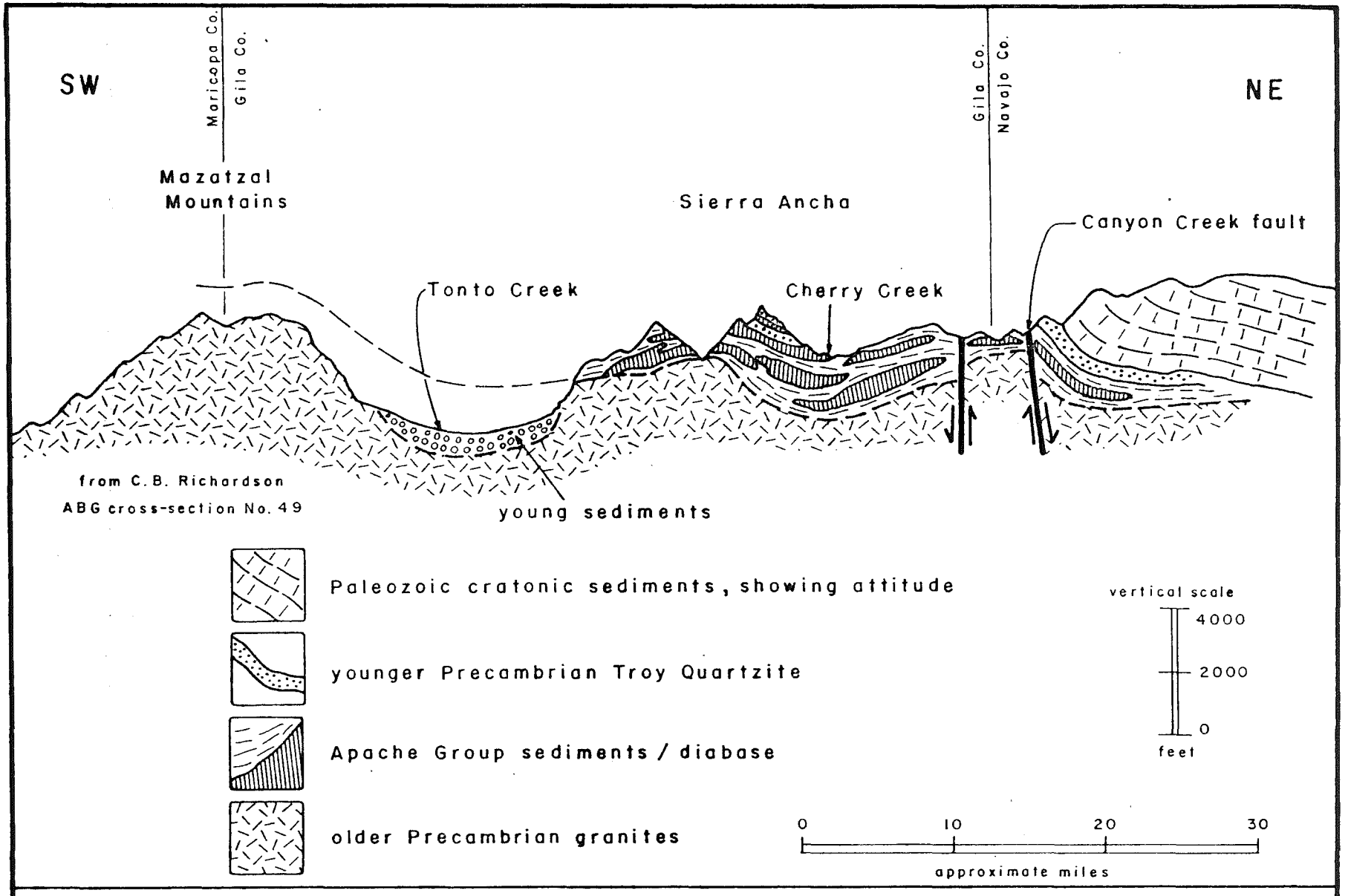


North-south cross sections through the Sierra Ancha, Gila county, from Shride (1967).

(A) at the end of Troy Quartzite time

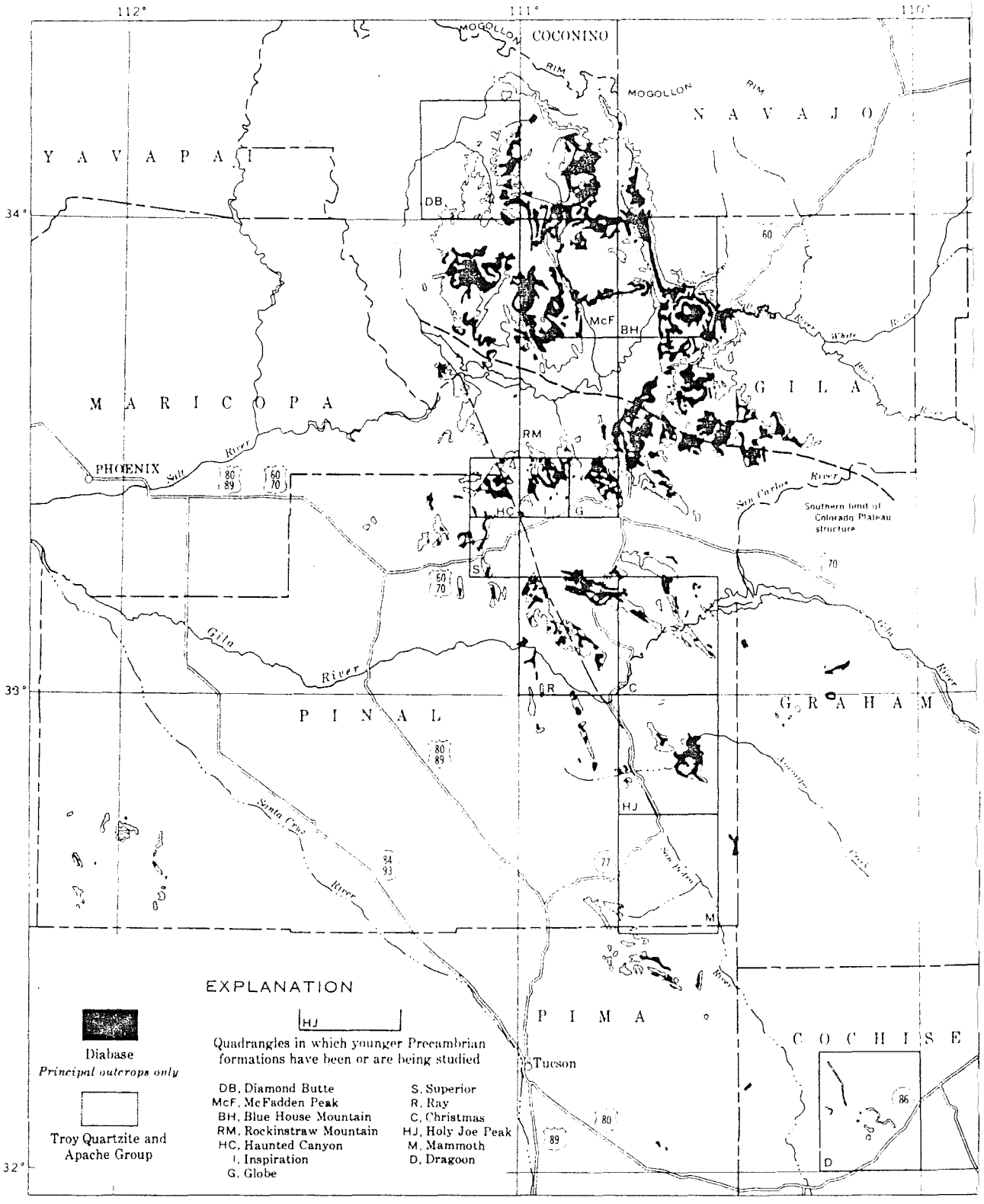
(B) at the end of Martin Fm. time

Figure 28



Generalized SW-NE Cross-Section showing extent of Apache Group Outcrops, Sierra Ancha, Gila County

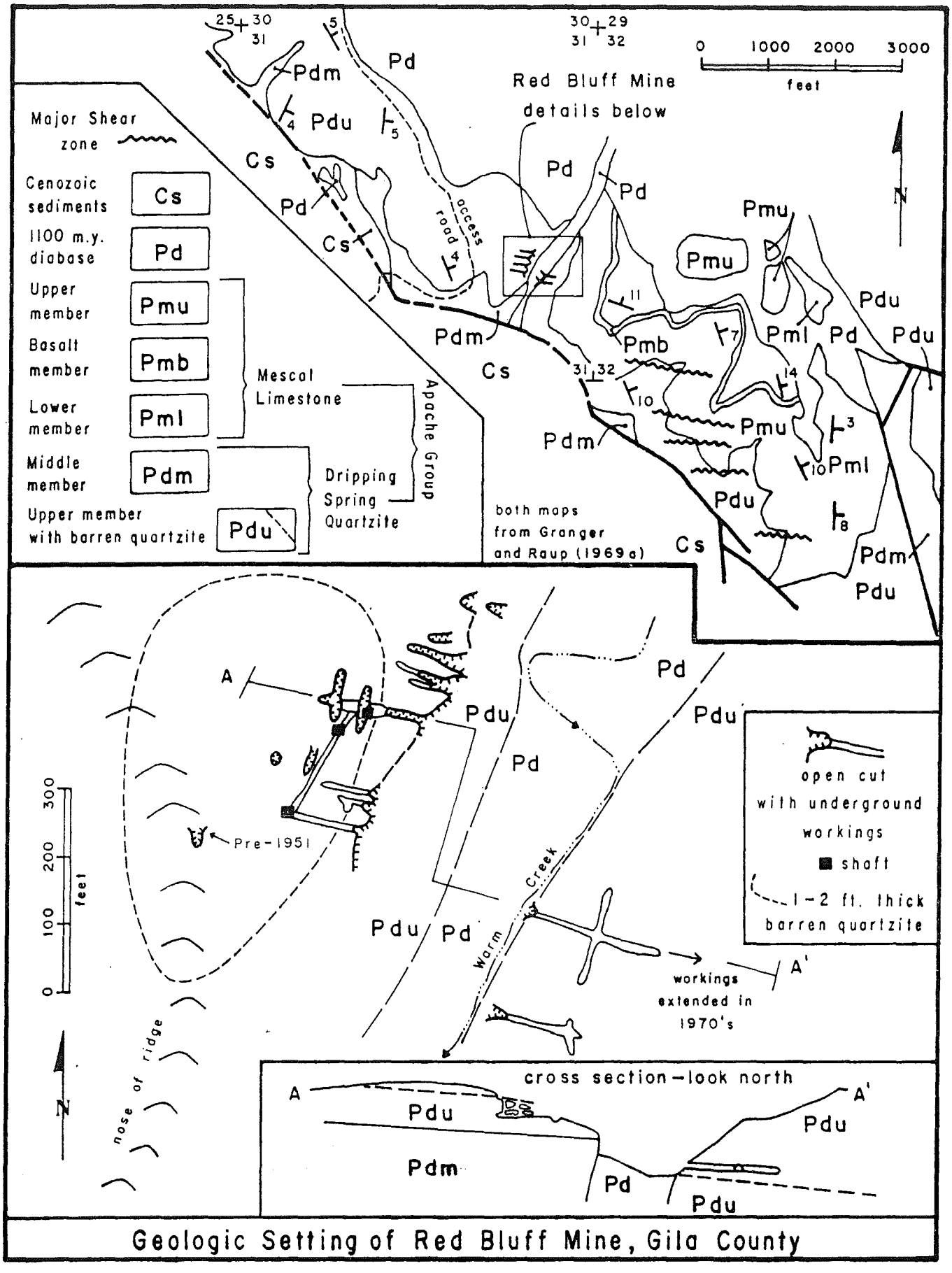
Figure 29



Shride (1967), p. 12

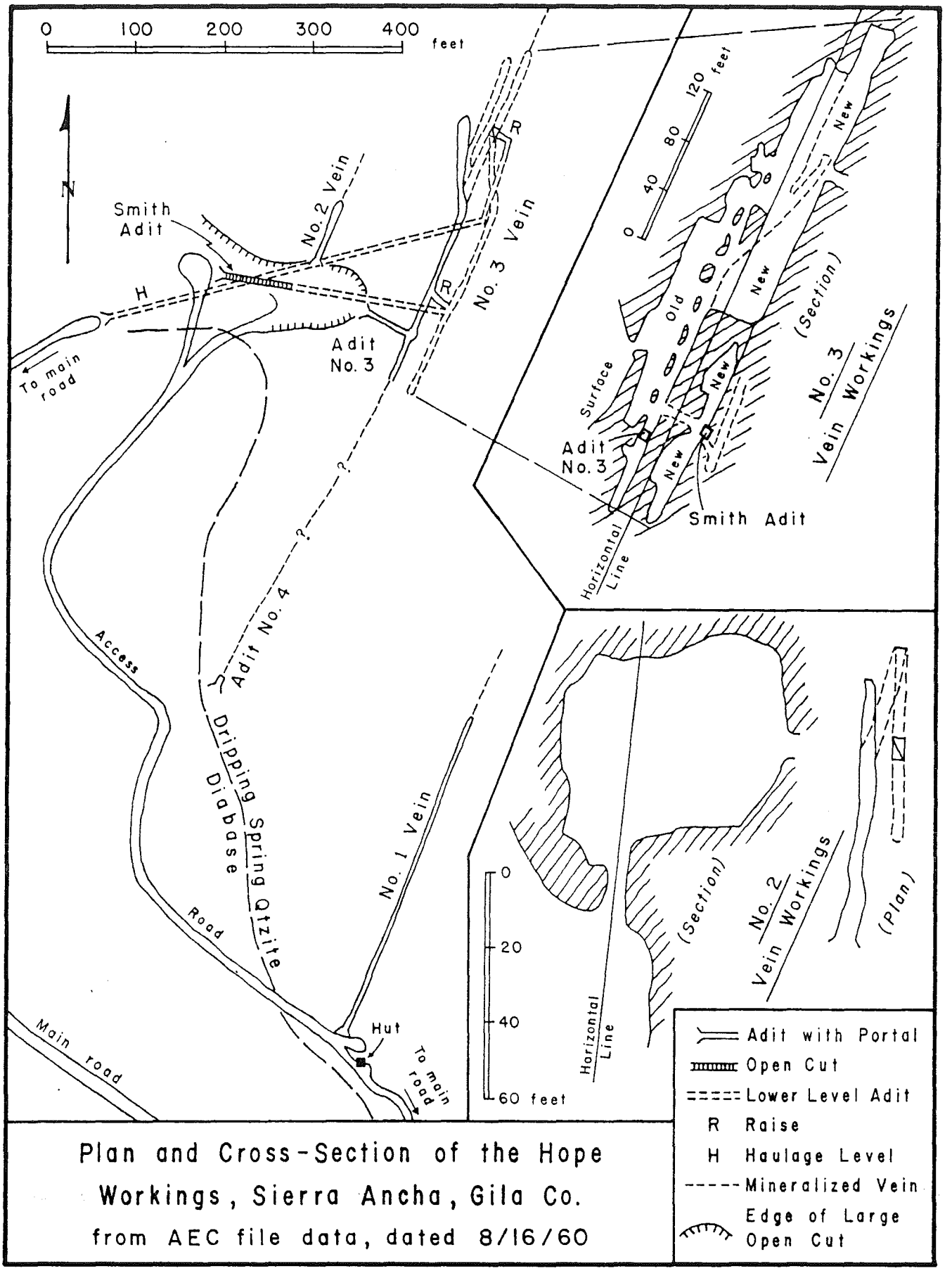
Outcrops of younger Precambrian strata and coextensive diabase intrusions in southeastern Arizona. Modified from county geologic maps published by Arizona Bureau of Mines, 1958–60.

Figure 30



Geologic Setting of Red Bluff Mine, Gila County

Figure 31



Plan and Cross-Section of the Hope Workings, Sierra Ancha, Gila Co.
from AEC file data, dated 8/16/60

Figure 32

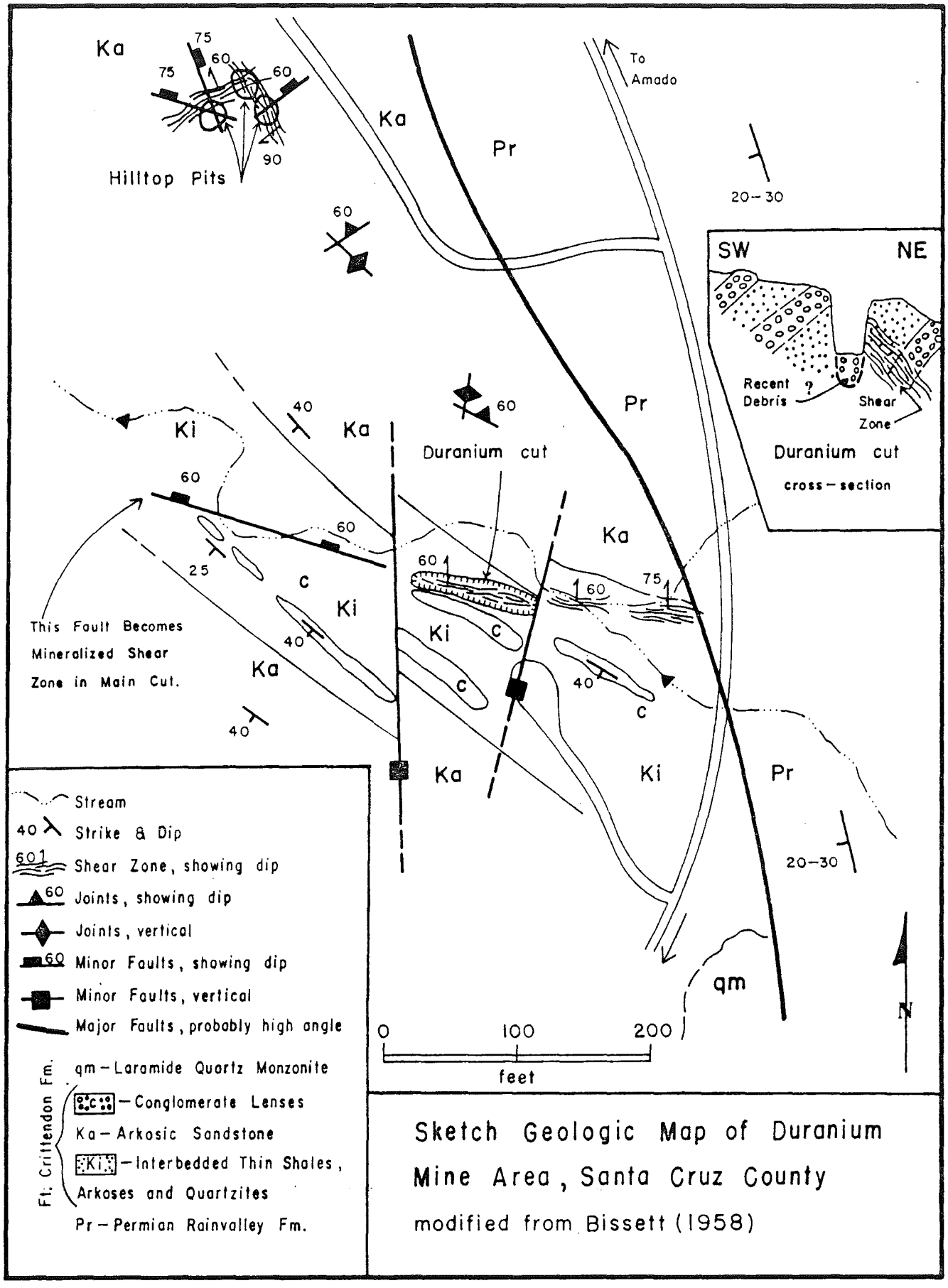
Cretaceous Sandstones

In contrast to the relatively abundant Mesozoic uraniferous sandstone deposits of the Colorado Plateau, southern Arizona has a paucity of such occurrences. Only three are noted: The Dipsy Doodle claims of Cochise County; the Duranium Mine of Santa Cruz County, and "unnamed D" occurrence of Pima County.

At the Dipsy Doodle claims east of Douglas in the Perilla Mountains, radioactivity is associated with limonite-hematite alteration zones in shales and sandstones of the Bisbee Group rocks of Lower Cretaceous age. At "unnamed D" occurrence on the southwest flank of the Whetstone Mountains, stratabound chrysocolla with very slight radioactivity fills intergranular voids in a 2-4 foot thick sandstone unit in a thick southward dipping clastic sequence mapped as Bisbee Group by Drewes (1980).

The only known uranium production from Mesozoic clastic rocks in southern Arizona comes from the Duranium Mine on the northwest flank of the Santa Rita Mountains. See Figure 33 for a sketch geologic map of the area. Drewes (1971, Mt. Wrightson quad geologic map I-614) maps the host rock as the upper red conglomerate and tuff member of the Upper Cretaceous Fort Crittenden Formation, and shows the Cretaceous clastics here as in high angle fault contact to the south and east with Paleozoic limestones. The entire Cretaceous section lies beneath a late Cenozoic pediment surface that terminates at the resistant Paleozoic outcrops. Uranium mineralization follows a N80°W shear zone that cuts across bedding in a conglomerate-arkosic sandstone-red shale bedded sequence which dips about 35°SW. Intense hematite and minor malachite follow the shear zone as well. Two miles to the southeast, a series of WNW-trending quartz latite dikes (dated at 67 m.y. by K/Ar) are mapped by Drewes (1971). These may relate to the Duranium shear zone insofar as their strike directions coincide.

The most radioactive rock at Duranium is a very hard, dense arkosic sandstone with void spaces filled with a shiny black mineral. 680 tons of ore @ 0.20% U_3O_8 was produced in 1956-57 from a long, narrow 15 ft deep dozer pit oriented along the shear zone. Mining stopped when the AEC ore buying station at Cutter (Globe) closed. Indications are that more ore-grade material remains in the area. Radioactivity and minor prospect pits are found on several knobs containing the same strata up to 0.5 miles northwest of the main pit, approximately along strike of the units exposed in the pit. Hence, there are indications of an underlying stratigraphic control of mineralization in the area, rather than an exclusive structural control.



Sketch Geologic Map of Duranium Mine Area, Santa Cruz County
modified from Bissett (1958)

Figure 33

Cenozoic Sediments

The Basin and Range portion of Arizona contains many stratigraphically confined uranium anomalies in fine-grained fluvial, paludal, and lacustrine rocks, of Cenozoic age, among them being the publicized Anderson Mine in the Date Creek Basin. This area contains estimated reserves of at least 30 million pounds of U_3O_8. In Arizona, some of these sedimentary occurrences are described in detail by Scarborough and Wilt (1979). Interesting analogs in California are discussed by Leedom and Kiloh (1978) and a report by Lucius Pitkin, Inc. (1980), and in Texas and Chihuahua, by Galloway and Kaiser (1980). Preliminary work on calcrete-gypcrete uranium deposits in the Southwest are compiled in Carlisle (1978).

Southern Arizona uranium occurrences of this category are found in sediments of Oligocene, Miocene, and Pliocene ages. Many of these rocks are coeval with a variety of volcanic rocks which commonly range in composition from high-potassic andesites through rhyolites, and occasional "ultra-potassic" trachytes (Shafiquallah, et al, 1976), yet, the fine-grained sediments contain many more radioactive anomalies than do the volcanics. In general, these deposits are assumed to have formed in paleo basins of restricted depth and lateral extent. Some of the larger basins were undoubtedly tectonically created, while many of the thinner sedimentary deposits found in volcanic terrains probably were created by volcanic damming effects as volcanism proceeded.

Lithologies in southern Arizona favorable for uranium mineralization include fetid, thin-bedded limestones that often contain chert pods or stringers; shale-mudstone lithologies with white, gray, or yellow-green colors; white marlstones (intimate mixtures of clays and finely divided calcium carbonate), thin-bedded aphanitic dolomites that sometimes contain plant root casts filled with chert; and dark gray-to-black carbonaceous mudstones or sublignites. In the absence of structural control, coarser-grained lithologies such as sandstones or conglomerates do not contain anomalies, nor do redbed lithologies. Examples of anomalies in redbeds with structural control are at the Cottonwood claim and Horseshoe Dam (Maricopa County), and the Rayvern and Ten Dee's claims (Yuma County).

Table 1, below, lists typical lithologies in southern Arizona which have radiometric or uranium shows, along with examples illustrating the lithologies:

TABLE 1. Examples of Uranium Occurrences in Cenozoic Sediments

Radioactive Lithology	Example(s)
Limestone, sometimes fetid, sometimes cherty	Masterson Claims, Mohave Co. Cave Creek Area, Maricopa Co. Dutchess Claim, Pima Co. Center Chance Claims, Pima Co. Catherine and Michael, Mohave Co.
Aphanitic dolomite, light colored	Los Cuatros Claim, Maricopa Co.
Light-colored mudstone	Teran Basin, Cochise Co. North Chance Claim, Pima Co. Muggins Mtns. Area, Yuma Co. Dab; Wharton; Sunset; Mohave Co.
White massive marlstones	Xmas; Half Moon Claims, Pima Co. Cottonwood Area, Verde Valley, Yavapai Co.
Dark carbonaceous mudstones to sublignites	Giger Claims, Gila Co. Anderson Mine, Yavapai Co.

Stratigraphic sections containing Oligocene-Miocene layered rocks are often found tilted in a rather uniform direction and amount over large regions within the Basin and Range country of the Cordillera. Stewart (1980) suggests a certain elongate regionality to these "domains" of tilted rocks, though the ultimate reason for their existance is unknown at this time. Many of the Southern Arizona uranium occurrences in Oligocene-Miocene strata or fault zones are in terrains affected by this phenomenon. Examples include many of the occurrences in the Muggins Mountains, and the Rayvern claims, Plomosa Mountains of Yuma County, the Anderson Mine area of Yavapai County, the Horseshoe Dam sites of Maricopa County, Catherine and Michaels claim in Mohave County, and the Chance Group claims of Pima County with related Teran Basin deposits of Cochise County, to mention a few. Evidence is gathering that some of this tilting is due to NW-SE directed curviplanar fault systems ("listric" faults) which cause antithetic rotation of upper plate rocks (those above a master basal flat fault of unknown extent) to produce dips toward the listric fault, as faulting proceeds. The result, well displayed in the cross section near the Anderson Mine (Figure 36), is that the same stratigraphic section may be repeated time and time again at the surface, and hence, the observed tilted section appears much thicker than it really is.

The following examples are uranium occurrences in Cenozoic sedimentary rocks in Southern Arizona of three different ages. It is suggested in Scarborough and Wilt (1979) that there appears to be a certain regionality to the ages of Cenozoic sedimentary uranium occurrences in Southern Arizona, based upon the proposition that only at certain times were there fluvial-lacustrine environments of any extent that favored uranium deposition. These times, from which the examples were drawn, were during the late Miocene-Pliocene (6-2 million years B.P.), during the middle of the first half of the Miocene (20-15 m.y.), and during the middle part of the Oligocene (30-25 m.y.).

In all three periods there were regions where fluvial, deltaic and lacustrine facies were in close proximity, and where numerous uranium occurrences are now recorded. The examples are given in order of increasing age, in parallel with the age listings above. The Anderson Mine strata are rough age equivalents of the radioactive dolomites around New River and Cave Creek (Los Cuatros locality).

EXAMPLES:

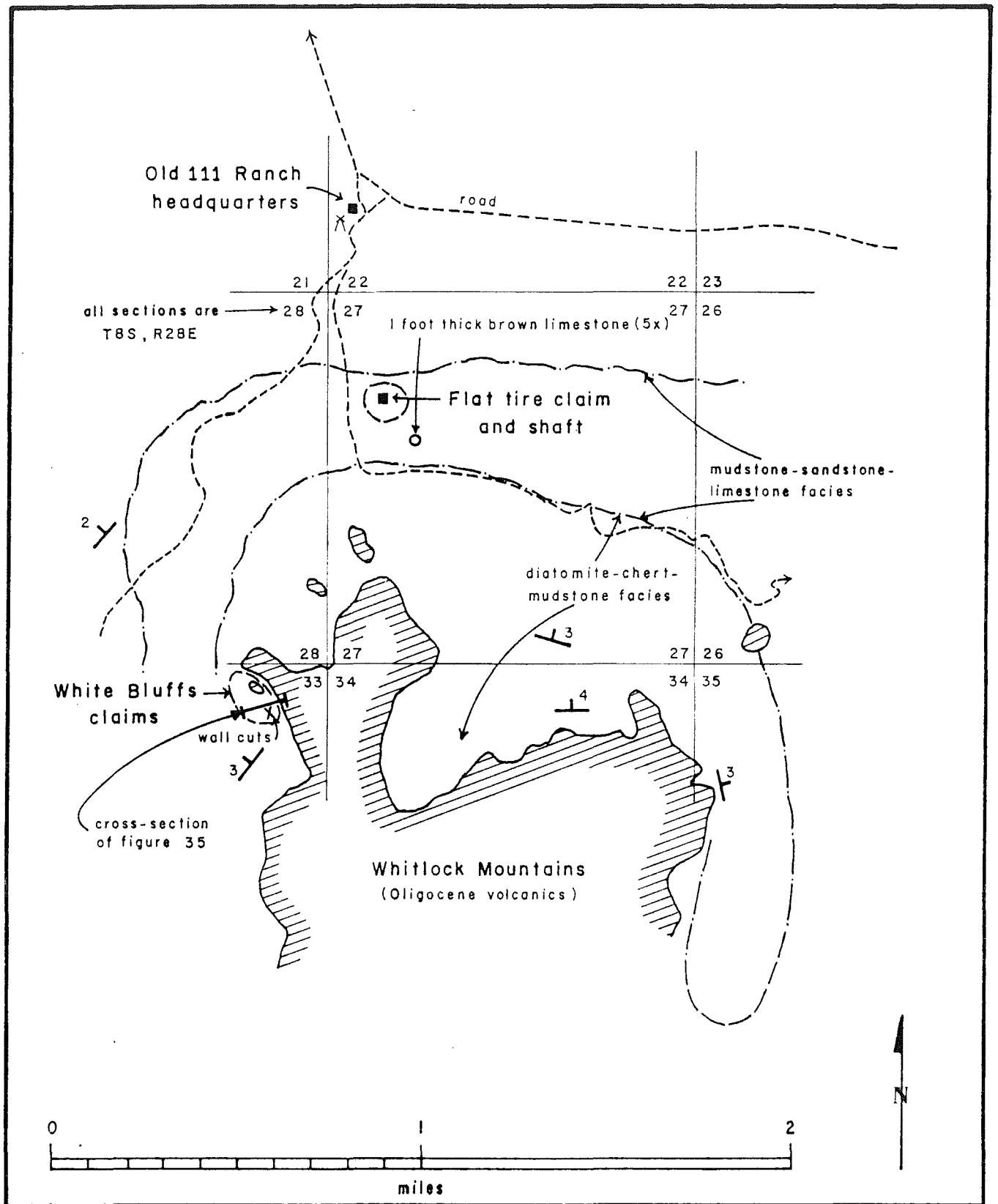
Pliocene Rocks near Safford, Graham County

Figure 34 is a general map view of the northern Whitlock Hills, about 17 miles southeast of Safford, in Graham County. In this area a section of quiet water, lacustrine and paludal fine-grained sediments of Pliocene age has been deposited against a mass of Oligocene volcanics. Figure 35 (top) is a generalized south-looking cross section showing general lithologies and radioactive beds at the White Bluffs claims. The anomalous zones are in (a) the cherts of a mixed tabular green chert and gray-green mudstone zone, and (b) the basal 2 feet of an overlying 20 ft thick diatomite zone. Nearby

masses of green chert incorporated into the diatomite are not anomalous. Figure 35 (bottom) is a nearby south-looking view of the same stratigraphy, folded nearly isoclinally, and displaying the highest radioactive readings at the crests of anticlines (see the Morale claim, Hopi Buttes, Navajo County for an interesting analog). Other claims in this area are staked on similar lithologies. At the Flat Tire claims (Figure 34) diatomaceous mudstones and a nearby thin, brown, fetid limestone containing bivalve fossil forms are anomalous. Most mudstones and cherts that have been analyzed for organic carbon in the White Bluffs-Flat Tire area contained 0.08-0.30% C (NURE data).

The exposed Pliocene section in the area measures about 100-150 ft thick and contains at least three thin vitric airfall ash beds of rhyolitic composition which have K/Ar age dates of about 3 m.y. and large mammal paleontologic ages of Blancan (5-2 m.y.) age. (Scarborough, 1974; E. Lindsay, pers.comm., Jan. 1981). The ash beds are undevitrified in places, but altered to clay-zeolite assemblages in others. They appear not voluminous enough or altered enough to account for the amount of uranium in the area.

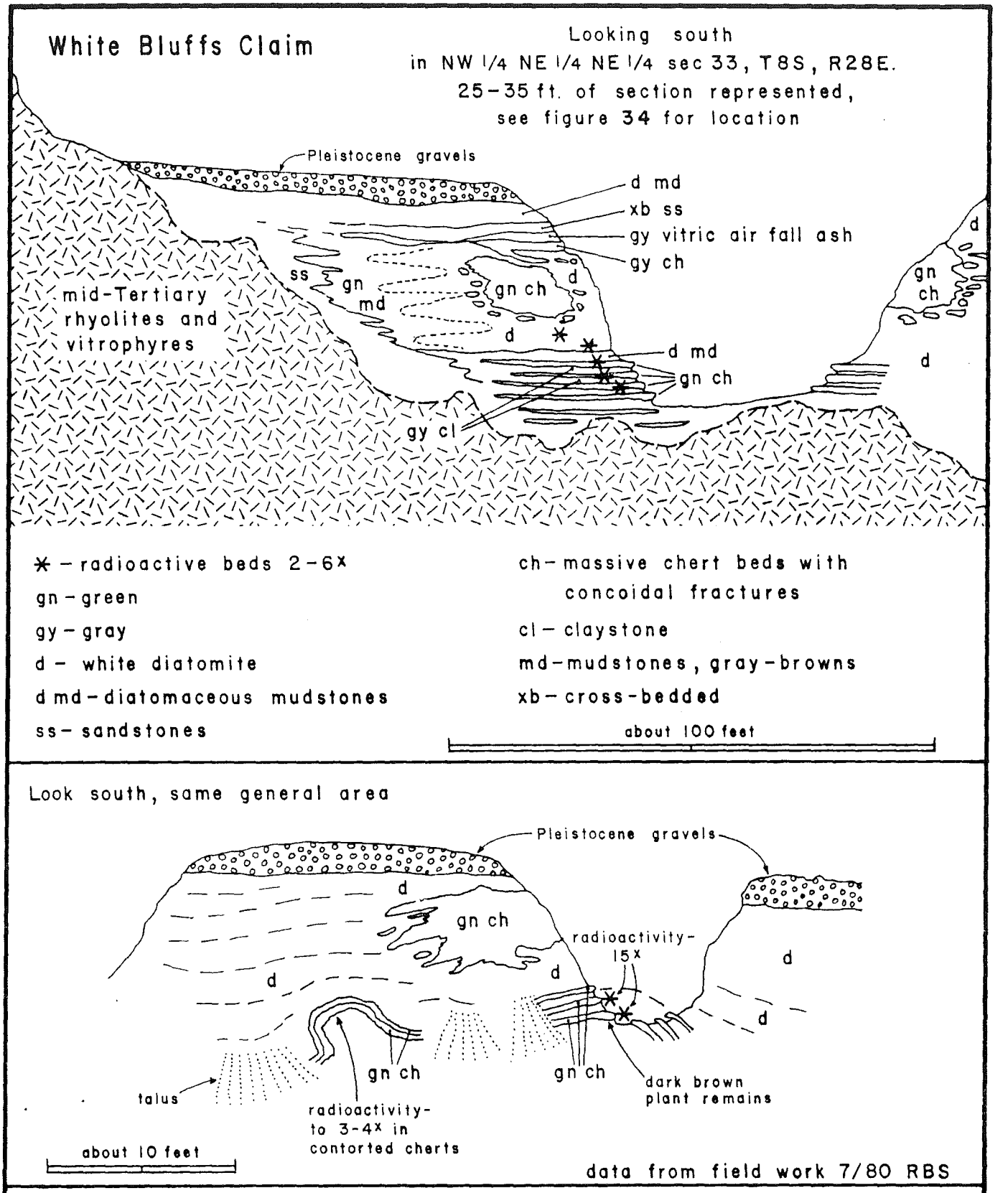
Other radioactive occurrences in Pliocene-Pleistocene fine-grained sediments are noted in the San Pedro Valley east of Tucson at the Xmas and Half Moon claims (Pima County), in marly sediments around Cottonwood, Verde Valley, and in northern Mohave County at the Dreamer, Wharton, Dab, and Sunset claims. All of these appear to be local, low tonnage and grade concentrations of oxidized uranium minerals. Similar mudstone-diatomite-green chert assemblages near the Gila River around Duncan, Greenlee County, contain slight anomalies (A. O'Neill, pers. comm. Jan.1981), but are not plotted for this report.



Pliocene Paludal Uranium occurrences

111 Ranch area, Graham County

Figure 34



Radioactive Pliocene Paludal-Lacustrine Rocks, 111 Ranch Area, N. Whitlock Hills, Graham County

Figure 35

Miocene Rocks in the Date Creek Basin, Yavapai County

The largest known uranium reserves and resources in Arizona at this writing are in the Date Creek Basin of Western Yavapai County. Reserves of at least 30 million pounds of U_3O_8 and resources of probably at least twice that amount have been projected for that part of the basin in the general area of the Anderson Mine. Current resource estimates indicate minable uranium ore with cutoff grade of 0.02% U_3O_8 utilizing an average grade of 0.05% U_3O_8 and average thickness of ore zones of about 20 feet. Uranium distribution in these reserves is such that average grade increases to 0.12% if average mined-thickness decreases to 6 feet, but total tonnage drops to 48% of the above amount (Sherborne et al, 1979).

Our understanding of the Cenozoic geology of the basin has been much improved by recent ongoing studies by the NURE program and the USGS, but understanding of the real extent and style of Miocene regional tectonics which has served to complicate the distribution of rocks in the region has yet to be realized.

The geology and uranium deposits of the Date Creek Basin are discussed by Otton (1977a and b) and Sherborne and others (1979). An earlier account of manganese mineralization in Miocene sediments in the area was given by Lasky and Webber (1949). See also a summary article in Engineering and Mining Journal for January, 1978.

The uraniferous sediments at the Anderson Mine are contained in a section of tuffaceous, locally carbonaceous paludal-lacustrine mudstones, calcareous mudstones, sandstones, and siltstones with some silica (chert) as pods, stringers, and plant root replacements. Two zones of uraniferous sediments are known in the Anderson Mine area, the upper one being the focus of mining activity during 1955-59 when 10,700 tons of ore assaying 0.15% U_3O_8 and at least 0.05% V_2O_5 were removed. See Figure 37 for a cross section of the area.

The Cenozoic section in the Anderson Mine region was deposited on a surface cut into a gneissic and granitic terrain of mostly Precambrian age. The Cenozoic rocks consist, in ascending order (See Figure 36 and 37), of an older sedimentary section which contains Eocene plant remains (J. Otton, pers. comm., 1980); a volcanic section called the Arrastra volcanics, composed of silicic to intermediate rock types with ages of roughly 25-20 m.y.; the uraniferous quiet-water Anderson Mine rocks and some overlying sandy beds, both probable equivalents to the early to middle Miocene-aged Chapin Wash Formation exposed farther west; an overlying 13 m.y. old alkali olivene basalt flow; and two sedimentary units of late Miocene through Pliocene-Pleistocene age. Hence the uraniferous rocks are roughly 20-13 m.y. of age.

All the above rocks up through the uraniferous Chapin Wash equivalents are repeated a number of times along a series of dominant NW-trending faults, movement along which has served to impart moderate SW dips to these strata.

The units above the 13 m.y. old basalt flow are essentially undeformed (see Figure 36). The uraniferous horizons at the Anderson Mine contain these SW dips and are last seen at the surface dipping into the main mass of the present-day Date Creek Valley. As seen in Sherborne and others (1979), the present uranium reserves are known only by drill holes that intercept the ore horizons at increasing depths to the southwest. DOE-sponsored deep stratigraphic test drilling in the main part of the Date Creek Valley has encountered uranium shows at depth that are included within sedimentary packages believed to be equivalent in age to the Miocene Artillery Peak and Chapin Wash Formations of the Artillery Peak area (see DOE report GJBX-86(80) for drill hole locations and logs).

It is important to realize our lack of understanding of the original geographic extent of sedimentary facies conducive to uranium localization. We understand approximate limits of preserved potential uraniferous strata where they occur in outcrop. But to envision boundaries of original deposition for the favorable rocks of Anderson Mine type as being limited to the present confines of the Date Creek Basin does not seem justifiable. This is because the geologic event that produced the arches of gneissic rock now present in the Harcuvar-Buckskin Ranges (present southern boundary of Date Creek Valley) appears by new regional geochronologic information to have postdated the deposition of the Anderson Mine beds. Hence, subsurface exploration should not be confined to the present Date Creek Valley. For discussion of the complexities of these Arizona "metamorphic core complexes", see Rehrig and Reynolds (1977), Davis and Coney (1979), Reynolds (1980), and Crittenden and others (1980).

Otton (1977b) and Sherborne et al (1979) both recognize two kinds of ore, or near ore-grade uranium mineralization, in the Anderson Mine area. The first is in carbonaceous siltstones and mudstones with minor silicification, and the second is in highly silicified, oxidized tuffaceous (?) siltstones with abundant megascopic plant debris. Uranium in the carbonaceous ores occurs as a urano-silica complex, close to coffinite in composition, either in microveinlets or totally disseminated (with homogeneous audoradiographs) in organic-rich siltstone (Otton, 1977b). In the oxidized, near surface regime, uranium occurs as very fine-textured carnotite with hematite in jasper pods, or as uraniferous silica in massive jasper, or in small silica veins. In less silicified ore it occurs as carnotite cement. Hence, some uranium species were fixed contemporaneously with a silicification episode, which appears to be at least in part subsequent to the original presence of the uranium in the carbonaceous ores.

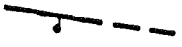
The uraniferous section at the Anderson Mine area is generally enriched in U, Li, B, Cu, F, V, Mo, and Ni. The carbonaceous ores generally are enriched in U, Ag, As, B, Cu, Ga, Ge, Ti, and Mo. Some of these enrichments are similar to examples on the Colorado Plateau, where Cu, U, or U-V mineralization occurs with Ag-Mo-Ni accessory minerals.

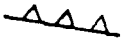
Several possibilities exist for the sources of Date Creek Basin uranium: (1) the anomalously uraniferous Precambrian granitic terrain adjacent to the Miocene depocenter in the Artillery Peak region (Otton, 1977a), and which was presumably exposed and eroding during the Miocene, (2) extensive leaching of the associated Miocene alkalic volcanic flows, tuffs, and ash beds - some of the coeval high-potassic volcanic rocks in the region contain 10-20 ppm by weight of uranium; and (3) a more remote possibility might be the leaching of alkalic Jurassic volcanic rocks that form a WNW-ESE swath through extreme south-central Arizona. Rocks of this affinity contain uranium occurrences in Santa Cruz County, and extend an unknown distance northwest towards the Blythe-Parker region. Possibility (2) appears most popular at this time, although the sparcity of anomalies in Cenozoic volcanic rocks is noted in the section on Cenozoic volcanics.

See discussion in the next section concerning possible temporal analogs of the Date Creek Basin uraniferous deposits.

Explanation for Anderson Mine general geology, Figure 36

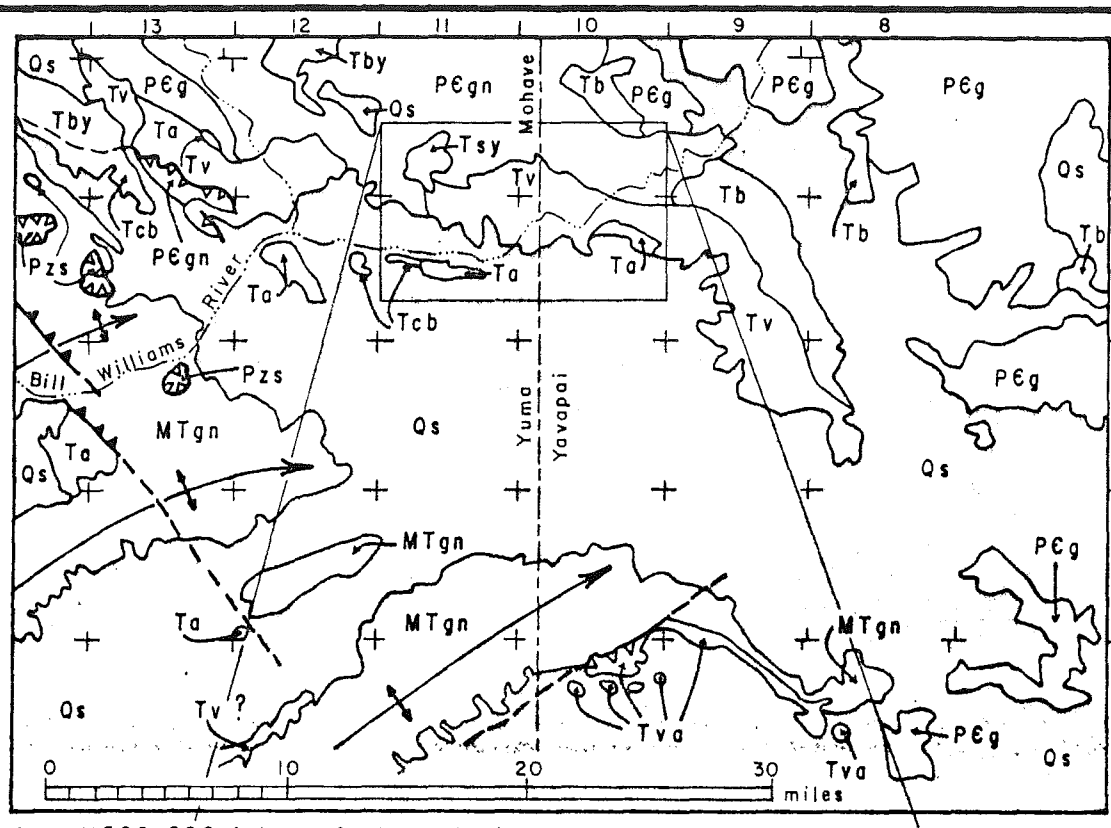
Qs	Quaternary sediments
Tb	Miocene basalts, exact age uncertain
Tby	9-10 m.y. old undeformed basalt flows
Tcb	13 m.y. old Cobweb basalt, faulted and gently folded
Tsy	Miocene sediments, containing 13 m.y. old Cobweb basalt
Ta	Miocene Anderson Mine Fm., and, to the west, Artillery and Chapin Wash Fms.
Tva	equivalent age volcanics
Tv	Oligocene Arrastra volcanics of Sherborne, et al, (1979)
Ts	basal Tertiary arkoses and tuffs
Pzs	metasediments involved in low-angle Miocene dislocation.
MTgn	Mylonitic gneisses
p€gn	Precambrian gneissic rocks
p€g	Precambrian granite


curviplanar, or listric Faults, dot on hanging wall


low-angle faults adjacent to MTgn masses, movement in mid-Miocene time, barbs on upper plate.

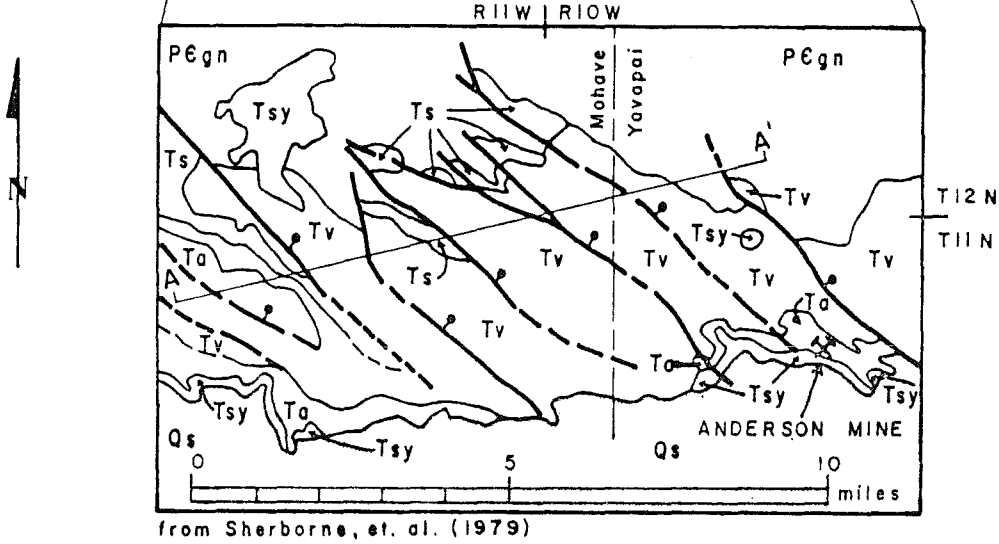
NW trending, SW vergent thrust faults, mid-Miocene age, barbs on hanging wall.

dome developed in MTgn in Miocene time, characteristic of the "metamorphic core complexes."

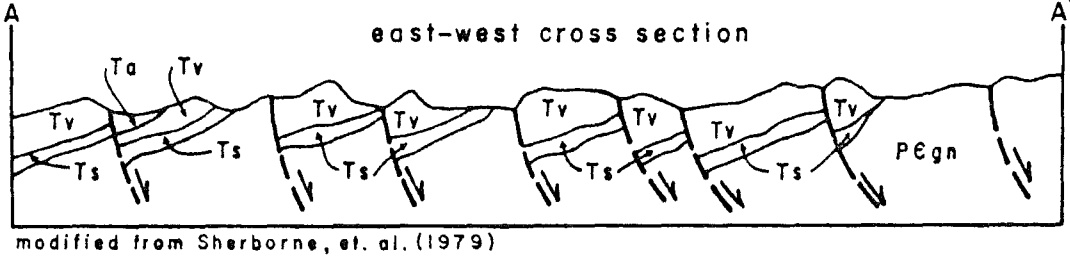


from 1:500,000 Arizona State geologic map.

tick marks are T & R



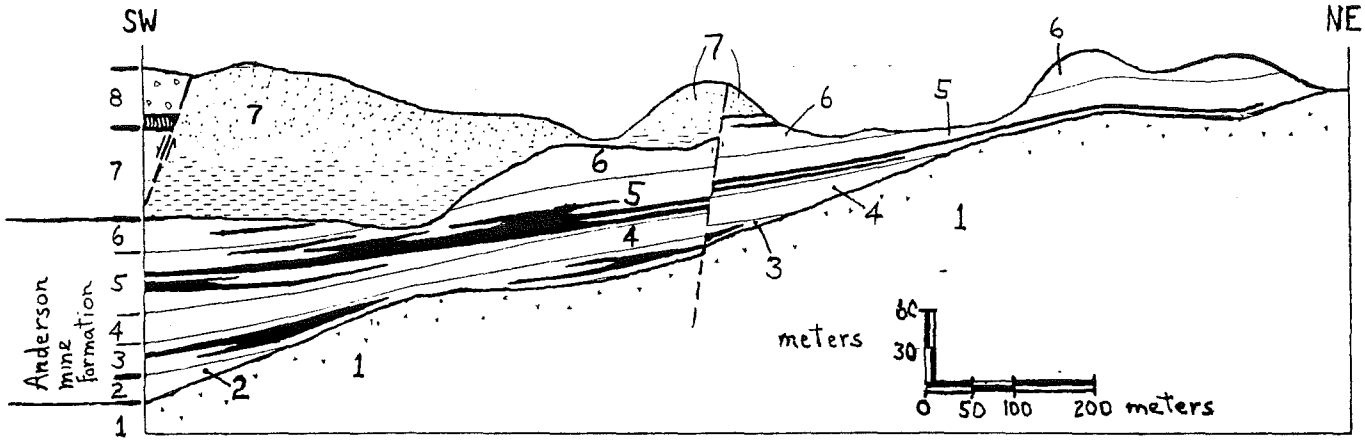
from Sherborne, et. al. (1979)

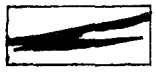


modified from Sherborne, et. al. (1979)

General Geology of the Anderson Mine area, Northern Date Creek Basin, Yavapai, Yuma and Mohave Counties

Figure 36




uranium-bearing strata

8 basalt and agglomerate (basalt is 13 m.y. old)

7 Flat Top formation

Anderson mine formation

upper mbr.

6 upper tuff and carbonate unit

5 upper carbonaceous unit

4 intermediate clastic unit

3 lower carbonaceous unit

2 lower Anderson mine member

1 Oligocene Arrastra volcanics (about 22-26 m.y.)

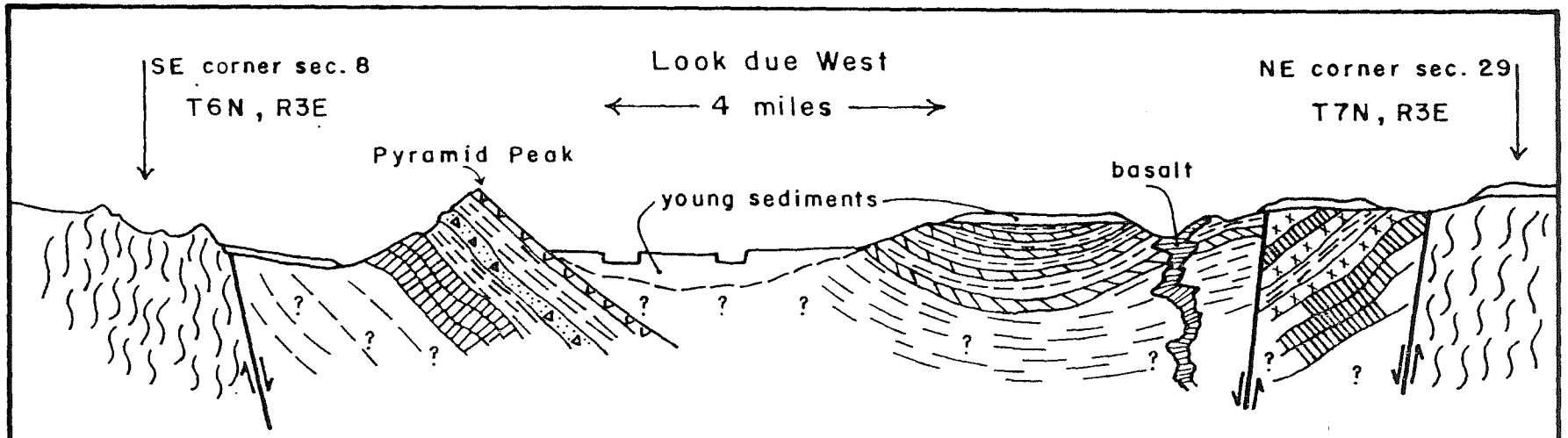
Figure 37. Southwest-northeast trending cross-section of uranium-bearing interval in the Anderson Mine area, from Sherborne and others, 1979.

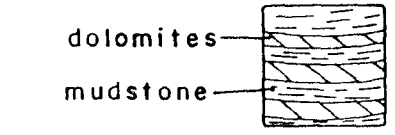
Miocene Dolomite - New River Area, Maricopa County

A volcanic-sedimentary section of early-middle Miocene age in the New River Area of Maricopa County is depicted in Figure 38. It was prospected in the 1950's as the Los Cuatros claims, and has received renewed exploration interest with some drilling in the late 1970's. The section is exposed beneath late Cenozoic terrace deposits in a valley floor, and is in high angle fault contact with Precambrian granites and schist around the perimeter of the valley.

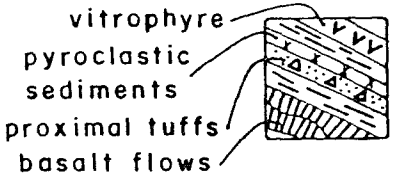
One part of the Cenozoic section consists of interlayered one-to-two foot thick light-colored aphanitic dolomite beds and buff-colored laminar bedded mudstones. Unconventionally, the dolomites are radioactive and assay 0.02 to 0.08% U_3O_8. The uranium, upon autoradiography and X-ray diffraction analysis, is randomly diffused throughout the massive dolomite, and is lacking any sign of concentration in the mudstones or sparce thin interbedded distal air-fall tuffs that are still vitric in places, altered in others. At the Los Cuatros locality, considerable tonnage of low-grade ore (about 0.03-0.06% U_3O_8) is suggested by the geology of Figure 38.

Interestingly, strata of similar age in other areas nearby (Cave Creek area and Rifle Range Section occurrences in Maricopa County listing; and in New River Mountains in cliffs on west side of Cave Creek), also contain very similar-appearing dolomitic rocks. The dolomites are known to be radioactive in the first two occurrences listed. Hence, an originally extensive areal distribution of these strata appears likely. Subsequent to Basin and Range faulting, they are now found both in range blocks and downdropped valley blocks in the region. Their subsurface distribution is not known. Age constraints on these rocks as reported by K/Ar dating results reported in Scarborough and Wilt (1979); are roughly 17-13 m.y. This time range corresponds to about the last half of the massive mid-Tertiary volcanic pulse (Cordilleran "igimbrite flare up" of Coney, referenced in Coney and Reynolds (1977), and described in Eberly and Stanley (1978). These middle Miocene ages are similar to the ages of the uraniferous units of the Date Creek Basin, which probably range roughly from 20 to 13 m.y. (Otton, 1977b; Scarborough and Wilt, 1979). Hence, from geochronologic information now available, it appears that this time during which the massive mid-Tertiary volcanic pulse of the southwestern United States was slowly shutting down, was also a time of mobility and fixation of uranium in sedimentary sumps in the central and west-central portions of Arizona. The fundamental question of the ultimate source of uranium and the role played by the massive mid-Cenozoic volcanic event in uranium mineralization remains unanswered. Positive evidence will come as more Cenozoic volcanic rocks in appropriate regions are checked for uranium depletion relative to thorium, to see if these rocks are indeed uranium depleted. Distal air-fall tuffs, when mixed into volcanoclastic sediments, may contribute appreciable uranium to the environment while losing much of their identifiable character, making them a "hidden source".

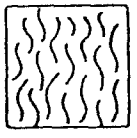




Upper (?) sequence of interbedded aphanitic dolomites and buff colored mudstones, folded into a shallow eastward-dipping syncline, and intruded by 13 m.y. old basalt dikes. Dolomites assay 0.02-0.06% U_3O_8 and count to 25 times background.



Older (?) mid-Miocene sequence of basalt flows, proximal air-fall tuffs, vitrophyres, and minor interbedded clastic sediments.



Older Precambrian Yavapai Schist, composed of metasediments.

data from Scarborough and Wilt (1979)

Los Cuatros PRR locality, New River area, Maricopa County

Figure 38

Mineta Formation - Rincon Mountains

The Mineta Formation is an Oligocene-aged sequence of mixed clastics and thin bedded limestones, 1,000 to 2,000 feet thick, and is contained in a NW-SE elongate, fault-bounded block on the NE flank of the Rincon Mountains, Pima and Cochise Counties. The section is well exposed, and dips homoclinally 15-40° to the northeast. Figure 42 idealizes the general geology and shows the general Mineta Formation stratigraphy as envisioned by Clay (1970) and Thorman and others (1978). The tectonic event that tilted the Mineta section occurred largely before the extrusion of an andesite mass, dated at 27 m.y. (Shafiqullah and others, 1978), that unconformably overlies the tilted beds.

The Mineta Formation consists of lower conglomerates containing shale lenses, middle vari-colored laminar-bedded shales and thin-bedded fossiliferous fetid limestones, and upper gypsiferous mudstones. Numerous radioactive anomalies occur over a strike length of five miles, in the following lithologies: (1) in white-to-gray thin shale lenses within the basal gray and red colored conglomerates, at the North Chance claims; and (2) in various light-colored shales or in fetid limestone beds of the middle unit, at the Center and East Chance claims; especially very near boundaries of beds where permeability changes abruptly. See Figure 42 for stratigraphic data on these locations.

Several uranium occurrences are known in complexly faulted rocks just upslope from the Mineta Formation outcrops. These include the Blue Rock claims (Pima County) and Robles Spring claims (Cochise County). These radioactive occurrences could have served as sources for uranium in the Mineta Formation, as could disseminated pods of radioactivity in Precambrian granites just upslope from the North Chance claims. However, there is no assurance that the structurally controlled occurrences in the older terrain formed before the Mineta Formation occurrences. They could all be part of a single mineralization episode.

Although some preliminary exploration work has been done in the Mineta Formation, the discontinuous nature of the radioactive outcrops and the steep dips of the formation discourage development. Potentially, however, similar rocks could underlie large areas of the adjacent San Pedro Valley at shallow depths, particularly since radioactive shales are noted in equivalent-aged sediments 10 miles east on the west flank of the Galiuro Mountains (Teran Basin occurrence of Cochise County).

Precambrian Sediments and Unconformities

As mentioned by Waechter (1979) several interesting radioactive occurrences in southern Arizona are found at or very near the contact between the base of the Pioneer Shale of the younger Precambrian Apache Group (with basal Scanlan Conglomerate missing) where it was deposited on Precambrian granite. The radioactivity appears associated with "silicified" red shales or "micropegmatites" or minor shear zones near the contact. Sometimes the red shales appear as small masses or pods within uppermost outcrops of granite. These occurrences are the Dutch Boy, Hammes, Hardrock, and Lonesome John claims of Gila County, and very possibly at the Red Hills claim in the southern Rincon Mountains near Tucson, Pima County. Other individual occurrences in Gila County (Bee Cave, Granite claims) have similar attributes, but with other modifications. None of the above occurrences except Bee Cave have any record of uranium production. Bee Cave shipped only one small shipment of "no pay" ore (i.e., assays less than 0.10% U_3O_8).

In a recently completed report by P. Anderson (GJBX-33(81), sediments of the Ader, Mazatzal, and Apache Groups of central Arizona were examined for uranium potential. Mild anomalies were located in the Mazatzal sediments associated with specularite and pyrite, and in sandstones and conglomerates of the Apache Group. Anderson attributes the lack of uranium in these sediments to their pervasively oxidized state and an absence of favorable and nearby Archean source terrain.

NON-STRATABOUND OCCURRENCES

Precambrian Granites

Radioactivity dispersed in granites of Precambrian age in southern Arizona has been recognized since the late 1940's when the first AEC reports covering the Basin and Range country were published. Anomalies disseminated in Precambrian granites, for example, are noted at the Diamond Head claims of Pima County and the Gypsy Queen, Malapai No. 1, and Valcarce claims of Maricopa County (among others).

With our increased understanding of ages of rock units as determined by isotopic dating techniques, new time-space patterns of uranium distribution in igneous rocks are emerging. Malan and Sterling (1969) summarized an AEC project that sought "exploitable uranium resources" in the Precambrian of the United States. They concluded that of the four geochronologic subdivisions of the Precambrian of the Western United States in use at that time, the highest uranium and thorium contents (4.4 ppm and 32.4 ppm respectively) were found in the 1.35-1.50 b.y. old granite suite. They also noted an apparent geographic east-to-west increase of uranium and thorium content of granites from New Mexico to southern California, with virtually all of the 21 bulk samples with statistically anomalous U-Th values coming from west of the 112° meridian (near Phoenix). This spatial arrangement of anomalies led them to propose that these rocks, present in the Mogollon highlands in Mesozoic time, was a possible source of the uranium now found in the Colorado Plateau stratabound deposits. Their preferred model of mineralization is transfer of uranium in Precambrian basement into parent magmas of Triassic-Jurassic volcanic rocks whose pyroclastic components were mixed with the Mesozoic clastics and supplied leachable uranium to the sedimentary environment.

Carlisle and others (1980), in a study of uranium mineralization of the Proterozoic sediments of the Kingston Peak Formation of the Death Valley region of California, examined the possibility of derivation of the sedimentary uranium from the anomalous crystalline rocks of the underlying World Beater crystalline complex. These rocks consist of older augen gneisses (age of about 1.8 b.y.) that contain 2.9 ppm uranium and 49 ppm thorium, intruded by a 1.35 b.y. old porphyritic quartz monzonite that contains an average of 27 ppm uranium and 70 ppm thorium. In the region, older metamorphosed sedimentary and crystalline assemblages of 1.7 b.y. age contain only a very few mild radioactive anomalies. Clearly, the 1.4 b.y. old quartz monzonite is the most uraniferous of the Precambrians crystalline rocks of the area.

Silver and others (1980) suggest that the uranium content of primary zircons in igneous rocks is a measure of the overall uranium content of the host rocks. Using this assumption, they have defined a regional uranium anomaly in the Precambrian basement rocks directly beneath that part of the Colorado Plateau which contains all of the major sandstone uranium districts (see their Figure 4, p.31). They have also applied U-Th-Pb isotopic systematics to three granites in Southern Arizona that date at 1400-1450 m.y. and

found evidence of significant uranium loss relative to thorium and lead in two of the three. These are the Ruin, Lawler Peak, and Dells Granites. Sampled parts of the Ruin Granite (Globe-Lake Roosevelt region, Gila County) have lost up to 60% (6 gm./ton) of their original uranium endowment probably within the last 75 m.y. Now, the Ruin Granite samples contain near-average crustal contents of uranium and thorium. The Lawler Peak Granite (Bagdad Mine area, Yavapai County) has lost 25% of its uranium during or since two geologic "events" at 230 ± 10 and 75 ± 25 m.y. This amount of loss, calculated for a reasonable volume of weathered granite, can account for the release of 100,000 metric tons of uranium into the environment. The Dells Granite (Prescott-Chino Valley, Yavapai County) is one of the most radioactive granites identified in the Southwest, as seen in the airborne radiometric surveys depicted in Figure 8 of Silver and others' paper. It is an equigranular two-mica granite, relatively massive and structureless, and contains about 39 ppm U and 31 ppm Th. Curiously, this very radioactive rock is in good isotopic equilbrium and has lost very little of its uranium or thorium after crystallization, based on a single sample site. The two times (230 and 75 m.y.) at which uranium loss appears to have occurred in two of the samples could be related to Permo-Triassic and Laramide orogenesis and volcanism.

In a detailed study of the Lawler Peak Granite, Silver and others (1980) concluded that most of the uranium is contained in rare high-uranium minerals such as brannerite, coffinite, and thorite. The remainder is distributed in the more common accessory minerals such as zircon, sphene, apatite, etc., and along intergranular positions and microfractures.

By all evidence, the 1400 m.y. old granite suite found throughout much of southern Arizona, does contain statistically anomalous amounts of uranium. However, no important uranium occurrences are known in these rocks where obvious shear or fault control of the occurrence is absent. However, several districts in southern Arizona with uranium prospecting or some production are situated where these granites constitute all or part of the Precambrian basement. These areas include the Bagdad region, Globe-Miami, Horseshoe Dam area (lower Verde River), northern Whetstone Mountains, Blue Rock claims of Rincon Mountains, and the western Sierrita Mountains. In the last four areas, uranium occurrences are situated along large faults that juxtapose 1400 m.y. granites with younger rocks. In each case, the granite is the most likely nearby rock to serve as a source of uranium.

Fluorite is a common accessory mineral in mineralized faults and shears involving Precambrian granites and schists in Arizona (Van Alstine and Moore, 1969). Many of the uranium occurrences in granites contain accessory fluorite, as noted in the individual listings. An example of a radioactive anomaly in Precambrian granite with fluorite is in a shallow pit just east of Highway 666 in NW¼ sec 23, T11S, R26E, (Graham County) where a thin purple fluorite veinlet cuts the granite (this locality not tabulated in individual listings). Arizona's largest fluorspar mine to date is the Lone Star Mine in the Whetstone Mountains of Cochise County. Here, greenish fluorite veins up to 2½ feet thick cut Pinal Schist. Nearby, drilling programs by Kerr-McGee and Rocky Mountain Energy have probed faults and shears involving Precambrian granite, for uranium anomalies

concentrated near the present water table. Perhaps an association of Precambrian-aged fluorite mineralization with uranium is suggested in this granite-schist terrain. At the Blue Rock claims (noted above, and discussed under vein occurrences), purple fluorite veins cut the rocks near a uranium-mineralized 10-20 foot thick fault zone that has juxtaposed 1400 m.y. (?) porphyritic granite with younger sediments.

Jurassic-Cretaceous Volcanic Rocks

South-central Arizona is known to contain a complex mixture of volcanic and plutonic rocks produced during the existence of arc-style magmatic events maximized during Jurassic through Cretaceous time. For descriptions of rocks, see Cooper (1971), Drewes (1971, 1976, 1980), Simons (1972), and Haxel and others (1980). These rocks are abundant throughout Santa Cruz County, southwest Cochise County and southwestern Pima County. The bulk of the rocks are intermediate to silicic in composition. and some are alkalic in character (S. Keith, pers. comm.,1979).

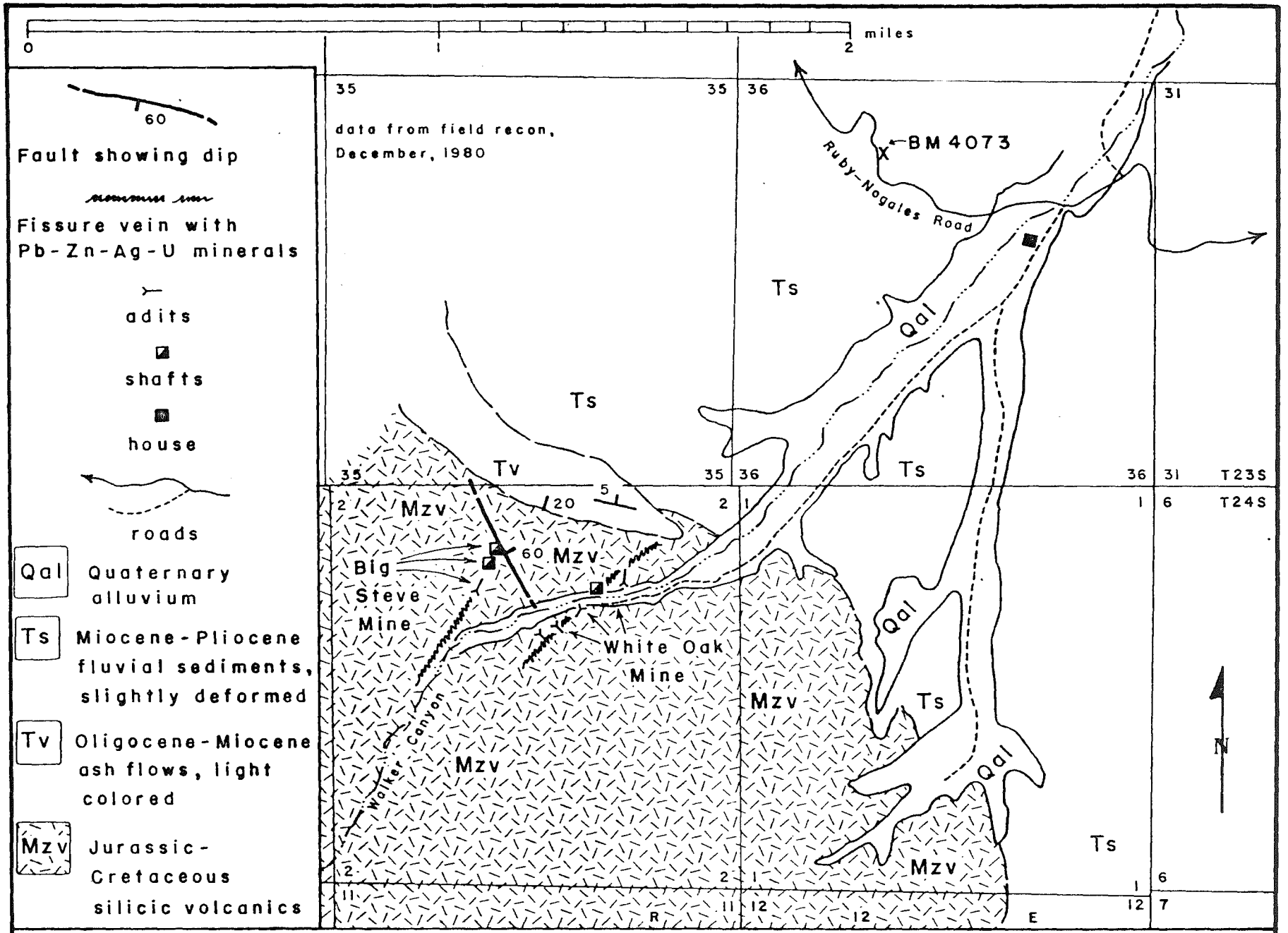
In Santa Cruz County alone, there are at least 16 known uranium occurrences in volcanic rocks thought to be of this age, including the following: Alto Group, Annie Laurie, Blue Jay, Canary Yellow, Four Queens, Happy Day and Joe Parker No. 5, Grandview Group, Happy Jack, Little Doc, Lone Star, Purple Cow, Santa Clara, Skyline, Sunset, and White Oak. Of these, minor production is recorded from two: 9 tons @ 0.28% U_3O_8 and 0.4% Cu from Santa Clara, and 18 tons @ 0.34% $U_3O_8$from White Oak. This concentration of occurrences in Santa Cruz County was first noted by Wright (1950). Figures 39 and 40 depict the geology and extent of mining at White Oak.

However, the sequence or timing of various mineralization events in this terrain is not established. The exploited mineralization in western Santa Cruz County is predominantly a Pb-Zn-(Cu)-Ag-Au vein-type with occasional uranium. However, some of the above uranium occurrences appear devoid of Pb-Zn-Ag minerals, yet appear in NE trending shears. Production from the Oro Blanco mining district (Ruby area) includes 617,000 tons of ore containing 44 million lbs of lead, 31 million lbs of zinc, 3.3 million ounces of silver, 31,400 ounces of gold, and 2.7 million lbs of copper. Many of the mineralized veins and shears strike about N50°E (see Figure 39), with a secondary NW strike component. This main strike direction and mineral association noted above is reminiscent of early Laramide (70-80 m.y.) vein systems elsewhere in southern Arizona (S. Keith, pers.comm.,Sept.1980). It remains to be determined whether the uranium was introduced with the other metals, perhaps during early Laramide time, or was more associated with earlier mineralization related to Jurassic magmatism. Since several of the radioactive occurrences are not associated with visible Pb-Cu minerals, the latter possibility is not dismissed. There is a strong relation between uranium and Cu-Pb-Zn-Au mineralization at Bisbee (Cochise County) where the base metal mineralization has been dated at lower- to middle Jurassic, and is related to the emplacement of the Juniper Flat granite there (see porphyry copper discussion).

There are a number of uranium occurrences in the Squaw Gulch-Temporal Gulch areas of the southern Santa Rita Mountains of Santa Cruz County (Figure 41), associated with limonite-stained shear zones cutting hydrothermally altered portions of the Jurassic-aged Squaw Gulch granite. See Blue Jay and Happy Jack occurrences . The nearby Ivanhoe Mine produced mostly gold, with other metals in low concentration. Drewes (1971) reports a 145 m.y. age on the Squaw Gulch granite, and maps two hydrothermally altered (Kaolinized) portions of this stock, the southernmost of which contains several radioactive anomalies.

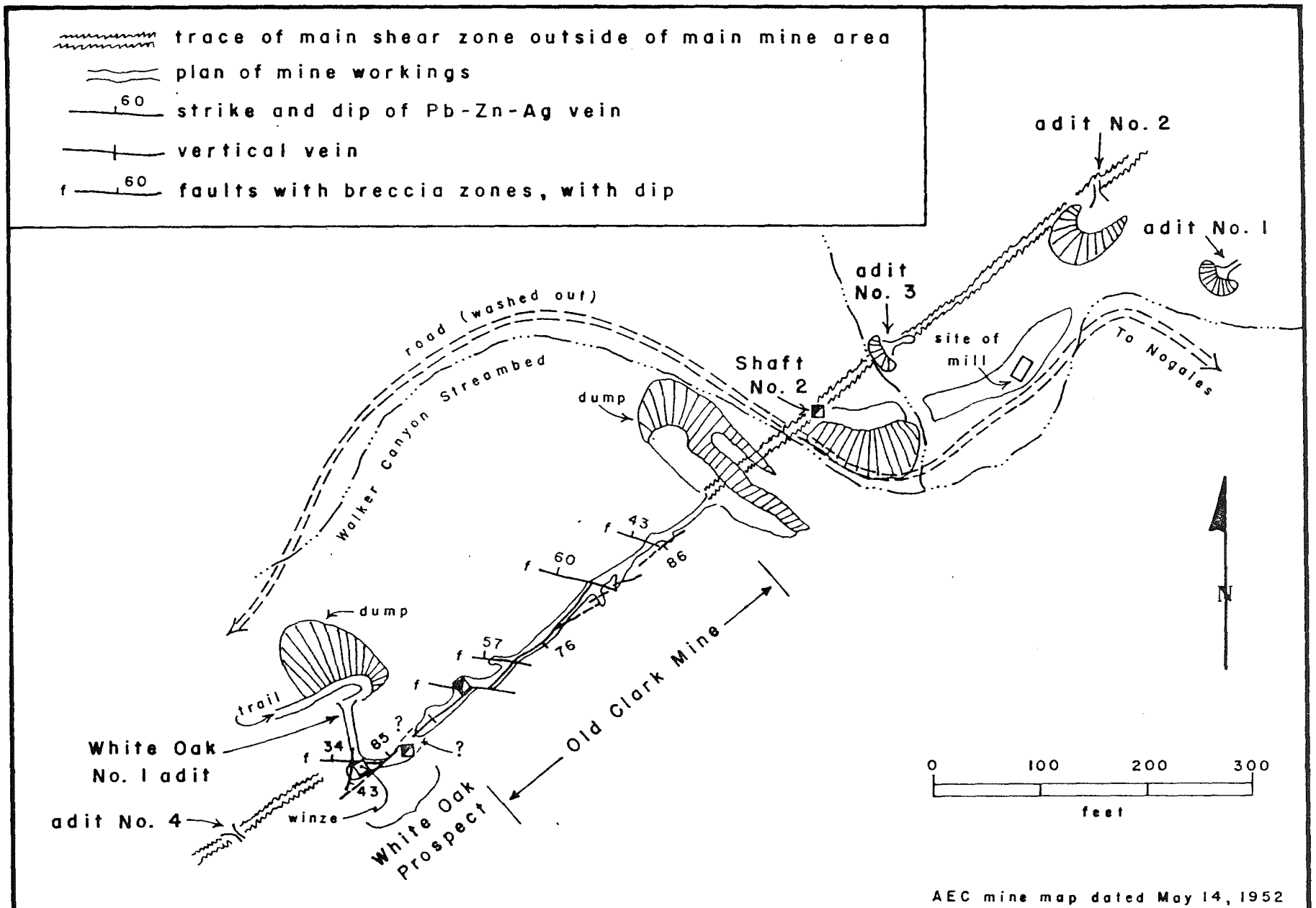
See the discussion on Jurassic granites in southern Arizona in Drewes (1976), p. 24-29. The NURE Nogales NTMS quadrangle evaluation by Bendix suggests the Squaw Gulch area to be favorable for further exploration.

The potential for uranium occurrences in Jurassic-Cretaceous volcanic rocks remains poorly understood. For example, drill programs in the late 1970s in the Squaw Gulch area did not necessarily test the zones most favorable for uranium mineralization. And at the Happy Day claims (Santa Cruz County), several vertical shears trend N35-55°E, and display copper colors along the veins on the ceilings of two short adits driven along the veins. Early production from these veins was for argentiferous galena and copper. The same veins contain one-half inch wide black metallic crystalline uraninite-pitchblende lenses that count to 100-200X background. Several parallel shears and fractures in the immediate area also count abnormally high, yet virtually no assessment work and no drilling have been done.



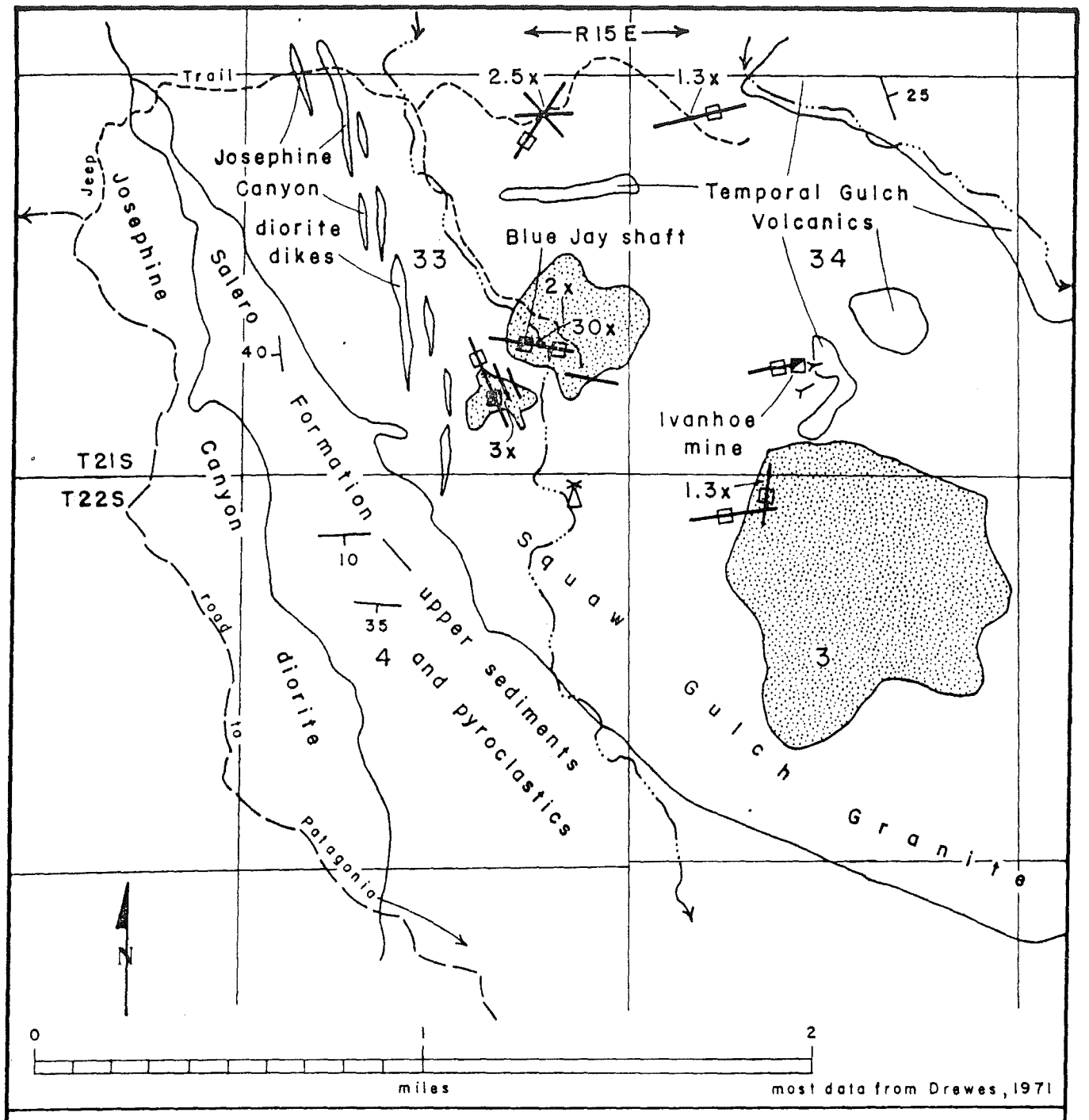
General Geology Around the White Oak Mine, Santa Cruz County

Figure 39



Mine Map of White Oak—Clark Mines, Santa Cruz County

Figure 40



intense argillic alteration of feldspars with hematite-quartz veins

6x radioactivity of 6 times background

major hematite-quartz vein directions

minor fractures with hematite

Hydrothermal Alteration and Uranium Occurrences, Squaw Gulch Granite, Santa Rita Mtns., Santa Cruz County

Figure 41

Porphyry Copper Deposits

The Basin and Range portion of Arizona is host to a series of calc-alkalic plutons and batholiths which are well-known for their copper and molybdenum contents. Age dates on plutonic biotite and on mineralization-related chlorites and sericites generally fall in the time range 70-50 m.y. (Titley and Hicks, 1966; Jenny and Hauck, 1978), and hence place the plutonism and related tectonics into the same general time frame as the classic Laramide orogeny first defined in Wyoming.

Besides the above metals, porphyry copper deposits characteristically contain small amounts of lead, zinc and gold. However, on a more refined scale, it appears that the ores which contain primarily Pb-Zn-Ag-Au with only minor Cu-Mo are part of a spacially related, earlier Laramide mineralization episode that was followed by the Cu-Mo porphyry pluton systems (S. Keith, pers.comm.,1981). Field evidence suggests that quite often these earlier fissure vein systems are truncated by the later plutons. Some dating evidence in southeastern Arizona suggests 75-65 m.y. for the Pb-Zn mineralization and perhaps 65-50 m.y for the Cu-Mo mineralization, with ages for both categories increasing toward the northwestern part of Arizona. In Arizona, it is the Pb-Zn systems that appear to have more closely associated uranium occurrences, rather than the Cu-Mo porphyry systems.

Some Arizona porphyry copper companies are beginning programs to extract uranium from copper leach solutions percolated through oxide dumps or mill tailings. Information in GJO-100 (80) (Statistical Data for Uranium Industry), dated 1 January 1980, suggests that nationwide, 20,000 tons of U_3O_8 will be recovered through the year 2000 from "copper dump leach liquors." Mines in Arizona at which uranium extraction is ongoing or soon to be initiated include the Twin Buttes Mine in Pima County (owned by Anamax, and Phelps Dodge's Morenci deposit in Greenlee County. Anamax has announced that first yellowcake shipments were made from Twin Buttes in May, 1980. They expect to ship roughly 120,000 lbs of yellowcake (85% U_3O_8 concentrate) per year (see "Pay Dirt" for Arizona, May, 1980 issue, and Tucson Citizen newspaper, May 1, 1980 issue). Also, uranium species have been noted at several other porphyry copper mines, such as at the Silverbell Mine, Pima County (torbernite in Oxide pit), the Copper Cities Mine, Gila County (unidentified uranium minerals in shear zones in the plutonic terrain; Still, 1962), the Ray Mine, Pinal County of Kennecott Corporation, and at the Esperanza Mine, Pima County (torbernite in altered volcanics). Detailed information on the uranium geology of these deposits is lacking. Uranium seems most abundant in association with oxidized ores, supergene-enriched areas, or vein replacements in country rock, and with shear or fault zones. Within this geologic framework, the uranium cannot be demonstrated to have been derived from the hypogene sulfide systems. It could just as well have come from other sources such as externally derived groundwaters with subsequently precipitation in the oxidized zone.

The Warren mining district at Bisbee (Cochise County), under control of Phelps Dodge Corporation, although not a Laramide, but rather a Jurassic (170 m.y. age) deposit, deserves mention. The district is now inactive except for copper leach operations, but led a colorful life as a major Cu-Pb-Zn-Au-Ag

producer from 1878 until 1975. Apparently, a concentration of uranium in the leach liquors exists that might be profitably extracted. Sketchy information indicates that concentration of uranium, along with copper, in replacement veins in country rock (such as Paleozoic limestones) is more important than uranium in the hypogene ores related to the Jurassic Juniper Flat granite or Sacramento stock. Certain of these vein systems with abundant and often spectacular azurite-malachite deposits count 2-5 times background on the scintillometer.

Bain (1952) published a 104 ± 6 m.y. uraninite age date from Bisbee , and Walker (1963) published two highly discordant ages of 175 and 1200 m.y. on similar material. These indicate some recent lead isotopic fractionation in the deposit. The Bisbee ores may prove to be a major Arizona source of uranium from the porphyry copper-type deposits. It is interesting that the Jurassic arc volcanism, which presumably produced the Bisbee ores, is somewhat more alkalic (higher $K_{57.5}$ values, Dickinson, 1970; Keith, 1978) than the Laramide porphyry copper-related rocks of the same region (Stan Keith, pers.comm,1980). Hence, an alkali-uranium relationship in plutonic terrains may suggest the feasibility of directing exploration energy towards areas having the more alkalic rocks.

The uranium occurrences of the Sierrita Mountains are an interesting example of probable Laramide uranium emplacement. Referring to Cooper's (1973) map of the Sierritas (USGS Map I-745), all the uranium occurrences in the main mountain range (Abe Lincoln, Black Dyke, Black Hawk, Diamond Head, Escondida, Glen, Hopeful, Leadville, Lena, etc.) are reported as vein-type occurrences in N70°E or N20°W fracture or fissure systems which cut a terrain dominated by pre-67 m.y. old early Laramide volcanics (Demetrie volcanics, Red Boy Rhyolite) and probable Triassic (?) - Jurassic (?) Ox Frame volcanics. These rocks are also the host for the Pb-Cu-Ag-Au vein systems of the area (Keystone Mine, etc.). This faulted volcanic terrain is intruded by the 59-62 m.y. old Ruby Star granodiorite which is thought to be related to the Cu-Mo porphyry sulfide systems of the Pima mining district. The uranium occurrences of these porphyry systems (Twin Buttes, Esperanza, New Year's Eve pit) are oxidized species (torbernite, etc.) which occur exclusively (?) in the oxide zones of these mines. The open pit mines lie under buried pediments on the lower flanks of the Sierrita Mountains, and have undergone extensive leaching, supergene enrichment, and erosional modification in their upper levels since Laramide time, much of it in the Miocene in response to Basin and Range pedimentation. Hence, with the numerous vein occurrences in the earlier Jurassic-Cretaceous volcanics upslope of this area, one may postulate either the environment of the hypogene sulfides of the porphyry systems or weathering of the upslope volcanics and vein systems as the source of the uranium minerals in the porphyry copper oxide zones.

Two Laramide porphyry copper-molybdenum systems at Mineral Park and Bagdad are discussed in the section on vein occurrences, but certainly substantiate an association of uranium with the peripheral Pb-Zn-Ag-Au vein systems of these Laramide deposits.

Cenozoic Volcanic Rocks

Although one of the more plentiful of the general rock types in Arizona Basin and Range country, the Cenozoic volcanic rocks contain relatively few uranium occurrences. These rocks range in chemistry from alkali olivine andesites to rhyolites, with voluminous latites and dacites, and volumetrically small proportions of alkali basalts and very alkalic trachytes (Shafiquallah and others, 1978).

Much attention has focused on the Anderson Mine area of the Date Creek Basin of Yavapai, Yuma, and Mohave County in the 1970's, during which time announcements were made of the discovery of at least 30 million pounds of U_3O_8 reserves (See the section on Cenozoic sediments for details). Many workers have hypothesized that this sedimentary uranium was ultimately derived from juxtaposed mid-Tertiary volcanic rocks in the area. Yet, the volcanics display many fewer surface anomalies than does, for example, the Precambrian crystalline terrain of the region. For instance, an alkalic series of flows in the Vulture Mountains, 40 miles southeast of the Anderson Mine, are devoid of uranium occurrences, as are similar-appearing flow sequences in the eastern arm of the Harcuvar Mountains, 25 miles farther west. At the west end of the Vulture Mountains, in a volcanic and volcanoclastic-dominated section, two uranium occurrences are noted in intercalated mudstones and thin-bedded limestone (Black Butte and Jar claims, Maricopa County), while the enclosing volcanics contain no known occurrences. Ten miles east of Wickenburg, a single area at the Golden Duck claims (Maricopa County) contains torbernite and other uranium minerals with chryscolla in shear zones cutting an alkali rhyolite vent complex of presumed early-middle Miocene age.

In the southeast part of the state, there are three large well-exposed volcanic centers of mid-Tertiary age; the Superstition Field, east of Phoenix; the Galiuro Field, east of Tucson; and the Chiricahua Field northeast of Douglas. All probably have larger exposed volumes of silicic rocks (rhyolites, dacites, latites) than andesitic rocks, yet have only rare uranium occurrences.

In the Chiricahua Mountains proper, a Late Oligocene, less deformed ignimbrite series (Rhyolite Canyon Formation of Marjaniemi, 1968) has a generally higher scintillometer count rate (300-500 cps with a Geometrics GR 101-A instrument over large areas) than a middle Oligocene, more deformed silicic flow series (Faraway Ranch Formation of Sabins, 1957, with 150-250 cps average readings), yet contains no known uranium anomalies in the main mountain mass. New NURE data on these two rock sequences indicate very similar K_2O contents, yet the younger rhyolites have four times the uranium content and twice the thorium content of the older rocks, based on a few field gamma ray spectrometric analyses. As well, a fluviolacustrine sequence intercalated into the Faraway Ranch silicic volcanics (termed "unknown C" in Cochise County listing) contains fetid thin-bedded limestones, and displays no anaomalous radioactivity. This would seem to hint that very little uranium was available in the surrounding volcanics for incorporation into the organic-rich sediments.

Elsewhere in southeast Arizona, a few radioactive occurrences are situated in mid-Tertiary volcanics. The Last Chance claims and the Little Swede Mine (Cochise County), about 10 miles east of Douglas in the Perilla Mountains occur

along fractures cutting a rhyolite porphyry complex mapped as mid-Tertiary in age by Drewes (1980). The Fluorine Hills and Elanna claims near Pearce, in the Sulfur Springs valley (Cochise County) are also both in faulted rhyolite-volcanic agglomeratic rocks of mid-Tertiary age, according to Drewes (1980). All these rocks are probably cogenetic with the rhyolites of the Chiricahua Mountains. The Golondrina claims (Graham County) contain radioactive pyromophite with Cu-Pb-Ag minerals in a broad N-S shear zone cutting flow breccias and agglomerates of probable mid-Tertiary age (Drewes, 1980).

In the Atascosa-Tumacacori-Oro Blanco area northwest of Nogales, it appears that the uranium occurrences there are much more confined to an outcropping altered Jurassic-Cretaceous volcanic sequence than to a moderately sized mid-Tertiary volcanic blanket, although these volcanic sequences have not necessarily been adequately differentiated on geologic maps. The fact that no uranium occurrences are known in the Cenozoic volcanics in this region, and yet many occurrences are recorded in the underlying rocks, suggests the Cenozoic volcanics are not especially uraniferous.

The uranium-beryllium-fluorine association in volcanic rocks noted in such areas as the McDermitt and Thomas calderas (Files, 1978; Wallace, et al, 1980) has not yet been recognized in Arizona, although Burt and Sheridan (1980, p.44) list two topaz rhyolite occurrences in the State, at Saddle Mountain in the southeast, and along Burro Creek, in the west-central part. Their Figure 1, p. 41, suggests that fluorine-bearing volcanic rocks are found in an area almost entirely surrounding the Colorado Plateau. This suggests that more rocks of this type may be found in central Arizona.

Vein, Fault, and Shear Zone Occurrences

Southern and western Arizona contains numerous uranium occurrences in structurally controlled positions related to quartz-rich veins, pegmatites, faults, shear or fissure zones, and along lithologic contacts in crystalline and metamorphic terrains. These occurrences appear especially prevalent in the Precambrian granite and schist terrain of Graham, Maricopa, Yavapai, and Mohave Counties, but, as seen below, often record post-Precambrian mineralization in areas where geochronology is known. This section mentions those vein-type occurrences with scattered ages and diverse geology, which do not fit neatly into the previous sections, although the Hillside Mine and Wallapai district occurrences are most likely related to Laramide mineralization.

Walker and Osterwald (1963) list 127 vein-type occurrences in southern Arizona, and give an eight-fold classification scheme into which these described occurrences are placed. In their scheme, the most numerous Arizona occurrences are in (2) base metal sulfide veins with accessory carbonates and siliceous materials, (b) veins dominated by uranium minerals (either oxidized or reduced species) with essentially no base metal shows, but with accessory geothite and pyrite, and (c) veins with fluorite and accessory barite, calcite, and silica, and occasional Pb, Zn, Cu, or Mo.

Often in shear-or vein-type occurrences, the data suggest leaching of uranium from Precambrian host rocks and its incorporation into the vein systems at the time of mineralization, such as the many occurrences in Maricopa County where only Precambrian crystalline, metasedimentary, or metavolcanic rocks are exposed over large areas surrounding the occurrences. See Altuda, Arrowhead, Bickle and Manley, Copper Kid, Dale-Compton, Lucky Find, Napsack, and Red Rover claims in Maricopa county for examples of these occurrences. Often the time of mineralization at Precambrian host occurrences is unknown. The Big Load and Stony Peak claims in Stockton pass of the Pinaleno Mountains, Graham County, record uranium concentration along large-scale N50° W faults and in attendant spring waters. Here the only country rocks for several miles are Precambrian granitics and gneissic rocks. And at the Red Rover mine of Maricopa County where considerable copper and silver with minor gold was mined out of fissure zones in Yavapai Schist, there is no obvious evidence for the time of mineralization.

Perhaps the greatest concentration of vein-like uranium occurrences in the state is in the Wallapai mining district of the Cerbat Mountains. Here, an extensive NNW trending series of veins, mined for Pb-Zn-(Cu)-Au-Ag and with thick lenticular masses of gouge also contain many radioactive anomalies, although no uranium production is recorded. The host rocks are various Precambrian crystallines, but the veins are contiguous with the Laramide Mineral Park porphyry copper pluton system, and contain evidence of geochemical zoning with respect to that system. Eidel, et al (1968) suggest that the Pb-Zn-Ag vein system constitutes the last of three stages

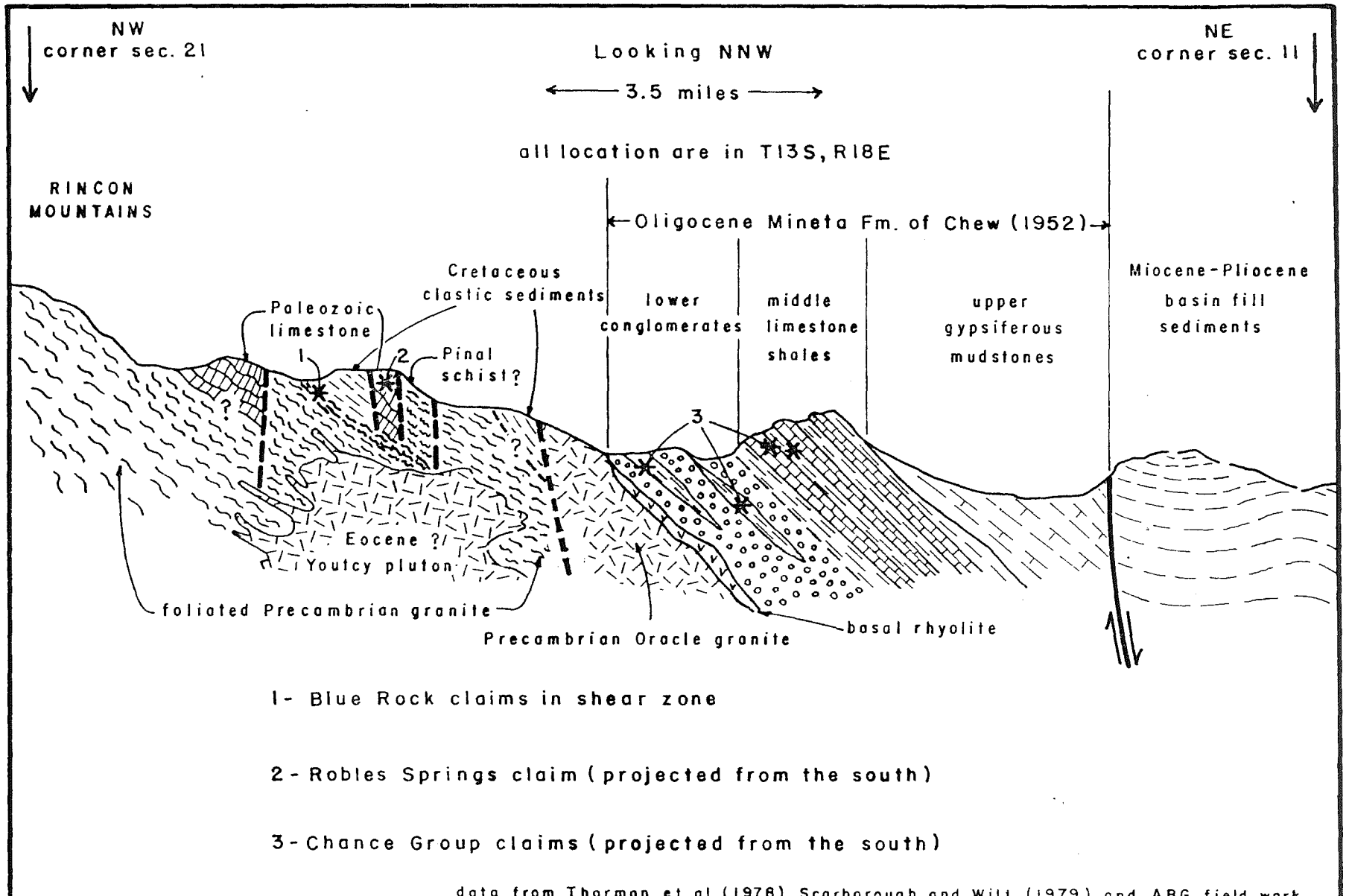
of hydrothermal mineralization related to the Mineral Park porphyry Cu-Mo system. See also Thomas (1949) and Dings (1951) for descriptions of mineralization studies of the Wallapi district. Damon and Mauger (1966) dated the Mineral Park porphyry at 72 m.y. by the K/Ar method.

The Hillside Mine of Yavapai County exploits a N-S trending sulfide vein system with an associated fault system (Anderson, and others, 1955) for 2,700 feet of outcrop length. Production between 1887 and 1956 amounted to 6.50 million lbs of Pb, 3.30 million lbs of Zn, 1.31 million oz. Ag, 58,700 oz. Au, and 0.40 million lbs of Cu. The mineralization is most likely Laramide in age, and is associated with the nearby Laramide Bagdad deposit. Nearby, massive sulfide mineralization associated with Precambrian volcanism in the Bagdad area consists of pyrite-chalcopyrite-sphalerite (S. Keith, pers.comm., 1981), but appears to lack radioactive anomalies. Uranium mineralization accompanies the vein system, and Anderson, et al, report a single company assay of 2.3% U_3O_8 from the now-flooded 700 foot level, directly down dip from uranium mineral occurrences on the 300 foot level studied by Axelrod, et al, (1951). Twenty-one tons of mine tailings assaying at 0.28% U_3O_8 were shipped from the mine in 1951. AEC personnel sampled the upper and lower tailings piles from the mine in 1959 and calculated 45,000 tons and 130,000 tons, respectively, of material assaying 0.06% U_3O_8 remains in the tailings.

An interesting example of a mineralized fault zone occurrence is the Blue Rock property of Redington Pass in the Santa Catalina-Rincon Mountains of Pima County. See Thorman and others (1978) for a geologic map of the area. As indicated in Figure 42, a 5-10 foot thick fault zone strikes NNW and dips 20-30° NE, and juxtaposes porphyritic granite of probable Precambrian age against a tectonically complex assemblage of Cretaceous clastic sediments, Paleozoic limestones, and Precambrian Pinal Schist (?). Quartz veins containing vugs lined with purple fluorite are found in the immediate area of the fault zone. Recent exploration drilling in the area has centered on this fault zone and possible others at shallow depths. Nearby, several other occurrences (see Robles Spring and Van Hill No. 5 claims) are in fault controlled positions with the same rock units present. The fault zone and its contained uranium mineralization is no older than mid-Cretaceous assuming a correct identification of the youngest faulted rocks as being units of the Bisbee Group. Still other uranium occurrences nearby are in Cenozoic sediments (see Chance claims, Pima County), which, from the present geologic setting, may have derived their uranium content from the upslope Blue Rock area. Coney and Reynolds (1980) have cited the Blue Rock occurrence as possibly associated with a "dislocation surface" related to the Santa Catalina-Rincon metamorphic core complex. They note (p.238-239) common hematite-chrysocolla-pyrite-barite-calcite-manganese mineralization associated with this class of faults elsewhere. The Pride Mine of northern Yuma County is developed in Cu-Fe mineralization along a dislocation surface and has minor radioactive anomalies associated with limonite pods near the fault (Scarborough and Wilt, 1979, p.69).

An area showing hydrothermal mobilization and concentration along shears of uranium mineralization is in Squaw Gulch of the southern Santa Rita Mountains. Figure 41, modified from Drewes (1971), indicates the geologic setting of the mineralized Jurassic (145 m.y.) Squaw Gulch granite. Two areas in the granite that show intense argillic alteration of feldspars (shown in the figure) contain numerous mild radioactive anomalies, as noted originally on the Blue Jay PRR (Santa Cruz County). These areas are also the loci of hematite - bull quartz veins following several major directions of shearing, especially E-W $\pm 10^{\circ}$, and N-S $\pm 30^{\circ}$. Radioactive anomalies are found most often in intensely kaolinized granite very near concentrations of these hematite veins, although often not in the veins. Also, the anomalies are most intense in valley floors, grading to barely noticeable along ridge crests. An old pre-1920 mining operation in the area at the Ivanhoe Mine recovered considerable Ag-Au-Pb-(Cu), yet is devoid of radioactive anomalies at the surface and on the mine dumps. Overall, the Squaw Gulch granite in the six square mile area centered around Figure 41 contains dozens of small discontinuous pockets of hydrothermal alteration not shown in the figure, some of which contain radioactive anomalies. It may be worthwhile to inquire about possible enrichment of uranium species near the present shallow water table in the area, since there are signs of pervasive anomalous uranium content at the surface. The age of this mineralization may best be gauged as Laramide based on (1) probable Laramide ages of E-W dikes found throughout the Santa Ritas (see Drewes, 1971) and noting that many pronounced anomalies in the Squaw Gulch area appear localized near E-W shears, and (2) the former presence of late Cretaceous volcanic cover over the Squaw Gulch granite (Temporal and Salero Formations, see Drewes, 1971) provides a mechanism for hydrothermal alteration of Laramide age in the area. Note also that the Duranium Mine (Santa Cruz County), 10 miles northwest of here, is in an E-W shear zone cutting Cretaceous sediments. That mine is discussed elsewhere in this report. The NURE Nogales quadrangle evaluation by Bendix personnel suggests the Squaw Gulch area is favorable for potential uranium resources.

The Black Dyke prospect of the Sierrita Mountains of Pima County was originally developed for copper on a NW-trending sheared contact between Paleozoic metasediments and Precambrian granitic plutons. The mined vein material contains uraninite, purple fluorite, and oxidized copper minerals. Eleven tons of ore shipped in 1957 averaged 0.18% U_3O_8. An additional 49 tons of "no pay" ore averaging 0.06% U_3O_8 and 0.04% V_2O_5 was shipped in 1956. Some potential for further mineralization remains. Most likely, the mineralization is Laramide in age, perhaps related to the extensive Pima mining district copper porphyry systems to the east. At least one of the mines in this district (Anamax's Twin Buttes Mine) is presently recovering uranium from leach circuits.



Idealized Cross-Section of Blue Rock, Robles Springs and Chance Claim Group Uranium Occurrences, Pima and Cochise Counties

Figure 42

THORIUM IN ARIZONA

Known or suspected occurrences of thorium minerals in Arizona are indicated in the geology sections of the individual listings. These fall into generally two categories, vein-pegmatite occurrences, and black placer sand deposits.

Many of the radioactive pegmatite occurrences, such as in the Aquarius Mountains and at scattered places through the Precambrian crystalline terrain of central Arizona (Yuma, Yavapai, Maricopa Counties) yield low chemical uranium analyses compared to radioactive analyses and hence probably contain thorium minerals such as euxenite, fergusonite, samarskite, or allanite. No mining of these deposits for thorium content is recorded. Staatz (1974) gives chemical and minerological analyses of two thorium vein occurrences in Arizona. The Farview claims (Yavapai County) are in a "breccia body" 100 x 60 feet across in a metamorphosed volcanic host rock, and contain rare thorite with abundant dolomite, limonite, and geothite. The Goodman Mine group of Yuma County (Staatz's Quartzite locality) has assays of up to 0.27% ThO_2 along a part of a WNW-trending shear zone which cuts Mesozoic (?) quartzose epidote schist and metasediments. He records thorite and allanite with magnetite and iron oxides from this occurrence.

The Bechetti Lease near Jerome, Yavapai County, contains a 25 foot-thick quartz vein intruding Precambrian metavolcanics and metasediments. Chemical assays on six small samples indicate ThO_2 contents of 0.2 to 1.4% and U_3O_8 contents on the same samples of 0.003-0.01%. The vein is described as containing quartz, limonite, and hematite as major minerals and is mapped for nearly 1,000 feet at the surface.

Radioactive black placer sand deposits have been noted in two environments in Arizona. These are fossil shoreline deposits related to the Mancos and Bisbee seaways of the Western Interior, and black placer sand concentrates in modern stream alluvium in the Basin and Range country of Maricopa and Pima Counties.

Cretaceous black sands of the Toreva Formation of the Black Mesa Basin are described by Murphy (1956) and Houston and Murphy (1977). They typically consist of opaque iron-titanium oxides and zircon, with minor variable amounts of rutile, monazite, sphene, apatite, allanite, niobium-bearing opaque minerals, anatase, and spinel. Radioactivity is due to variable amounts of uranium and thorium. Houston and Murphy describe three localities on Black Mesa which are thought to represent regressive beach and tide-reworked sandstones in the Toreva Formation. These deposits are 10-20 m.y. older than their geologic equivalents in the northern Rocky Mountains region.

Slightly radioactive black sand concentrates are also noted in fluvial channel deposits associated with the Petrified Forest Member of the Chinle Formation, eight miles north of Cameron, one-tenth mile east of new Highway 89.

In several parts of the Basin and Range country, modern stream alluvium containing black sands has been noted to be slightly radioactive. In Pima County, claims have been staked in the northern Sierritas (England, Will, Bixby) and in the Happy Valley area (Dollar Bill), and in the Big Horn Mountains

of Maricopa County (Black Magic). The radioactivity in these deposits is probably due to both uranium and thorium in several heavy mineral species hydraulically concentrated along the stream courses. Apparently, these placers are being derived from both Precambrian and Laramide crystalline source rocks.

Individual County Listings

The following pages (p. 104-263) contain an alphabetical listing, county by county, of all known radioactive occurrences (including all producers of uranium) in the State. The guide to the kinds of information found in the individual listings is on pages 4 and 5. The first page or two of each county's listings is the number key to the NTMS (1:250,000) maps which accompany the report under separate cover. For example, in Apache County, the Etsitty Mine is plotted as #15 on the Shiprock NTMS map, which, from the Contents section, is Plate 13. These keys do not include those occurrences and mines plotted on the four district maps (Plates 18 - 21), each of which has its key included on the map.

Index for Apache County Uranium Occurrences

(Excluding Carrizo Mountains and Lukachukai Mountains District Maps)

		Name
S	9	Agua Sal Drilling Permit
S	16	Air Anomaly #5
S	31	Alkali Water Gap
S	33	Arrowhead
S	3	Black and Black Water
S	30	Black Mountain Vase
S	5	Bluestone #1
S	4	Cato Sells Tracts, 1S, 2W, 1N
S	24	Charles James
S	4	Chee Nez #1
SJ	42	Chester
S	34	Claim #3
S	26	Claim #4
S	29	Claim #7
S	28	Claim #10
S	27	Claim #14
S	25	Claim #16
S	22	Claim #27
S	21	Claim #28
S	20	Claim #31
S	11	Dan Taylor
S	36	Dodge
S	35	Edward Steve
S	15	Etsitty
SJ	46	G & G
S	17	George Belinte #2
SJ	39	Grant Prospect
C	48	Hansen
S	1	Harvey Blackwater #1 & 2
S	2	Harvey Blackwater #4
SJ	41	Hinkson Cattle Company
S	4	John M. Yazzie #1
SJ	38	Juanita
S	12	Kasewood Bahe
S	14	La Gloria Oil and Gas Claims
G	37A	Nazlini TP area
S	18	M.O. #2
S	19	M.O. #28
S	4	Monument #2
S	4	Monument #2 Supplement
SJ	43	N.S.M. 2
S	10	Rough Rock Slope
S	12	Sam Charley
S	12	Thomas Begay #1
S	13	Todecheenie
S	7	Tom Klee #1 Mine
S	8	Tom Wilson
SJ	47	Tomcat
SJ	44	Unnamed A
SJ	40	Unnamed B
S	6	Unnamed D
S	23	Unnamed E
S	32	Unnamed F
SJ	45	Warhoop
S	4	Willy Waters
S	37	Zealy Tso

C = Clifton
SJ = St.Johns
S = Shiprock
G = Gallup

APACHE COUNTY

Note: Apache County production details and mine locations in the Carrizo Mtns, Black Mtn, and Lukachukai Mtns areas are from the following D.O.E. publications:

Preliminary Map No. 28 (Lukachukai Mtns)
Preliminary Map No. 31 (Black Mtn area)
Chenoweth, W. (1980, TM-209), N.W. Carrizos
Chenoweth, W. (1980, TM-210), East Carrizos.

A.E.C. PLOTS - listed below, totaled 960 acres. (see Chenoweth, W., 1980, TM-209)

A.E.C. plot A - Saytah Canyon, head of canyon, east of main claim
A.E.C. plot B, C, D - Segi Ho Cho Mesa
A.E.C. plot E - Kinusta Mesa, east end
A.E.C. plot 1 - Martin Mine
A.E.C. plot 2 - North Martin Mine
A.E.C. plot 3 - Saytah Wash, just north of Carson Mine
A.E.C. plot 4 - Saytah Canyon Mine, NW of MC Mine
A.E.C. plot 5 - CBW-MC Mine (Curran Bros and Wade - main claim)
A.E.C. plot 6 - Eurida Mines
A.E.C. plot 7 - Cove Mesa Mines of UCA

AGUA SAL DRILLING PERMIT (Wilson Prospect)

LOC: Approx. Sec. 17, T8N, R9W
East bank of Agua Sal Creek

QUAD: Yellowstone Canyon 15°; Shiprock NTMS

DEVL: 20 holes drilled to average depth of 60' in 1956

ANAL: 0.33% e U_3O_8, and 0.36% U_3O_8

GEOL: Yellow uranium minerals associated with a zone of mudstone galls and splits at base of Shinarump channel 40 ft. deep, atop DeChelly Sandstone. Small monocline nearby.

REF: D.O.E.

AIR ANOMALY #2 and 3 (Charlie James #1)

AIR ANOMALY #5

LOC: Approx. Sec. 9, T33N, R23E
Black Mesa

QUAD: Tah Chee wash 7½'; Shiprock NTMS

GEOL: Uranium mineralization associated with iron oxide concretions in fractured arkosic sandstone, about 100 ft. below the contact between the lower and upper members of the Mesaverde Fm.

REF: PR-R-EDR-1293 & 1296 (#45 & 46)

AIR ANOMALY #13-15 (Claim #3)

ALCOVE-TOH ACON MESA (Refer to Chester Mud #1)

LOC: Approx. central and SE ¼ Sec. 10, NW¼ and SE¼ Sec. 13, NE¼ Sec. 23, NW¼ Sec. 24, N½ Sec. 25, T38N, R27E

QUAD: Los Gigantes Butte 15'; Shiprock NTMS

GEOL: Tyuyamunite-type mineralization in fine to medium grained sandstone with carbonized plan remains in Morrison Fm.

REF: Peirce, H.W. and others (1970)

ALKALI WATER GAP

LOC: Approx. E. center edge Sec. 9, T32N, R23E

QUAD: Blue Gap 7½; Shiprock NTMS

GEOL: Tyuyamunite replacing cement and coating grains along cross-bedding in light-gray, quartzose, fine- to coarse-grained carbonaceous sandstone interbedded between carbonaceous strata. Mineralized bodies 10-100 ft. long and 1-2 ft. thick possibly with some vanadium.

ALLEN GLEASON

LOC: "4.2 miles up road to Foutz-Ashcroft Mine in Carrizo Area from junction with main road, then up wash to west of road to bottom of upper basalt.

QUAD: Pastora Peak 15'; Shiprock NTMS

GEOL: Tyuyamunite-type mineralization in Salt Wash about 40 ft. above lower contact. Upper contact is basalt.

ANOMALY 15-30.1

LOC: SW¼, T2N, R9W
Nazlini Canyon-Canyon DeChelly

QUAD: Nazlini 15'; Gallup NTMS

GEOL: Uranium mineralization associated with abundant silicitied and carbonized plant remains in greenish siltstone of Chinle Fm.

REF: Finch, W.I. (1967)

APACHE MINE

LOC: Unknown to BIA or Navajo Tribe

PROD: 5 tons @ 0.18% U_3O_8; 1.14% V_2O_5 in second quarter 1951 by Uranium Development Corp.

ARROWHEAD

LOC: Approx. Sec. 2, T32N, R23E
Black Mountain

QUAD: Lohali Point 7½; Shiprock NTMS

DEVL: Small adit

PROD: 6 tons @ 0.13% U_3O_8; 0.11% V_2O_5; 0.5% $CaCO_3$, 1955

GEOL: Carnotite in sandstone of the Toreva Fm.

REF: D.O.E., preliminary map No. 31

BARE ROCK MESA (Black #2)

BARTON #3 (King #8)

LOC: Approx. NE¼ Sec. 28, T41N, R27E
NW end of Toh-Atin Mesa, NW Carrizo Mtns.

QUAD: Toh-Atin Mesa 15'; Shiprock NTMS

DEVL: Adit

PROD: 31 tons @ 0.12% U_3O_8; 0.52% V_2O_5; 1954

RAD: 3 mr/hr.

ANAL: 0.01-0.61% e U_3O_8; 0.09-0.37% U_3O_8; 0.92% V_2O_5; 0.72% $CaCO_3$

GEOL: Discontinuous streaks of tyuyamunite and vanadium minerals associated with limonite and carbonaceous matter in Salt Wash sandstone.

REF: Butler, A.P. Jr. and others (1962), PRR-EDR-253, Finch, W.I. (1967)

BASALT CLAIM

LOC: "3½ miles west of Beclabito Trading Post, turn left on dirt road which leads into canyon in the Carrizo Mtns. toward Zona #1 Mine. Park car after traveling 4½ miles on dirt road and climb the hill to the NW of parked car." Might be same as Allen Gleason claim.

QUAD: Pastora Peak 15';
Shiprock NTMS

ANAL: 25.5% e U_3O_8; 24.62% U_3O_8; 0.07% V_2O_5; 0.9% $CaCO_3$

GEOL: Tyuyamunite and possibly montrosite in channel deposit in Salt Wash member between 2 dolerite sills.

REF: PRR-EDR-386

BEE SHO SHEE (Willy Waters)

BEGAY #1 (Thomas Begay #1)

BENALLY (Melvin Benally #1)

BENALLY #1-3 (Capitan Benally)

BETTIE #1

LOC: Approx. Sec. 21 and 28, T40N, R30E, East Carrizos (AEC plot: 36°51' 15"N, 109°08' 05" W)

QUAD: Pastora Peak 15'; Shiprock NTMS

DEVL: 3 adits with about 100 ft. underground workings. Ore brought off mountain with horses.

PROD: 53 tons @ 0.18% U_3O_8; 0.91% V_2O_5, 1955-56

GEOL: Ore lenses of tyuyamunite and vanadium minerals associated with carbon matter pockets along sandstone-mudstone contact about 30 ft. above Salt Wash member basal contact.

REF: D.O.E.

BILLIE #1

LOC: Approx. NE corner of Sec. 34, SE corner of Sec. 27, T40N, R30E. N Carrizo Mtns. Beclabito Canyon - 450 ft. SE from Zona Mine, near Ruben No. 1.

QUAD: Pastora Peak 15'; Shiprock NTMS

DEVL: 75 ft. of incline adit (N75°E), driven from rim cut. Access to mine is along extension of Zona mine road.

GEOL: Ore zone 0.2-2 ft. thick in discontinuous bands and scattered patches 40 ft. above base of Salt Wash member contact with dolerite sill.

REF: D.O.E.

BILLY TOPAHA MINE (Topaha)

LOC: Approx. Sec. 28 T36N, R29E

QUAD: Lukachukai and Red Rock Valley 15'; Shiprock NTMS

DEVL; 200 ft. adit w/room and pillar workings

PROD: 703 tons @ 0.20% U_3O_8; 0.96% V_2O_5, 1959-60

GEOL: Small pods of tyuyamunite ore in Salt Wash member.

REF: D.O.E.

BLACK AND BLACKWATER CLAIMS (Blackwater)

LOC: Approx. E. central Sec. 3, NW¼ Sec. 10 and E½ Sec. 9, T41N R23E. Now a part of Monument #2 supplement.

QUAD: Dennehotso 15'; Shiprock NTMS

DEVL: Several small open pit and underground workings

PROD: 5,350 tons @ 0.30% U_3O_8 in 1952-57

GEOL: Tyuyamunite-type mineralization as fracture fillings and disseminations at the Shinarump-Moenkopi contact. Abundant carbonized and silicified plant materials in Shinarump sandstone and conglomerate.

REF: Johnson, H. & Thordarson, W. (1956, TEI-640), Finch, W. (1967)

BLACK #1 (Flag #2)

LOC: Approx. Sec. 29, T36N, R29E
Lukachukai-Flag Mesa

QUAD: Los Gigantes Buttes and Red Rock Valley 15'; Redrock Valley 15'; Shiprock NTMS

DEVL: Stopes, portions are caved.

PROD: 1,407 tons @ 0.18% U_3O_8; 0.63% V_2O_5 in 1955.

GEOL: Pods of tyuyamunite mineralization bedded in Salt Wash member

REF: D.O.E.

BLACK #2 (East) (Bare Rock Mesa)

LOC: Approx. Sec. 29, T36N, R29E
Lukachukai Mtns.-Bare Rock Mesa

QUAD: Lukachukai and Redrock Valley 15'; Shiprock NTMS

DEVL: Underground

PROD: 1,879 tons @ 0.19% U_3O_8; 1.60% V_2O_5, 1955-57 & 1963-64, includes minor production from Black #2 (West)

GEOL: Bedded and poddy tyuyamunite mineralization in Salt Wash member

REF: D.O.E.

BLACK #2 (West)

LOC: Approx. Sec. 29, T36N, R29E
Lukachukai Mtns.

QUAD: Lukachukai and Redrock Valley 15'; Shiprock NTMS

DEVL: Underground

PROD: Minor production included with east mine in 1955.

GEOL: Tyuyamunite-type mineralization in Salt Wash member

REF: D.O.E.

BLACK MTN. - Rough Rock Area

Roughly 57,600 lbs. of U_3O_8 and 26,000 lbs of V_2O_5 were mined from the Cretaceous Toreva Fm. in this area from 1951 through 1968, according to D.O.E. preliminary map No. 31 (1973). The producers are (in decreasing order of pounds of U_3O_8 production):

1. Claim 28
2. Claim 10
3. Claim 7
4. Todecheenie No. 1
5. Claim 3
6. Tom Klee (1.01% avg. U_3O_8)
7. Dan Taylor No. 1
8. Tom Wilson
9. Etsitty No. 1
10. Rough Rock Slope No. 9
11. Kasewood Bahe No. 1
12. Thomas Begay No. 1
13. Black Mtn. Vase
14. Claim 31
15. Arrowhead No. 2

BLACK MOUNTAIN VASE (Jim L. Smiley)

LOC: Sec. 3 and 10, T32N, R23E
Black Mtn.

QUAD: Lohali Point 7½'; Shiprock NTMS

DEVL: Surface scrapings

PROD: 11 tons @ 0.12% U_3O_8; 0.08% V_2O_5, 1955

GEOL: Carnotite mineralization lies near an axis of a broad synclinal through, trending NW-SE in upper part of Toreva Fm. Fairly strong fracturing.

REF: D.O.E., preliminary map No. 31

BLACK MUSTACHE

LOC: Monument Valley (unknown in Carrizos)
Not plotted on maps

DEVL: Mined by Tom Benally

PROD: 95 tons @ 0.23% U_3O_8; 1.99% V_2O_5 in 1951.

REF: D.O.E.

BLACK ROCK POINT MINE (Thomas Clani)

LOC: Approx. NW¼ Sec. 8, T40N, R29E
On north prong of Black Rock Point-NW Carrizo Mtns.

QUAD: Toh-Atin Mesa 15'; Shiprock NTMS

DEVL: Open stope on edge of Mesa - 1,365 ft. of workings

PROD: 2,025 tons @ 0.20% U_3O_8; 1.33% V_2O_5, 1951-58, 1962, 1965-66.

GEOL: Discontinuous bands and lenses of tyuyamunite ore along sandstone-mudstone bedding planes in median basal Salt Wash member. Also associated with structures and accumulations of mud and organic matter.

REF: D.O.E.

BLACKHORSE CREEK

LOC: Approx. SW¼ Sec. 13, T39N, R29E

QUAD: Pastora Peak 15'; Shiprock NTMS

GEOL: Tyuyamunite-type mineralization in Salt Wash member.

REF: Strobell, J. (1956)
O'Sullivan, R. and Beikman, H. (1963)

BLACKWATER (Black and Blackwater)

BLUESTONE #1 (Garnet Ridge Diatreme, Keith Francis Claims)

LOC: Approx. Sec. 19, 20, 29, T41N, R24E
Monument Valley-Comb Ridge Area-Garnet Ridge

QUAD: Dennehotso 15'; Shiprock NTMS

DEVL: Rim cut and drilled

PROD: 53 tons @ 0.22% U_3O_8; 0.82% V_2O_5 in 1955-56.

ANAL: 0.07-1.26% U_3O_8; 0.54-1.16% V_2O_5; 6.68% Cu

GEOL: Tyuyamunite and calcocite mineralization along dike and vein in Navajo sandstone. Highly altered mica-serpentine dike strikes N75°W, dips 60°N. and extends to west end of a collapsed structure on a N50°E trending syncline Metatyuyamunite, volborthite, malachite, and chrysocolla with traces of silver, cobalt, nickel vanadium, lead and thallium are present.

REF: Shoemaker, E. (1956)
Shoemaker, E. (1955, TEI-590, P.63-65)
Malde, H. & Thaden, R. (1963)

BLOCK K

LOC: Approx. Sec. 31, T41N, R29E
NW Carrizo

QUAD: Toh-Atin Mesa 15'; Shiprock NTMS

DEVL: Inclined shaft

PROD: 2,018 tons @ 0.17% U_3O_8; 1.30% V_2O_5, 1962-64

GEOL: Tyuyamunite occurs in the basal portion of Salt Wash member on north flank of Toh-Atin anticline. Discovered beneath valley fill by AEC drilling.

REF: D.O.E.

BLUE LAKE CLAIM

LOC: On a generally NW-facing rim of Salt Wash member, according to PRR map, probably in Apache Co. (Red Point Mesa 7.5 map) in extreme NW corner somewhere; possibly in Navajo Co., (Church Rock, AZ 7.5' map) in extreme NE corner. See PRR locality. Also shown as mineralized outcrop of Salt Wash 10 miles west of Rattlesnake Mine (between "R" and "I" of "ARIZONA") on USGS map MF-16 by W. Finch (1955).

QUAD: Marble Canyon NTMS

RAD: 7X

GEOL: Yellow uranium minerals in fossil wood, lower part of Salt Wash member.

REF: PRR-GJEBR-103 (#48)
Chester, J. W. (1952, TM-12)

BRODIE #1 (Mike Brodie #1)

CAMP MINE (Refer also to Cisco #1 and Joleo Mine)

LOC: Approx. Sec. 28, T36N, R29E at SW end of ridge Lukachukai Mtns. - Camp Mesa

QUAD: Redrock Valley 15'; Shiprock NTMS

DEVL: Underground

PROD: 18,853 tons @ 0.24% U_3O_8; 0.94% V_2O_5, 1953-56, 1962-63, includes minor production from Cisco #1 in 1953.

GEOL: Associated with carbonized logs, ore zones range in thickness from 1 ft. to 10 ft. and average 3 ft. Most ore is in the lower 10 to 15 ft. of Salt Wash member with festoon and trough-type cross-stratification. Sandstone has filled channels, and scours in underlying joints filled w/tyuyamunite, indicating that some secondary distribution of ore is controlled by jointing.

REF: D.O.E.

CAPITAN BENALLY #4A and 5

LOC: Approx. Sec. 29-30, T41N, R29E
NW Carrizo

QUAD: Pastora Peak 15'; Shiprock NTMS

DEVL: Incline

PROD: 114 tons @ 0.21% U_3O_8; 1.38% V_2O_5, 1957 includes illegal shipments by Jimmie King

GEOL: Small, discontinuous bands and lenses of tyuyamunite ore in basal Salt Wash along sandstone-mudstone bedding planes.

REF: D.O.E.

CARRIZO MOUNTAIN

LOC: Unknown; in Apache Co.? May belong to VCA West Reservation Lease.

PROD: 160 tons @ 0.29% U_3O_8, 4.44% V_2O_5 in 1950

REF: Chenoweth, W. L. (1980, TM-209) and Chenoweth (pers. comm., 1980)

CARSON

LOC: Approx. Sec. 13, T40N, R28E
NW Carrizo Mtns.

QUAD: Toh-Atin Mesa 15'; Shiprock NTMS

DEVL: 200 ft. drifts, adits and crosscuts

PROD: 93 tons @ 0.22% U_3O_8, 1.58% V_2O_5, 1958

GEOL: Tyuyamunite ore replacing logs and associated with pockets of organic matter in lower part of Salt Wash member.

REF: D.O.E.

CATO #1 PIT

LOC: Approx. Sec. 5-8, T36N, R29E
Lukachukai Mtns.

QUAD: Redrock Valley 15'; Shiprock NTMS

DEVL: Open pit

PROD: 54 tons @ 0.28% U_3O_8; 2.52% V_2O_5, 1951

GEOL: Mineralization in Salt Wash member

REF: D.O.E.

CATO #2 MINE

LOC: Approx. common corner Sec. 5,6,7,8, T36N, R29E
Lukachukai Mtns.

QUAD: Los Gigantes Buttes and Red Rock Valley 15';
Shiprock NTMS

DEVL: 3 short adits

PROD: 52 tons @ 0.23% U_3O_8; 1.53% V_2O_5, 1953-54

GEOL: Mineralization in Salt Wash member

REF: D.O.E.

CATO SELLS (Cove Mesa #1)

CATO SELLS TRACTS 1S, 2W, 1N (SM Tract #2, Tract #1 & ?)

LOC: Approx. Sec. 27 and 34 T41N, R23E
Monument Valley

QUAD: Dinnehotso 15'; Shiprock NTMS

PROD: Now part of Monument #2 supplement: Tract 1 south produced 8,049 tons @ 0.40% U_3O_8 in 1952-54; Tract 2 west produced 295 tons @ 0.30% U_3O_8 in 1955-58; Tract 1 north produced 17,950 tons @ 0.29% U_3O_8 in 1951-59.

REF: D.O.E.

CBW-MC MINE (AEC Plot 5) (Curran Bros. & Wade Main Claim Mine)

LOC: Approx. Sec. 31-32, T39N, R29E
Carrizo Mtns.

QUAD: Toh-Atin Mesa and Pastoria Peak 15'; Shiprock NTMS.

DEVL: Small underground working

PROD: From August, 1942 to February, 1944, Wade, Curran, and Company shipped 2,942 tons @ 2.23% V_2O_5 from Martin, North Martin, CBW-MC. Saytah, Saytah Canyon and Eurida Mines.

GEOL: Mineralization in Salt Wash member

REF: Harshbarger, J. (1946, RMO-441)
Chenoweth (1980, TM-209)

CHARLIE BEKIS CLAIM (Cottonwood Butte Claim)

CHARLIE JAMES #1 (Salina #4, Ruin Mesa; Air Anomaly #2 and 3)

LOC: Approx. Sec. 28 and 29, T33N, R23E. Taasahdi or "Ruin" Mesa - Black Mountain

QUAD: Blue Gap 7½; Shiprock NTMS

RAD: Detected by air survey

ANAL: 0.10-0.61% e U_3O_8; 0.08-0.66% U_3O_8; 0.05-0.25% V_2O_5; 0.4-0.8% $CaCO_3$

GEOL: Carnotite associated with carbon matter, as halos around limonite, disseminated interstitially and as paint with vanadium mineral coatings in a light gray sandstone about 10 ft. thick and 250 ft. above Mancos contact in Toreva Fm.

REF: PRR-EDR-1289 (#42)
PRR-EDR-238
Clinton, J. (1956, RME-91)

CHEE NEZ #1

LOC: Approx. Sec. 27 and 3,4, T41N, R23E

QUAD: Dinnehotso 15'; Shiprock NTMS

DEVL: Now part of Monument #2 supplement

PROD: 438 tons @ 0.31% U_3O_8; 1.23% V_2O_5 in 1955-57

REF: D.O.E.

CHESTER GROUP

LOC: Sec. 26, T15N, R25E

QUAD: Hunt 15'; Saint Johns NTMS

DEVL: Open pit

PROD: 7 tons @ 0.17% U_3O_8 and 0.27% V_2O_5 in 1955; 112 tons @ 0.02% U_3O_8 and 0.04% V_2O_5 probably in 1956.

GEOL: Carnotite in basal Chinle Fm., probably Mesa Redondo member.

REF: D.O.E.

CHESTER MUD #1 (Mud Mesa #1)

LOC: Approx. Sec. 11 and 12, T38N, R27E
Alcove Mesa - Carrizo Mtns

QUAD: Los Gigantes Buttes 15'; Shiprock NTMS

DEVL: Underground

PROD: 159 tons @ 0.14% U_3O_8; 1.09% V_2O_5, 1955-57

ANAL: 0.11-0.28% U_3O_8

GEOL: Tyuyamunite in thin discontinuous bands along sandstone - mudstone contact, especially where carbon matter is concentrated in Salt Wash member near Bluff contact.

REF: D.O.E.

CHIMNEY #1 (H. Piet and R. Harrison)

LOC: Not located - Apache Co., Carrizo Mtns. B.I.A. Window Rock has no record of the operators having any dealings with the Navajo tribe.

PROD: 71 tons; 140 lbs. U_3O_8; 2,525 lbs. V_2O_5 in 1951

CISCO #1 (Refer to Camp Mine)

LOC: Approx. S. center Sec. 28, T36N, R29E Lukachukai Mtns.

QUAD: Redrock Valley 15'; Shiprock NTMS

DEVL: Underground

PROD: Minor production in 1953 included with Camp Mine.

GEOL: Tyuyamunite in channel fill, Salt Wash member sandstone with nodules, clay lens and abundant carbon matter. Most ore is in sandstone just above black and red claystone. Joints are well defined and paleochannel trends N-S, same as ore body elongation.

REF: Nestler, R. & Chenoweth, W. (1958, RME-118) D.O.E.

CLAIM #3 (Denny Lee, Air Anomaly #13-15)

LOC: Approx. common corners Sec. 34, 35, T33N, R23E. and Sec. 2, 3, T32N, R23E, Black Mountains

QUAD: Lohali Point 7½; Shiprock NTMS

PROD: 745 tons @ 0.15% U_3O_8, 1956

GEIL: Carnotite associated with carbon matter, pebbly zones and carbonaceous mudstones in arkosic sandstone, Toreva Fm.

REF: PRR-EDR-1292 (#44), PRR -EDR-1291 (#43) PRR-EDR-1297 (#47)

CLAIM #4

LOC: Sec. 34 & 35, T33N, R23E

QUAD: Lohali Point 7½; Shiprock NTMS

DEVL: Drilled

ANAL: 0.13% U_3O_8

GEOL: Carnotite in sandstone lenses in Toreva Fm.

REF: D.O.E.

CLAIM #7 (Homer Scott, Dry Run Canyon)

LOC: Approx. Sec. 3, T32N, R23E, adjacent to Claim #10, Black Mountain

QUAD: Lohali Point 7½, Shiprock NTMS

DEVL: Open pit and adits, drilled

PROD: 4,661 tons @ 0.14% U_3O_8, 1964 and 1967

ANAL: 0.09-0.43% U_3O_8 in drill holes

GEOL: Carnotite in sandstone lenses in Toreva Fm.

REF: D.O.E.

CLAIM #10 (Homer Scott, Dry Run Canyon)

LOC: Approx. Sec. 3, T32N, R23E. Adjacent to Claim #7 Black Mountain

QUAD: Lohali Point 7½'; Shiprock NTMS

DEVL: Open pit, adits and drilling

PROD: 5,216 tons @ 0.15% U_3O_8; 1964-67

GEOL: Carnotite in sandstone lenses in Toreva Fm. Second largest producer of uranium in Black Mtn. area.

REF: D.O.E. Preliminary Map No. 31

CLAIM #14 (Dry Run Canyon)

LOC: Approx. Sec. 33, T33N, R23E Black Mtn.

QUAD: Johali 7½'; Shiprock NTMS

DEVL: Drilled

ANAL: 0.12% U_3O_8

GEOL: Carnotite in fine-grained, cross bedded sandstone lens in Toreva Fm. Mineralization on steep flank of the Black Mtn. anticline.

REF: D.O.E.

CLAIM #16

LOC: Approx. Sec. 27, T33N, R23E Black Mtn.

QUAD: Lohali Point 7½'; Shiprock NTMS

RAD: 0.10% e U_3O_8

GEOL: Carnotite and meta-hewettite associated with carbon matter in sandstone lenses between gray shale partings in Toreva Fm.

REF: D.O.E.

CLAIM #27 (West Burnt Corn Wash)

LOC: Approx. Sec. 21 and 28, T33N, R23E, adjacent to Claim #28 Black Mtn.

QUAD: Blue Gap 7½'; Shiprock NTMS

DEVL: Drilled

GEOL: Carnotite in sandstone underlying carbonaceous seam in Toreva Fm. just below middle member.

REF: D.O.E. Clinton, J. (1956)

CLAIM #28 (West Burnt Corn Wash)

LOC: Approx. common corners Sec. 20,21,28,29 T33N, R23E adjacent to Claim #27 - Black Mtn.

QUAD: Blue Gap 7½; Shiprock NTMS

DEVL: Drilled extensively, open pit w/adit from pit wall

PROD: 4,181 tons @ 0.21% U_3O_8; 0.16% V_2O_5, 1957-58, 1966-68.

ANAL: 0.76% e U_3O_8; 0.72% U_3O_8, 0.27% V_2O_5; 1.3% $CaCO_3$

GEOL: Carnotite in quartzose Toreva sandstone beneath carbonaceous siltstone. Largest uranium producer from Black Mtn. area.

REF: D.O.E.

CLAIM #31 (Claim #35)

LOC: Approx. N½ Sec. 29, T33N, R23E Black Mountain

QUAD: Blue Gap 7½'; Shiprock NTMS

DEVL: NE-SW Trending rim cut

PROD: 15 tons @ 0.08% U_3O_8, 1958 - shipment was made as claim #31 but came from claim #35, as shown on Navajo Tribal Claim map.

GEOL: Carnotite associated with carbonaceous matter in lower sandstone member of Toreva Fm.

REF: D.O.E.

CLAIM #35 (Claim #31)

CLANI (Tree Mesa)

CLEVELAND #1 (Grover Cleveland #1)

COTTONWOOD BUTTE CLAIM (Charlie Bekis Claim)

LOC: 36°47' 32" N, 109°02' 45"W, perhaps 500 ft. west of Arizona-New Mexico boundary 3.7 miles SW of Bitlabito School.

QUAD: Pastora Peak 15'; Shiprock NTMS

DEVL: Road built to property, never developed. Located by UMDC personnel in early 1940's (UMDC location SW-40).

ANAL: 0.5 to 2.5% V_2O_5, 0.05-0.15% U_3O_8

GEOL: Tyuyamunite and dark vanadium minerals in two seams one foot apart in sandstone beds of the lower part of the Salt Wash member of Morrison Fm. Outcrop length of about 40 ft. shows analyses given above. Seams are 0.5-1.5 ft. thick.

REF: AEC file data; Coleman (1944)

COVE MESA MINES (south two-thirds of Cove Mesa) (AEC Plot 7, Navajo Permit #558)

LOC: Approx. Sec. 1, T37N, R. 28E SW Carrizo Mtns.

QUAD: Los Gigantes Buttes 15'; Shiprock NTMS

DEVL: Numerous inclines from Mesa top and adits from Mesa rim - see detailed map. AEC acquired lease from Manhattan Project and contracted with VCA to mine ore.

PROD: 35,963 tons @ 0.22% U_3O_8; 1.61% V_2O_5, 1948-1965 continuous.

GEOL: Tyuyamunite and vanadium minerals disseminated in thin-bedded, cross-bedded, fine-grain, gray calcareous sandstone, Salt Wash member.

REF: Blaybrough, J. and others (1959, RME-127) Harshbarger, J. (1946, RMO-441), Webber, B. (1943, RMO-480), Chenoweth (1980, TM-209)

COVE MESA MINES No. 1 and 2 (north 1/3 of Cove Mesa) (Cato Sells)

LOC: Approx. S. central Sec. 36, T38N, R28E, and N. to S. central Sec. 1, N. central Sec. 12, T37N, R28E

QUAD: Los Gigantes Buttes 15'; Shiprock NTMS

DEVL: Underground -few adits

PROD: 2,531 tons, @0.14% U_3O_8; 1.51% V_2O_5, 1948-58 and 1962-63.

GEOL: Tyuyamunite, metatyuyamunite and carnotite in limy sandstone and associated with carbonized logs along flanks of paleochannels in Salt Wash member.

REF: Blaybrough, J. (1959, RME-127)
Harshbarger, J. (1946, RMO-441)
Jones, D. (1954, RME-3093)
King, J. (1951, RMO-754)
Lowell, J. (1955)
Webber, B. (1943, RMO-480)

CURRAN MESA (Segi-Ho-Cho Mesa)

DAN TAYLOR #1 (LaGloria Oil and Gas Claim; Yale Point; adjacent claims include Hillside #1, Rough Rock Group, and Dan Taylor #4)

LOC: Approx. Sec. 11, T34N, R. 23E, along rim of Black Mesa @ Yale Point.

QUAD: Sweathouse Peak 7½'; Shiprock NTMS

DEVL: Prospected - rim cut w/small adit

PROD: 290 tons @ 0.14% U_3O_8; 0.31% V_2O_5 in 1955

RAD: 0.01-0.03% e U_3O_8

ANAL: Grab samples @ 0.01-0.38 U_3O_8; 0.08-0.84% V_2O_5 as coatings on sand grains.

GEOL: Carnotite-tyuyamunite disseminated and as small pads in quartzose, fine-grained, cross-bedded sandstone with a carbonaceous seam in Toreva Fm. Two foot thick and 30-35 ft. long zone along rim.

REF: PRR-EDR-551 (41)
Clinton, J. (1956, RME-91)
D.O.E. preliminary map No. 31

DENNY LEE (Claim #3)

DODGE #1 & #2 (Highjump claims, probably Zealy-tso #1)

LOC: SE corner Sec. 25, T6N, R10W

QUAD: Chinle 4 NE 7½'; Shiprock NTMS

DEVL: Small prospect pits

ANAL: 0.06-0.31% U_3O_8

GEOL: Carnotite in basal Shinarump on crest of Chinle Monocline with fracturing and some faulting parallel to fold.

REF: D.O.E.

DRY RUN CANYON (Claims #7, 10, 14)

EAST MESA MINES

LOC: Approx. NE¼ Sec. 24, T37 N., R28E
S. Carrizo Mtns.

QUAD: Los Gigantes Buttes 15'; Shiprock NTMS

DEVL: Rim cuts and 370 ft. of underground workings

PROD: 994 tons @ 0.24% U_3O_8; 0.62% V_2O_5, 1951-55

GEOL: Tyuyamunite as discontinuous lenses along sandstone-mudstone bedding planes and scattered patches of carbonaceous mudstone lenses in Salt Wash member.

REF: Dodd, P. (1956)
Blagbrough, J. and others (1959, RME-127)
Webber, B. (1943, RMO-480)

EAST RESERVATION LEASE OF VCA, - Eastern Carrizo Mtns.

Includes early major production from:
Plot #3 (New Mexico)
and minor production from:
Plot #1 (New Mexico)
Plot #2 (New Mexico)
Plot #4 (New Mexico)
Plot #6-9 (New Mexico)
Plot #11-12 (Arizona)

These plots collectively produced 6,758 tons @ 0.22% U_3O_8, 2.31% V_2O_5 during 1948-1950, which was not broken down by plot number by VCA at the time. Most production from New Mexico, but probably some from East Carrizos in Arizona (none from VCA Plot 10).

EASTERN CARRIZO MOUNTAINS

Initial production from:
Lone Star (Plot 9) (New Mexico)
Lower Oak Creek (Plot 7) (New Mexico)
Shadyside (Plot 3) (New Mexico)
Syracuse (R.F. & R) (Arizona)
Syracuse (VCA Plot 12) (Arizona)
Sunnyside (Plot 3) (New Mexico)

Lumped as Eastern Carrizo Mtns. production by UMDC (Union Mines Development Corp.) with a total recorded production of about 1,500 tons @ 0.27% U_3O_8 and 3.0% V_2O_5 during the years 1942-1944. Production was for vanadium initially, uranium was extracted later from discarded mill tailings. Most of the production probably came from Syracuse (R.F. & R) Mine according to early reports (Coleman, 1944).

EDWARD STEVE #1

LOC: Approx. Sec. 36, T33N, R23E

QUAD: Lohali Point 7½; Shiprock AMS

DEVL: 200 ft. of rim stripping, 2 short adits, 14 holes drilled in 1954.

PROD: Owners reportedly shipped 2 loads

GEOL: Uranium occurs as discontinuous streaks along mesa rim in sandstone of upper Toreva Fm. uraniferous beds at a depth of 65 ft. and average 1 ft. thick.

REF: Clinton, J. (1956, #24 outcrop, Fig. 3, p. 7)
PRR W/o #

EMMA #1 (Zona #1)

ETSITTY #1 (M.O. 5)

LOC: Approx. Sec. 10, T33N, R23E
Burnt Corn Wash Canyon - Black Mtn.

QUAD: Sweathouse Peak 7½'; Shiprock NTMS

DEVL: 200 ft. rim stripping, 100 ft. drifting in 2 adits; 5000 ft. drilling.

PROD: 130 tons @ 0.18% U_3O_8; 0.61% V_2O_5, 1954-55.

GEOL: Carnotite, tyuyamunite, rauvite and meta-hewettite coating grains and cementing a highly carbonaceous sandstone interbedded with carbonaceous siltstone in the Toreva Fm.

REF: PRR-EDR-264 (#36)
Clinton, J. (1956, RME-91)
Clinton, J. & Carithers, L. (1956)
D.O.E. Prelim. Map #31

EURIDA MINES (AEC Plot 6)

LOC: Approx. SE ¼ Sec. 11, SW¼ Sec. 12, NE¼ Sec. 13, N. border of Sec. 14 and NE¼, Sec. 15, T39N, R28E.

QUAD: Toh-Atin Mesa 15'; Shiprock NTMS

DEVL: Underground

PROD: From 1942 to 1944, Wade, Curran and Company shipped 2,942 tons @ 2.23% V_2O_5 from the Martin, North Martin, Saytah, Saytah Canyon, CBW-MC and Eurida Mines

GEOL: Mineralization in Salt Wash member

REF: Harshbarger, J. (1946, RMO-441)
Webber, B. (1943, RMO-480)

EURIDA MESA MINES (VCA west reservation plots No. 14, 15, 16)

LOC: Approx. SW¼ Sec. 12, T39N, R28E
Carrizo Mtns.

QUAD: Toh-Atin Mesa 15'; Shiprock NTMS

DEVL: Several short adits

PROD: 467 tons @ 0.17% U_3O_8; 2.86% V_2O_5; 1950-51, 1956.

GEOL: Mineralization in Salt Wash member

REF: Harshbarger, J. (1946, RMO 0-441)
Webber, B. (1943, RMO-480)

FALL DOWN MESA (Tommy James Mine)

FLAG #1 MINE

LOC: Approx. NW¼ Sec. 29, T36N, R29E, Lukachukai Mtns. on west side of ridge - Flag Mesa-near Black #1

QUAD: Los Gigantes Buttes and Red Rock Valley 15'; Shiprock NTMS

DEVL: Room and pillar underground

PROD: 11,286 tons @ 0.24% U_3O_8, 1.01% V_2O_5, 1953-57, 1964-66.

GEOL: Elongation of ore body parallel to easterly trend of paleostream deposition in cross-stratified sandstone with abundant clay chips, carbon matter and interstitial clay in Salt Wash member. Beds strike N62°W, dip 1½°NE on the Chuska Syncline and are well jointed.

REF: Nestler, R. and Chenoweth, W. (1958, RME-118)

FLAG #2 (Black #1)

FRANK #1 (Mines 4b, 709, 1207)

LOC: Approx. Sec. 8 and 17, T.36N, R29E Mesa 4½, Lukachukai Mtns.

QUAD: Los Gigantes Buttes 15'; Shiprock NTMS

DEVL: 8 adits with track and 1,200 ft. of underground room and pillar workings, operated by Climax Uranium Co.

PROD: 75,739 tons @ 0.25% U_3O_8; 1.15% V_2O_5, 1952-63, 1965-67, includes: South Portal (4B Mine)
East Portal (709 Mine)
North Portal (1207 Mine)

GEOL: Tyuyamunite-type or a zone 3 ft. thick and 150-200 ft. below surface in Salt Wash member.

REF: Dare (1959)
Dodd (1956)
Beam (1957, TM-115)

FRANK BLUEHORSE (Mesa 7)

FRANK JR.

LOC: Approx. Sec. 8, T36N, R29E, Lukachukai Mtns., Mesa V

QUAD: Redrock Valley 15'; Shiprock NTMS

DEVL: Adit and stope

PROD: 10,519 tons @ 0.31% U_3O_8; 1.70% V_2O_5, 1960-62, 1965 Small amount of ore hauled out of Mesa V Mine from this property, credited properly here.

GEOL: Tyuyamunite in Salt Wash member

REF: D.O.E.

FRANK TODECHEENIE (Todecheenie #1)

FRIDAY MESA

LOC: Approx. N. parts of Sec. 2 and 3, T38N. R28E, S. Carrizo Mtns. Segi-ho-cho Mesa, about 1.5 miles WSW of Sunnyside Mine.

QUAD: Los Gigantes Butte 15'; Shiprock NTMS

GEOL: Tyuyamunite-type mineralization associated with carbonized matter in medium-fine-grained Salt Wash sandstone.

REF: Harshbarger, J. (1946, RMO-441)
Webber, B. (1943, RMO-480)

G & C #1 (G and G)

G AND G (G and C #1)

LOC: NE¼ Sec. 18, T12N, R29E
Probably near shore of Lyman Reservoir

QUAD: St. Johns South 7½; Saint Johns NTMS

DEVL: Shallow stripped area 50 X 65 X 5 ft. deep

PROD: 3 tons @ 0.30% U_3O_8; 0.82% V_2O_5, 1956

GEOL: Mineralization in small 1.5 ft. thick limey sandstone lenses in Amejo Sandstone, Petrified Forest member. (Amejo from U. of Texas nomenclature)

REF: D.O.E.

GARNET RIDGE DIATREME (Bluestone #1)

GEORGE BELINTE #2

LOC: Approx. Sec. 22, T33N, T22E, on Apache/Navajo Co. line, Black Mtn.

QUAD: Blue Gap 7½'; Shiprock NTMS

DEVL: Drilled

ANAL: 0.08-0.19% e U_3O_8; 0.07 - 0.32% U_3O_8, 0.07-0.14% V_2O_5

GEOL: Carnotite disseminated in sandstone lenses just below carbonaceous member in upper part of lower member of Toreva Fm.

REF: D.O.E.

GEORGE SIMPSON #1 INCLINE (Geo. Simpson #1A - connects with Saytah Mine)

LOC: Sec. 11, 12, 13, 14, T40N, R28E
NW Carrizo Mtns.

QUAD: Toh-Atin Mesa 15'; Shiprock NTMS

DEVL: 600 ft. adit and 150 ft. incline. Initial access to the George Simpson #1A was thru the old Saytah Mine until the development of the incline.

PROD: 2,000 tons @ 0.20% U_3O_8; 1.40% V_2O_5, 1957-58

GEOL: Tyuyamunite in bands and lenses associated with pockets of carbon matter and sedimentary structures along sandstone-mudstone contact in Salt Wash member.

REF: D.O.E.
Harshbarger, J. (1946, RMO-441)

GOERGE SIMPSON #1A (George Simpson #1 Incline)

GEORGE SIMPSON #1B (access through Martin Mine)

LOC: Sec. 11,12,13,14, T40N, R28E
NW Carrizo Mtns.

QUAD: Toh-Atin Mesa 15'; Shiprock NTMS

DEVL: Underground - access was thru the Martin Mine

PROD: 1,697 tons @ 0.25% U_3O_8; 1.87% V_2O_5, 1957-58. Production from Geo. Simpson 1A and 1B is unclear because of confusion in the records concerning which mine was "1A" and which was "1B". The Labels shown in the accompanying figure conform to official shipping receipts; however, there is a suggestion that the "1A" and "1B" Labels need to be reversed.

REF: D.O.E.

GEORGE SIMPSON #2 (Mesa 4½ Mine)

GILA MINE (VCA Plot No. 4)

GOTHIE (GOTHE) (Henry Phillips)

LOC: NW Carrizo region; 4 miles SE of Boundary Butte along headwaters of Gothie Creek.

QUAD: Toh-Atin 15' or Walker Creek Reservoir 7.5 quads; Shiprock NTMS.

DEVL: Claim of 80 acres

PROD: 90 tons @ 0.54% U_3O_8 in 1949

GEOL: From Cooley et al USGS Prof. Paper #521-A, plate 5, there are Salt Wash outcrops in this general area which could have produced this ore.

REF: D.O.E.

GRANT PROSPECT

LOC: Approx. Sec. 1, T15N, R25E

QUAD: Hunt 15'; Saint Johns NTMS

GEOL: Tyuyamunite-type mineralization associated with carbonized plant matter in sandy clay and shale of the lower Chinle.

REF: Finch, W. (1967)

GRAVEL CAP (Oak Spring Mine)

GROVER CLEVELAND #1 (Cleveland #1)

LOC: Approx. Sec. 13, T40N, R28E,
NW Carrizo

QUAD: Toh-Atin Mesa 15'; Shiprock NTMS

PROD: 28 tons @ 0.22% U_3O_8; 1.84% V_2O_5, 1957

GEOL: Tyuyamunite ore replaced woody matter in sandstone of the Salt Wash member.

REF: D.O.E.

H. & R. NEZ (VCA Plot No. 10)

HALL MINE (Tom Naki Chee #6-8, Thirsty Mesa)

LOC: Approx. NE ¼ Sec. 11, T36N, R28E
Thirsty Mesa - Lukachukai Mtns.

QUAD: Los Gigantes Buttes 15'; Shiprock NTMS

DEVL: 100 ft. adit; 300 ft. tunnel w/stoped out area.

PROD: 2,448 tons @ 0.20% U_3O_8; 0.32% V_2O_5, 1956-58.

GEOL: Tyuyamunite and possibly pascoite, pintadoite and hewettite in discontinuous ore bodies in Salt Wash member. Ore body and pockets are horizontally lenticular in cross-section and parallel paleostream depositional trends. Thin seams of mudstone and pebble conglomerate cut through host festoon-type cross-bedded sandstone with abundant carbon matter. Ore in whitish, thin-bedded sandstone shows considerable disequilibrium with daughter products. Jointing is well defined.

REF: PRR-EDR-598
Nestler, R. and Chenoweth, W. (1958, RME-118)
Chenoweth, W. (1967)
O'Sullivan, R. and Beikman, H. (1963)

HANSEN CLAIM (Lucky Stripe Claim)

LOC: Sec. 27, T4N, R27E

QUAD: Hannagan Meadow 15'; Clifton NTMS

DEVL: 2 prospect pits

RAD: 4X 0.08-0.11% e U_3O_8

GEOL: Carnotite in limonite cemented sand and bentonitic clay in old river channel in volcanics.

REF: PRR-AP-266 (#25)

HARVEY BEGAY #3

LOC: Approx. NW¼ Sec. 12, T39N, R30E
East Carrizo Mtns.

QUAD: Pastora Peak 15'; Shiprock NTMS

DEVL: Rim cuts and short adits

PROD: 21 tons @ 0.12% U_3O_8; 2.05% V_2O_5, 1956

GEOL: Discontinuous bands of carnotite-type mineralization along mudstone layers and with carbon matter in light gray, fine-grained sandstone in 2 basal units of Salt Wash member. Sandstone is black in places. contains black mudstone galls and is strongly fractured. Diorite sill is above and a dike lies to the north.

REF: PRR-EDR-532 (#40)
D.O.E.

HARVEY BLACKWATER # 1 and 2

LOC: Approx. NW¼, Sec. 1, T41N, R23E.
Monument Valley

QUAD: Dennehotso 15'; Shiprock NTMS

DEVL: Pits

PROD: 576 tons @ 0.16% U_3O_8 in 1954-57

GEOL: NW trending Shinarump channel, N.E. of Main Monument 2 Mine

REF: D.O.E.

HARVEY BLACKWATER #4

LOC: Approx. S½ Sec. 2, T41N, R23E
Monument Valley

QUAD: Dennehotso 15'; Shiprock NTMS

DEVL: Room and Pillar, 10,000 ft. of drilling

PROD: 374 tons @ 0.20% U_3O_8; 0.35% V_2O_5, 1955-56

GEOL: Ore zone averages 2 ft. thick in Shinarump paleochannel at base of scour.

REF: D.O.E.

HARVEY PLATT RANCH (Possible alias for G and G claims)

LOC: Sec. T12N, R29E
at edge of lava beds

QUAD: St. Johns South 7½; Saint Johns NTMS

RAD: 20X

ANAL: 0.45% e U_3O_8; 0.48% U_3O_8

GEOL: Tyuyamunite-type associated with carbon matter in Chinle Fm.

REF: PRR-EDR-258

HAZELL MINE

LOC: Approx. Sec. 19 and 30, T39N, R31E
Carrizo Mtns. adjacent to Syracuse (R.F.& R.) and Plot 11 VCA

QUAD: Pastora Peak 15'; Shiprock NTMS

DEVL: Rim cuts and shallow adits with stoping parallel to rim. 19 drill holes.

PROD: 36 tons @ 0.16% U_3O_8; 1.88% V_2O_5, 1955 & 1957
Some pre-1952 shipments probably may include production from adjacent VCA Plot #11.

GEOL: Ore along mudstone-sandstone contact in Salt Wash member 40 ft. above Bluff sandstone.

REF: Blagbrough, J. & Brown, J. (1955)

HENRY PHILLIPS MINE

LOC: Approx. Sec. 21, T36N, R36E
Mesa 1½, Lukachukai Mtns.

QUAD: Redrock Valley 15'; Shiprock NTMS

DEVL: Rim cut

PROD: 16 tons @ 0.27% U_3O_8; 1.04% V_2O_5, 1955

GEOL: Ore in Salt Wash member

REF: D.O.E.

HIGHJUMP CLAIMS (Probably Dodge #1 & #2)

HILLSIDE #1 (Refer to Dan Taylor #1)

HINKSON CATTLE COMPANY

LOC: SW¼ Sec. 30, T15N, R25E

QUAD: Hunt 15'; Saint Johns NTMS

RAD: 2 mr/hr. around logs

GEOL: Carnotite-type mineralization associated with silicified and carbonized logs in lower Chinle Fm.

REF: PRR-EDR-221 (#31)

HOGAN MINE (VCA Plot No. 1)

HOMER SCOTT (Claim #7 and #10)

HORSE MINE (VCA Plot No. 10)

HORSE PORTAL (VCA Plot No. 10)

HOSKIE HENRY

LOC: Approx. Sec. 6, T40N, R29E
Carrizo Mtns. - just east of Pope #1

QUAD: Toh-Atin Mesa 15'; Shiprock NTMS

DEVL: Incline and stoping. Access thru Rattlesnake (VCA Plot #6)

PROD: 978 tons @ 0.20% U_3O_8, 1.29% V_2O_5 in 1964-66.

GEOL: Mineralization in Salt Wash member. A late mining permit for a horseshoe-shaped area surrounding northern part of VCA plot 6, to cover ore extensions in the subsurface to the west and east off of VCA Plot No. 6.

REF: D.O.E.

HOWARD NEZ (VCA Plot No. 10)

JEROME CHEE (Rocky Spring)

JERRY JAY #1

LOC: Poorly located - probably one of the Mesa 4 or Mesa 4½ localities. Lukachukai Mtns.

QUAD: Los Gigantes Buttes 15'; Shiprock NTMS

ANAL: 0.10-0.28% e U_3O_8; 0.12-0.33% U_3O_8; 0.15-0.43% V_2O_5; 2.2 -4.1% $CaCO_3$

GEOL: Tyuyamunite disseminated as grain coatings and filling interstices in Salt Wash member.

REF: PRR-EDR-422

JIM HATATTLY (Tom Wilson)

JIM L. SMILEY (Black Mtn. Vase)

JIM LEE #1 AND RICHARD KING #1 (Claims are contiguous and overlapping)

LOC: Approx. Sec. 27 T40N, R30E. East Carrizos (AEC plot 36° 50' 40"N, 109° 05' 35" W)

QUAD: Pastora Peak 15'; Shiprock NTMS

DEVL: Rim cuts and shallow adits

PROD: 120 tons @ 0.12% U_3O_8; 1.76% V_2O_5, 1955 from Jim Lee #1, 57 tons @ 0.18% U_3O_8; 2.78% V_2O_5, 1955 from Richard King #1.

GEOL: Thin discontinuous bands and scattered lenses of tyuyamunite about 40 ft. above Salt Wash contact with Bluff sandstone. Workings are between 2 igneous masses.

REF: D.O.E.

JIMMY BILEEN #1 and 3 (Refer to Sandy K Mine)

LOC: Approx. Sec. 8, T40N, R29E
NW Carrizo Mtns.

QUAD: Toh-Atin Mesa 15'; Shiprock NTMS

DEVL: Rim cuts, 2 connecting adits, 96 ft. of drifting, and caved incline.

PROD: 67 tons @ 0.20% U_3O_8; 1.31% V_2O_5, 1955-57.

GEOL: Discontinuous, 1 ft. thick lenses of ore in sandstone in lower 30 ft. of Salt Wash member.

REF: D.O.E.

JIMMY KING #9 MINE

LOC: Approx. E. Sec. 24, T36N, R28E
Lukachukai Mtns.

QUAD: Los Gigantes Buttes 15'; Shiprock NTMS

DEVL: 4 adits 10 to 120 ft. long, 100 ft. drift, 1000 ft. of rim stripping.

PROD: 80 tons @ 0.10% U_3O_8; 0.25% V_2O_5, 1956-57

GEOL: Ore is disseminated in fine-grained sandstone and as fracture coatings about 15 ft. above base of Salt Wash member. Three feet of red-gray mudstone caps ore zone -- scattered with barren tree remains.

REF: D.O.E. map No. 28

JOHN KEE TRACTS #3 & 4

LOC: Sec. 10,11,14,15, T31N, R28E
Carrizo Mtns. on north flank of Red Mesa syncline

QUAD: Toh-Atin Mesa 15'; Shiprock NTMS

DEVL: 300 X 300 X 10 ft. deep pit

PROD: 926 tons @ 0.51% U_3O_8; 0.91% V_2O_5, 1955

GEOL: Tyuyamunite-type ore occurs at mudstone-sandstone bedding plane interfaces, in sedimentary structures, and with carbon matter pockets - basal Salt Wash members.

REF: D.O.E.

JOHN LEE BENALLY

LOC: NE¼ Sec. 8, T40N, R27E
Carrizo Mtns. - NW side of North Water Mesa

QUAD: Toh-Atin Mesa 15'; Shiprock NTMS

DEVL: 5 X 10 ft. open cut along cliff face.

PROD: 37 tons @ 0.17% U_3O_8; 0.43% V_2O_5, 1963

GEOL: Pods of ore associated with carbonaceous matter in sandstone bed of Salt Wash member. Horizontal ore horizon.

REF: D.O.E.

JOHN M. YAZZIE #1 (Now Monument #2 Supplement)

LOC: Sec. 27 and 34, T41N, R23E

QUAD: Dinnehotso 15'; Shiprock NTMS

PROD: 1048 tons @ 0.47% U_3O_8; 1.06% V_2O_5, 1952-54, by Clani and Yazzie. Lease #1 of Spencer Uranium Co. came from this property as well, and accounts for 1510 tons in 1954-1957, for a total of 2558 tons @ 0.345% U_3O_8 and 0.796% V_2O_5.

JOHNNY McCOY #1

LOC: Approx. S. central Sec. 22, T40N, R27E. NW Carrizo Mtns. On nose of divide one mile NW of Sweetwater Trading Post.

QUAD: Toh-Atin Mesa 15'; Shiprock NTMS

DEVL: Rim cut

PROD: 34 tons @ 0.06% U_3O_8; 0.09% V_2O_5, 1955

ANAL: 0.01-0.14% e U_3O_8; 0.03-0.07% U_3O_8, 0.15-0.20% V_2O_5

GEOL: Tyuyamunite-Type ore body (10 X 5 ft. X 20 inches) in large, fine-grained, light gray sandstone lenses underlain by green and red mudstone galls and partings. Abundant carbon matter and heavy limonitic staining. In Salt Wash member 20 feet above base.

REF: D.O.E.

JOLEO MINE (Refer to Camp Mine and Cisco #1)

LOC: Approx. W. Sec. 28, T36N, R29E
Lukachukai Mtns.

QUAD: Redrock Valley 15'; Shiprock NTMS

DEVL: Room and pillar underground

PROD: 10,751 tons @ 0.24% U_3O_8; 0.98% V_2O_5, 1952-54

GEOL: Tyuyamunite with pascoite, rossite, corvusite, and vanadium clays occur in Salt Wash member about 65 ft. above Bluff contact. Sandstone is trough and festoon cross-stratified. Ore is associated with carbon matter, carbonized logs, mudstone pebble conglomerate, and with thin clay seams and galls. On the SW flank of Chuska Syncline, the beds strike N70° W, dip 2°NE. Joints are well defined and parallel two paleostream channels.

REF: Nestler, R. & Chenoweth, W. (1958, RME-118)

JUANITA

LOC: Sec. 14, T18N, R25E

QUAD: Adamana 1NW 7½; Saint Johns NTMS

DEVL: Cuts and trenches

PROD: 5 tons @ 0.13%, U_3O_8; 0.44% V_2O_5, 1954

GEOL: Small pods of carnotite associated with carbonaceous matter in argillaceous sandstone lenses just below the Sonsela unit of the Chinle Fm.

REF: D.O.E.

KASEWOOD BAHE #1 (Adjacent to and continuous with Thomas Begay #1)

LOC: Approx. Sec. 36, T34N, R23E, Black Mtn.

QUAD: Sweathouse Peak 7½; Shiprock NTMS

DEVL: Surface stripping-small open pit

PROD: 26 tons @ 0.45% U_3O_8; 0.55% V_2O_5, 1955-56

GEOL: Carnotite in upper part of lower sandstone member of Toreva Fm., overlain by 1-2 ft. bed of lignite.

REF: D.O.E.

KEITH FRANCIS CLAIMS (Bluestone #1)

KING #8 (Barton #3)

KINUSTA (Tree Mesa) (AEC Plot E)

LOC: Approx. S. center Sec. 21, SW¼ Sec. 28, N½ and SE¼ Sec. 34, S½ Sec. 33, T38N, R28E, S. Carrizo Mtns.

QUAD: Los Gigantes Buttes 15'; Shiprock NTMS

DEVL: Rim cuts

PROD: 788 tons @ 0.08% U_3O_8; 1.80% V_2O_5, 1949-52, 1958.

GEOL: Weak and irregular tyuyamunite-type specks and coatings in fine to medium grained sandstone of Salt Wash member, Carbonized matter. Best mineralization is 70-90 ft. above Bluff contact.

REF: D.O.E.

KNIFE EDGE MESA

LOC: Approx. SE¼ Sec. 29, T36N, R29E
On west side of Ridge-N. Lukachukai Mtns.

QUAD: Redrock Valley 15'; Shiprock NTMS

DEVL: Adit

PROD: 1,032 tons @ 0.19% U_3O_8; 0.50% V_2O_5, 1966

GEOL: Tyuyamunite-type in Salt Wash member

REF: D.O.E.

LA GLORIA OIL AND GAS CLAIMS (Same area as Thomas Begay #1-Kasewood Bahe #1)

LOC: Approx. N½, Sec. 2, T33N, R23E
Black Mtn.

QUAD: Sweathouse Peak 7½'; Shiprock NTMS

DEVL: Prospect pits

GEOL: Carnotite coatings on fine to coarse grained quartzose sandstone interbedded with carbonaceous siltstone just below middle member of Toreva Fm.

REF: Clinton, J. (1956, RME-91)

LA GLORIA OIL AND GAS CLAIM (Dan Taylor #1)

LAST CHANCE

LOC: Sec. 11,12,13,14, T 40N R28E, Carrizo Mtns.
just south of George Simpson #1A and B

QUAD: Toh-Atin Mesa 15'; Shiprock NTMS

DEVL: Incline-entrance caved

PROD: 32 tons @ 0.17% U_3O_8; 1.34% V_2O_5, 1961-62, & 1965.

GEOL: Tyuyamunite bands and lenses localized in Salt Wash member at sandstone-mudstone contacts, sedimentary structures and pockets of carbon.

REF: D.O.E.

LEROY #1 -MP-522 (Pettigrew #1, Leroy Pettigrew #1)

LOC: Approx. Sec. 29-30, T39N, R31E, Arizona-New Mexico line - Carrizo Mtns.

QUAD: Pastora Peak 15'; Shiprock NTMS

DEVL: 32° incline, 82 ft. long with 60 ft. of drift at bottom.

PROD: 25 tons @ 0.19% U_3O_8; 2.46% V_2O_5 in 1956 & 1961

GEOL: Mineralization in lower Salt Wash member

REF: D.O.E.

LOOKOUT CLAIMS (Tomcat)

LUCKY STRIPE CLAIM (Hansen Claim)

LUKE TSOSIE #1 (Tsosie #1)

M.O. 2

LOC: Approx. SW¼ Sec. 20, T33N, R23E
Black Mtn.

QUAD: Blue Gap 7½; Shiprock NTMS

GEOL: Carnotite or tyuyamunite coating grains in bands following cross-bedding in light-gray, quartzose, fine to coarse grained sandstone interbedded between carbonaceous siltstones. Ore zone is about 450 ft. long by 1.5 ft. wide and oriented along bend in paleochannel direction. Just below middle member of Toreva Fm.

REF: Clinton, J. (1956, RME-91)
Clinton, J. & Carithers, L. (1956)

M.O. 5 (Etsitty #1)

M.O. 28

LOC: Approx. central Sec. 25, T33N, R22E
Black Mtn.

QUAD: Blue Gap 7½'; Shiprock NTMS

GEOL: Carnotite or Tyuyamunite coating quartz grains in discontinuous bands along bedding in a carbonaceous sandstone just below middle member, Toreva Fm. Ore zone is about 500 ft. long and 3 ft. thick.

REF: Clinton, J. (1956, RME-91)

MP-181 (Mesa 4½ Mine)

MARTIN MINE (AEC Plot #1, refer also to later development of George Simpson #1B)

LOC: Approx. N. central Sec. 13, T40N, R28E
On east rim of Dry Mesa - Carrizo Mtns.

QUAD: Toh-Atin Mesa 15'; Shiprock NTMS

DEVL: Underground - Martin Mine provided initial access to The Simpson #1B ore body.

PROD: From August, 1942 to February, 1944, Wade, Curran and Company shipped 2,942 tons @ 2.23% V_2O_5 from the Martin, North Martin, Saytah, CBW-MC, Saytah Canyon and Eurida Mines.

1,481 tons @ 0.26% U_3O_8; 1.93% V_2O_5, 1951, 1953-55 produced by VCA under contract with AEC; includes illegal shipment by Jimmie King in 1954-54.

GEOL: Tyuyamunite, pascoite, volborthite, and montroseite occurs in bands and lenses associated with carbon matter pockets along sandstone - mudstone contact in Salt Wash member. Montroseite occurs as masses of fine needles 0.01 to 0.03 mm. long and rimming quartz and feldspar grains plus less often disseminated in calcite cement.

REF: Chenoweth, W. (1980)
Chenoweth, W. (1955, TM-75)
Harshbarger, J. (1946, RMO-441)
Stokes, W. (1951)
Hatfield, K. & Maise, C. (1953, RME-9)

MAYBE CLAIMS (Tomcat)

McKENZIE #3

LOC: Approx. Sec. 1 & 2, T40N, R28E
NW Carrizo Mtns.

QUAD: Toh-Atin Mesa 15'; Shiprock NTMS

DEVL: Drift and adit

PROD: 504 tons @ 0.18% U_3O_8; 1.64% V_2O_5, 1955-56.

GEOL: Scattered, small, low grade pockets of tyuyamunite ore 5 ft. above base of Salt Wash member on North flank of Rattlesnake anticline.

REF: D.O.E.

MELVIN BENALLY #1 (Benally)

LOC: Approx. Sec. 31-32, T39N, R29E
SW Carrizo Mtns.

QUAD: Pastora Peak and Tol-Atin Mesa 15'; Shiprock NTMS

DEVL: Drift

PROD: 147 tons @ 0.18% U_3O_8; 1.59% V_2O_5, 1955

GEOL: Tyuyamunite-type ore occurs as pods and lenses in sandstone - median horizon of Salt Wash member

REF: Harshbarger, I. (1946, RMO-441);
Webber, B. (1943, RMO-480)

MESA 1 (Includes Mines #10-15)

LOC: Approx. SE¼ Sec. 16, SW¼ Sec. 15, and NW¼ Sec. 22, T36N, R29E. at SE end of ridge - Lukachukai Mtns.

QUAD: Redrock Valley 15'; Shiprock NTMS

DEVL: Underground

PROD: 58,082 tons from all 6 mines @ 0.33% U_3O_8; 1.07% V_2O_5, 1950-58, 1961-63, 1965-67

GEOL: Clusters of small, irregular ore bodies of carnotite-Tyuyamunite scattered in Salt Wash member.

REF: Dare, W. (1961)

MESA 1¼ MINE

LOC: Approx. Sec. 22, T36N, R29E
N. Lukuchukai Mtns.

QUAD: Red rock Valley 15'; Shiprock NTMS

DEVL: Underground

PROD: 132 tons @ 0.16% U_3O_8; 0.79% V_2O_5, 1957

GEOL: Carnotite-Tyuyamunite in Salt Wash member

REF: D.O.E.

MESA 1½

LOC: Approx. central Sec. 21, T36N, R29E
Lukachukai Mtns. on East side of ridge.

QUAD: Redrock Valley 15'; Shiprock NTMS

DEVL: Underground

PROD: 7,555 tons @ 0.22% U_3O_8; 0.74% V_2O_5, 1958 & 1964-67, includes minor production from the West Mine in 1956.

GEOL: Tyuyamunite in Salt Wash member. On north flank of Chuska Syncline.

REF: Dare, W. (1961)
Eppich, J. (1956, TM-107)
Stokes, W. (1954, RME-3102)
Nestler, R. & Chenoweth, W. (1958, RME-118)
Masters, J. (1953, RME-27)

REF: D.O.E.

MESA 1½ WEST MINE

LOC: Approx. Sec. 21, T36N, R29E
Lukachukai Mtns.

QUAD: Redrock Valley 15'; Shiprock NTMS

DEVL: Adit

PROD: Minor production included with Mesa 1½ Mine

GEOL: Uranium in Salt Wash member.

REF: D.O.E.

MESA 1-3/4 INCLINE

LOC: Approx. SW¼, Sec. 21, T36N, R29E
Lukachukai Mtns.

QUAD: Redrock Valley 15'; Shiprock NTMS

DEVL: 30° incline connects with Mesa II, P-21 mine

PROD: 44,174 tons @ 0.20% U_3O_8; 0.89% V_2O_5, 1956-58

GEOL: Carnotite - Tyuyamunite in Salt Wash Member

REF: Dare, W. (1961)
D.O.E.

MESA 1-3/4, MINE #2, P-150

LOC: Approx. SW¼, Sec. 21, T36N, R29E
N. Lukachukai Mtns.

QUAD: Redrock Valley 15'; Shiprock NTMS

DEVL: Adit from rim, room and pillar mining

PROD: 6,423 tons @ 0.25% U_3O_8; 0.88% V_2O_5, 1951-55, 1959-69

GEOL: Tyuyamunite-type ore in Salt Wash member. Ore body is elongated NE, parallel to sedimentary trend. Fine grain sandstone is interbedded with mudstone. Hematite and limonite stain associated with ore. The biggest part of ore is not closely associated with visible carbon but in some places is above or below sandstone with carbon matter and logs.

REF: Nestler, R. & Chenoweth, W. (1958, RME-118)

MESA 2 - MINE #1 (P-150)

LOC: Approx. Sec. 21, T36N, R29E
Lukachukai Mtns.

QUAD: Redrock Valley 15'; Shiprock NTMS

DEVL: Underground

PROD: 3,825 tons @ 0.26% U_3O_5; 1.01% V_2O_5, 1952-55

GEOL: Tyuyamunite and pascoite associated with carbon matter, interstitial fillings and diffusion bands in sandstone of Salt Wash member. Ore body parallels paleostream depositional trends.

REF: Nestler, R. and Chenoweth, W. (1958, RME-118)

MESA 2 -MINE #1 & #2 (P-21)

LOC: Approx. NW¼ Sec. 16 and NW¼ Sec. 21, T36N, R29E
N. Lukachukai Mtns. - on east side of ridge connects with Mesa 1-3/4 incline and Mesa II½ mines.

QUAD: Redrock Valley 15'; Shiprock NTMS

DEVL: 2 main adits, 2,500 ft. long - room and pillar

PROD: 274,128 tons @ 0.23% U_3O_8, 1.00% V_2O_5, 1956-67

ANAL: 15.0% V_2O_5 max

GEOL: Tyuyamunite and vanadium minerals occur in Salt Wash member as bands and streaks filling interstices between sand grains and as diffusion bands and halos. Ore body elongated parallel to paleostream depositional trend. On SW limb of Chuska Syncline, beds strike N60°NW, dip 1½°NE.

REF: Dare, W. (1961)
Nestler, R. & Chenoweth, W. (1958, RME-118)

MESA 2 - MINE 4

LOC: Approx. Sec. 21, T36N, R29E
Lukachukai Mtns.

QUAD: Redrock Valley 15'; Shiprock NTMS

DEVL: Rim cut

PROD: 36 tons @ 0.38% U_3O_8; 1.37% V_2O_5, 1952

GEOL: Ore in Salt Wash member

REF: D.O.E.

MESA 2 PIT

LOC: Approx. Sec. 16, T36N, R29E
Lukachukai MTNS

QUAD: Redrock Valley 15'; Shiprock NTMS

DEVL: Pit

PROD: 822 tons @0.20% U_3O_8; 0.61% V_2O_5, 1950-51

GEOL: Ore in Salt Wash member

REF: D.O.E.

MESA 2-¼ MINE

LOC: Approx. Sec. 20, T36N, R29E
Lukachukai Mtns.

QUAD: Redrock Valley 15'; Shiprock NTMS

DEVL: Adit

PROD: 725 tons @ 0.18% U_3O_8; 0.85% V_2O_5, 1966

GEOL: Ore in Salt Wash member

REF: D.O.E.

MESA 2½ MINE

LOC: Approx. NE¼, Sec. 20, NW¼, Sec. 21, T36N, R29E
Lukachukai Mtns. on east side of ridge connects with Mesa II, P-21 mine.

QUAD: Redrock Valley 15'; Shiprock NTMS

DEVL: Drilled in 1955; over 4,000 ft. of drifts - room & pillar.

PROD: 38,343 tons @ 0.25% U_3O_8; 1.1% V_2O_5, 1956-67

GEOL: Tyuyamunite - carnotite mineralization in scattered clusters up to 13 feet thick, along a paleostream channel in Salt Wash member.

REF: Dare, W. (1961)
Stokes, W. (1954, RME-3102)
Masters, J. and Blum, R. (1951, RMO-707)

MESA 2½ - MINE #4

LOC: Approx. Sec. 20, T36N, R29E
Lukachukai Mtns.

QUAD: Redrock Valley 15'; Shiprock NTMS

DEVL: Underground short adit

PROD: 114 tons @ 0.26% U_3O_8; 1.54% V_2O_5, 1951

GEOL: Ore in Salt Wash member

REF: Dare, W. (1961)
Stokes, W. (1954, RME-3102)
Masters, J. and Blum, R. (1951, RMO-707)

MESA 3 MINE

LOC: Approx. Sec. 20, T36N, R. 29E
SE. Lukachukai Mtns.

QUAD: Redrock Valley 15'; Shiprock NTMS

DEVL: Underground room and pillar

PROD: 50,907 tons @ 0.26% U_3O_8; 1.22% V_2O_5, 1953-58, 1963-65.

GEOL: Tyuyamunite and partially oxidized uranium and vanadium minerals in Salt Wash member. Ore in a series of connected masses 30-200 ft. wide, over 1,000 ft. long and elongated SE along paleostream trend.

REF: Nestler, R. & Chenoweth, W. (1958, RME-118)
Dare. W. (1961)

MESA 3, NORTHWEST AND WEST MINES

LOC: Approx. N. central Sec. 20, T36N, R29E
Lukachukai Mtns. on east side of ridge

QUAD: Redrock Valley 15'; Shiprock NTMS

DEVL: One main adit with over 4,000 ft. of drifts, crosscuts, and stoping - room and pillars.

PROD: 735 tons @ 0.12% U_3O_8; 0.60% V_2O_5, 1954-58, 1966
Includes minor production from West Mine in 1966.

GEOL: Tyuyamunite-carnotite in sandstone with some mudstone lenses of Salt Wash member. Blue mudstone underlies most mineralization. Ore bodies elongated NW-SE along a scour or channel complex. NE joint set may have minor control on redistribution of oxidized ore.

REF: Nestler, R. & Chenoweth, W. (1958, RME-118)
Dare, W. (1961)

MESA 4 - MINE #1

LOC: Approx. NE¼ and central Sec. 16, T36N, R29E
Lukachukai Mtns.

QUAD: Redrock Valley 15'; Shiprock NTMS

DEVL: modified room and pillar

PROD: 7,648 tons @ 0.24% U_3O_8; 1.00% V_2O_5, 1950-51, 1953, 1955.

GEOL: Ore in Salt Wash member

REF: D.O.E.

MESA 4 - MINE #2

LOC: Approx. NE¼ and central Sec. 16, T36N, R29E
Lukachukai Mtns. on east side of ridge.

QUAD: Redrock Valley 15'; Shiprock NTMS

DEVL: Modified room and pillars

PROD: 3,711 tons @ 0.21% U_3O_8; 0.92% V_2O_5, 1950-51, 1953-54, 1956-59, 1962-62.

GEOL: Ore in Salt Wash member

REF: D.O.E.

MESA #4 - MINE #3

LOC: Approx. NE¼ and central Sec. 16, T36N, R29E
Lukachukai Mtns. on east side of ridge.

QUAD: Redrock Valley 15'; Shiprock NTMS

DEVL: Trackless, room and pillars.

PROD: 229 tons @ 0.38% U_3O_8; 0.91% V_2O_5, 1953

GEOL: Ore at a depth of 50-100 ft. and averaging 2.5 ft. in thickness in Salt Wash member.

REF: D.O.E.

MESA #4 - WEST MINE

LOC: Approx. E. Sec. 17, T36N, R29E
Lukachukai Mtns.

QUAD: Los Gigantes Buttes & Redrock Valley 15'; Shiprock NTMS.

DEVL: Modified room and pillar.

PROD: 3,365 tons @ 0.19% U_3O_8; 0.96% V_2O_5, 1963

GEOL: Ore in Salt Wash member

REF: D.O.E.

MESA #4½ MINE

LOC: Approx. Sec. 18, T36N, R29E
Lukachukai Mtns.

QUAD: Los Gigantes Buttes 15'; Shiprock NTMS

DEVL: Incline

PROD: 344 tons @ 0.15% U_3O_8; 1.16% V_2O_5, 1965 & 1968.

GEOL: Ore in Salt Wash member

REF: D.O.E.

MESA 4½ MINE (Tom Joe #1, 1212 Mine, Simpson #181, George Simpson, #2, MP-181)

LOC: Approx. Sec. 7, and 8, T36N, R29E,
N. Lukachukai Mtns., connects with Mesa V mine

QUAD: Los Gigantes Buttes 15'; Shiprock NTMS

DEVL: Adit from rim with room and pillar. Operated by Kerr-McGee, later VCA.

PROD: 8,977 tons @ 0.25% U_3O_8; 1.58% V_2O_5, 1954-58, 1960, 1965, 1968. Includes production from westward extension, called Simpson #181.

GEOL: Widely scattered clusters of small bodies of meta-tyuyamunite, pascoite, melanovanadite, hummerite, rossite, and metarossite in lenticular Salt Wash member sandstone interbedded with thin bands of bluish mudstone and surrounded by barren reddish sandstone and mudstone.

Bodies are often connected by thin mineralized bands and occur in several horizons about 40 ft. above Bluff sandstone contact. Most mineralization associated with paleostream channels and carbon matter. Traces of uraninite found in carbonized wood. Fine-grained iron oxides occur as pseudomorphs after pyrite or as earthy coatings on clay galls. Thickness of ore varies from a few inches to 6 feet, average 2.5 - 3.0 feet. Ore is irregularly tabular and elongated along sedimentary structures.

REF: D.O.E.

MESA 5 MINE

LOC: Approx. Sec. 8, T36N, R29E, Lukachukai Mtns.

QUAD: Redrock Valley and Los Gigantes Buttes 15'; Shiprock NTMS

DEVL: Room and pillars on 2 levels. Operated by Kerr-McGee, some ore mined here is properly credited to Frank Jr. mine.

PROD: 55,588 tons @ 0.20% U_3O_8; 0.72% V_2O_5, 1960-68

ANAL: 0.37 - 0.50% U_3O_8; 1.0-2.0% V_2O_5

GEOL: Disseminated tyuyamunite scattered throughout bottom of 1-5 ft. of Salt Wash sandstone 65-95 ft. above its base. Thin mudstone seams, mud galls, gypsum, and calcite locally abundant. Ore bodies, cluster in several horizons, 1-5 ft. thick and up to 40 ft. long.

REF: D.O.E.

MESA 5 ADIT (MINE 1) AND INCLINE (MINE 2)

LOC: Approx. Sec. 8, T36N, R29E
Lukachukai Mtns.

QUAD: Redrock Valley and Los Gigantes Buttes 15'; Shiprock NTMS.

DEVL: Modified room and pillars

PROD: 4,906 tons @ 0.21% U_3O_8; 1.38% V_2O_5, 1950-51, 1953-56.

GEOL: Ore in Salt Wash member, refer to Mesa 5 mine.

REF: King, J. (1951)

MESA 6 MINE

LOC: Approx. S. center Sec. 5 and NE¼ Sec. 7, T36N, R29E
Lukachukai Mtns. on east side of ridge.

QUAD: Los Gigantes Buttes 15'; Shiprock NTMS

DEVL: One larger incline mine, one smaller adit

PROD: 8,994 tons @ 0.24% U_3O_8; 1.12% V_2O_5, 1961-64.

GEOL: Tyuyamunite, pintadoite and pascoite in limy, quartzose sandstone of the Salt Wash member. Mineralization associated with clay galls and clay seams. Lower 6-100 ft. of pink Salt Wash is barren.

REF: Ellsworth, P. and Hatfield, K. (1951, RMO-802)

MESA 7 (Frank Bluehorse)

LOC: Approx. SE¼ Sec. 36, T37N, R28E
NE Lukachukai Mtns.

QUAD: Los Gigantes Buttes 15'; Shiprock NTMS

ANAL: 0.23% U_3O_8

GEOL: Tyuyamunite impregnating a light-tan sandstone of the Salt Wash member about 40 ft. above Bluff contact. Visible mineralization is 2 ft. long, 10 inches thick and underlain by barren green mudstone.

REF: King, J. and Ellsworth, P. (1951, RMO-803)

MEXICAN CRY MINE (Tom Naki Chee #1)

LOC: Approx. Sec. 2-3, T36N, R28E
Mexican Cry Mesa-Lukachukai Mtns.

QUAD: Los Gigantes Buttes 15'; Shiprock NTMS

DEVL: Drilled 1951-52, 200 ft. rim cut, 2 interconnecting adits, 220 ft. drift.

PROD: 58 tons @ 0.17% U_3O_8; 0.21% V_2O_5, 1955

GEOL: Tyuyamunite occurs as interstitial fillings and grain coatings in thin sandstone interbedded with claystone. Ore body parallel to palestream depositional trend.

REF: PRR-EDR-422
Nestler, R. & Chenoweth, W. (1958, RME-118)

MIKE BRODIE #1 (Brodie #1)

LOC: Approx. Sec. 5, T40N, R28E
NW Carrizo Mtns.

QUAD: Toh-Atin Mesa 15'; Shiprock NTMS

DEVL: Short adit and small stope

PROD: 5 tons @ 1.28% U_3O_8; 3.1% V_2O_5, 1951

GEOL: Spotty high grade tyuyamunite in Salt Wash member 3 to 4 ft. above Bluff contact and on NE edge of large scour with the Bluff. Rattlesnake-type mineralization associated with mineralized-carbonized logs. Inter-fingering mudstone and prominent iron staining.

REF: PRR-EDR-202
D.O.E.

MILDRED #1

LOC: Approx. Sec. 13-14, T38N, R28E
Segi-Ho-Cho Mesa, Carrizo Mtns.

QUAD: Los Gigantes Buttes 15'; Shiprock NTMS

DEVL: 90 ft. drift bearing S25° W from a roadcut. Only first 25 ft. of drift is mineralized.

PROD: 25 tons @ 0.05 U_3O_8, 2.68% V_2O_5, 1956

GEOL: Discontinuous bands and scattered lenses of ore along sandstone -mudstone contact and associated with carbon pockets in Salt Wash member, 30-40 ft. above Bluff contact.

REF: D.O.E.
Harshbarger (1946, RMO-441)

MONUMENT #2

LOC: Approx. W½ Sec. 27, N. central Sec. 32, T41N, R23E 36° 56' 05"N, 109° 53' 05"W - Monument Valley-Comb. Ridge.

QUAD: Dinnehotso 15'; Shiprock NTMS

DEVL: Underground and open pit

PROD: 766,998 tons @ 0.34% U_3O_8; 1.42% V_2O_5, 1948-1969 largest producer in Arizona @ 5.2 million pounds U_3O_8. Leased initially by VCA in 1942, some production by mechanical upgrader which separated ore sand from sub-ore slime.

ANAL: 0.10-0.58% U_3O_8; 1.0-2.24% V_2O_5; 0.4-1.5% $CaCO_3$.

GEOL: Principal ore is tyuyamunite and carnotite impregnating sandstone, filling fractures and replacing quartz, clay and fossil plant matter in Shinarump. Richest ore is in elongate horizontal flattened cylindrical "rods", up to 8 ft. in diameter and 100 ft. long.

Rods are aligned approximately parallel to N18°W trend of scour. Ore also extends as much as 7 ft. into DeChelly sandstone, where Shinarump paleochannel is cut down through Moenkopi and into DeChelly sandstone. Channel is about 2 miles long by 3 miles wide by 50 ft. deep and inner channel 700 ft. wide, and some 30 ft. deep. Uraninite is found in logs. Minerals identified include: montroseite, navahoite, becquerelite, fourmarierite, rauvite, volborthite, steigerite, hewettite, corvusite, uranophane, torbernite, metazeuneite, ilsemannite, autunite, pascoite, metatyuyamunite, and fernandinite.

REF: U.S.A.E.C. (1959, RME-141); Weeks, A. and others (1953-TEI-392),
McKee, E. and others (1953, RME-3089); Johnson, D. (1963)
Finnell, T (1957); Johnson, H. & Thordarson, W. (1966, TEI-640); Witkind, I. & Thaden, R. (1963); Witkind, I. (1956);
Mitcham, T. and Evensen, J. (1955).

MONUMENT #2 SUPPLEMENT

LOC: Approx. Sec. 27 & 34, T41N, R23E
Monument Valley

QUAD: Dinnehotso 15'; Shiprock NTMS

DEVL: Open pit

PROD: 31,181 tons @ 0.293% U_3O_8; 1.312% V_2O_5, 1952-59. Includes the following former claims which are listed separately:

Black and Blackwater
Cato Sells Tracts 1N, 1S, and 2W
Chee Nez #1
John M. Yazzie #1
Willy Waters

MOUNTAIN MINING COMPANY

LOC: "19 miles north of Springerville, on U.S. 260, turn left at gate by white highway guard railpost, thence ½ mile west to rim."

QUAD: Lyman Lake SW or Salado 7½; Saint Johns NTMS

RAD: 150 c/sec.

GEOL: Tyuyamunite-type as weak fracture fillings with with chert in Chinle Fm. redbeds.

REF: PRR-EDR-261 (#33)

MUD MESA (Chester Mud #1)

N.S.M. 2

LOC: Sec. 34, T15N, R26E
North Mountain

QUAD: Hunt 15'; Saint Johns NTMS

DEVL: Rim stripping and 25' adit, caved

PROD: 57 tons @ 0.03% U_3O_8; 0.08% V_2O_5, 1953

ANAL: 4 samples @ 0.08-0.68% U_3O_8

GEOL: Carnotite in Petrified Forest member

REF: D.O.E.

NAKAI CHEE BEGAY (Tom Joe #7 permits)

LOC: Approx. Sec. 11, T36N, R28E
Lukachukai Mtns.

QUAD: Los Gigantes Buttes 15'; Shiprock NTMS

DEVL: Underground

PROD: 428 tons @ 0.14% U_3O_8; 0.51% V_2O_5, 1955-57, 1959-60, 1963, includes production from contiguous Tom Joe #7 permit.

GEOL: Discontinuous tyuyamunite ore in Salt Wash member

REF: D.O.E.

NAKAI CHEE BEGAY (Upper Red Wash)

NAZLINI TP - Ft. Defiance Area

LOC: T1,2,3N, R8W, T2N, R9W and N½ Sec. 19, T1N, R5W (see Gallup NTMS for plotted locales) total of 9 occurrences.

QUAD: Gallup NTMS

RAD: Unknown

GEOL: Radioactive fossil log and wood material in Chinle Fm., probably Monitor Butte member, according to USGS map reference below. D.O.E. has no information regarding the six occurrences plotted on the Gallup NTMS map to accompany this report.

REF: D.O.E. Hackman and Olsen (1977, USGS Map I-981)

NO. 8 MINE (VCA Plot 12)

NORTH MARTIN MINE (AEC Plot #2)

LOC: Approx. S, center Sec. 12, T40N, R28E
NW Carrizo - on rim of Dry Mesa

QUAD: Toh-Atin Mesa 15'; Shiprock NTMS

DEVL: Rim cut

PROD: 2,942 tons @ 2.23% V_2O_5 from August, 1942 to February, 1944, Wade Curran and Company shipped a combined production from Martin, North Martin, Saytah CBW-MC, Saytah Canyon and Eurida Mines. North Martin produced less than 100 tons of ore.

GEOL: Ore in Salt Wash member

REF: Harshbarger, J. (1946, RMO-441)

NORTH MESA MINE (Rattlesnake #1)

NORTHEASTERN MEXICAN CRY MESA

LOC: Approx. SW central Sec. 25, T37N, R28E, Lukachukai Mtns.

QUAD: Los Gigantes Buttes 15'; Shiprock NTMS

GEOL: Tyuyamunite-type mineralization in fine-grained sandstone of Morrison Fm. with carbonized logs and debris.

REF: Peirce, H. and others (1970)
Webber (1943, RMO-480)

OAK SPRING MINE (Gravel Cap)

LOC: Approx. N. central Sec. 31, T39N, R31E
East Carrizo Mtns. near head of Oak Springs Wash.

QUAD: Redrock Valley and Pastora Peak 15'; Shiprock NTMS

DEVL: 400 ft. incline, 150 ft. shaft, drifts, stopes, room and pillars.

PROD: 5,112 tons @ 0.23% U_3O_8; 2.28% V_2O_5, 1949, 1954-59, 1962, 1966

ANAL: 0.1 -0.3% U_3O_8; 2.1 -3.2% -3.2% V_2O_5

GEOL: Tyuyamunite disseminated in unevenly bedded, light-gray, fine-grained Salt Wash sandstone with blue-green clay seams and carbon matter. Ore zone 54 ft. above Bluff contact and along sandstone mudstone contacts, in sedimentary structure and associated with carbon matter.

REF: PRR-CEBR-54 (#28)
Swanson, N. and Hatfield, K. (1952, RMO-811)
Dodd, P. (1952, TM-26)

OAK SPRINGS (Plot #10 VCA; East Reservation Lease)

LOC: Approx. NE¼, Sec. 31, T39N, R31E
Carrizo Mtns. - adjacent to Gravel Cap Mine

QUAD: Redrock Valley and Pastora Peak 15'; Shiprock NTMS

DEVL: Rim cuts, 350 ft. of drift, room and pillars, 50 drill holes, connects with Cato Sells Gravel Cap deposit.

PROD: 1979 tons @ 0.24% U_3O_8; 2.82% V_2O_5, 1949-50 by Cato Sells illegally, and 1955-57.

GEOL: Tyuyamunite-type ore in Salt Wash member 30-60 feet above Bluff contact.

REF: Swanson, M. and Hatfield, K. (1952, RMO-811)
Dodd, P. (1952, TM-26)

1½ WEST MINE (Mesa 1½)

1212 MINE (Mesa 4½ Mine)

PAUL BUCK (Upper Red Canyon)

PAUL SHORTY #1 (Rattlesnake #1)

PETTIGREW #1 (Leroy #1)

PHILLIP DEE #1

LOC: Approx. Sec. 20-21, T40N, R27E
NW Carrizo Mtns.

QUAD: Toh-Atin Mesa 15'; Shiprock NTMS

DEVL: 6 small pits

PROD: 154 tons @ 0.04%, 0.09% V_2O_5, 1954-55.

GEOL: Ore replaced logs and carbon matter in lower part of Salt Wash member.

REF: PRR-EDR-281
D.O.E.

PLOT #1 -- VCA RESERVATION PLOT
(Hogan Mine, West Reservation Lease)

LOC: Approx. SW¼, Sec. 1, T40N, R28E
NW Carrizo Mtns. on north prong of Dry Mesa

QUAD: Toh-Atin Mesa 15'; Shiprock NTMS

DEVL: Underground

PROD: For Plot #1, total of 3,507 tons @ 1.86% V_2O_5 mined for vanadium content in 1943-44 from VCA west reservation plots 1, 6-13. Also, minor production from here included with VCA west reservation plot 6 total. See entry on west Reservation lease for minor production in 1948-52 from plots 1 and 12.

GEOL: Tyuyamunite, schroechingerite, and metatyuyamunite in scattered, relatively small bodies in fine-grained shaly and limy sandstone of lower Salt Wash. ss. Carbonized logs and plant matter are abundant.

REF: Harshbarger, J. (1946, RMO-441)
Stokes, W. (1951)
Finch, W. (1967)

PLOT #2 - VCA West Reservation plot
(West Reservation Lease)

LOC: Approx. Sec. 1, T40N, R28E
NW Carrizo Mtns.

QUAD: Toh-Atin Mesa 15'; Shiprock NTMS

DEVL: 2 shallow pits

PROD: 163 tons @ 0.22% U_3O_8; 1.82% V_2O_5, 1960-61. Minor production in 1948-1952 reported as West Reservation Lease (see that entry).

GEOL: Mineralization in Salt Wash member

REF: D.O.E.

PLOT 3 and 5 - VCA west reservation plot
(West Reservation Lease)

LOC: Sec. 1, T40N, R28E, just north and down dip of Gila Mine

QUAD: Toh-Atin Mesa 15', Shiprock NTMS

DEVL: About 5 small prospect pits and several shallow trenches cut in shallow dip slope of Morrison Fm.

RAD: 30X max.

GEOL: In lower 20 ft. of Salt Wash member of Morrison Fm., on north flank of Toh-Atin anticline. Prospected by VCA in 1942-1943 for vanadium only.

REF: D.O.E.

PLOT #4 - VCA West Reservation Plot
(Gila Mine, West Reservation Lease)

LOC: Approx. SE¼ Sec. 1 and N. central Sec. 12, T40N, R28E, NW Carrizo Mtns. on North prong of Dry Mesa

QUAD: Toh-Atin Mesa 15'; Shiprock NTMS

DEVL: Adit

PROD: 22 tons @ 0.17% U_3O_8, 1.82% V_2O_5 in 1960-61. Portion shipped in 1949 as West Reservation lease (see that entry).

GEOL: Ore in Salt Wash member

REF: D.O.E.

PLOT #5 (Refer to Plot #3)

PLOT #6 - VCA West Reservation Plot
(Rattlesnake Incline)

LOC: Approx. Sec. 6-7, T40N, R29E
NW Carrizo

QUAD: Toh-Atin Mesa 15'; Shiprock NTMS

DEVL: Drilled, 600 X 100 ft. strip mine, adits and stopes

PROD: 7,365 tons @ 0.21% U_3O_8; 1.47% V_2O_5 in 1955-56 and 1958-59. This includes minor production from plots 1, 2, 3, 4, 7-12. Production in 1943-44 includes plots 1, 6-13, and totaled 3,507 tons @ 1.86% V_2O_5. See entry on West Reservation lease for minor production in 1948-52 from Plot 6.

GEOL: Ore in medial part of Salt Wash member

REF: Hatfield, K. and Maise, C. (1953, RME-9)
Harshbarger, J. (1946, RMO-441)

PLOT #7 - VCA West Reservation Plot
(Rattlesnake #5 Mine, West Reservation Lease)

LOC: Approx. Sec. 6-7, T40N, R28E
NW Carrizo Mtns.

QUAD: Toh-Atin Mesa 15'; Shiprock NTMS

DEVL: Underground

PROD: Total of 3,507 tons @ 1.86% V_2O_5 mined for vanadium content in 1943-44 from VCA west reservation plots 1, 6-13. Also, minor production from here included with VCA west reservation plot 6 total.

GEOL: Ore in Salt Wash member.

REF: Harshbarger, J. (1946, RMO-441)

PLOT #8 (West Reservation Lease)

LOC: Approx. Sec. 6-7, T40N, R28E
NW Carrizo Mtns.

QUAD: Toh-Atin Mesa 15'; Shiprock NTMS

DEVL: Short adit

PROD: 28 tons @ 0.18% U_3O_8; 1.80% V_2O_5, 1950.
Total of 3,507 tons @ 1.86% V_2O_5 mined for vanadium content in 1943-44 from VCA west reservation plots 1,6-15. Also, minor production from here included with VCA west reservation plot 6 total.

GEOL: Mineralization in Salt Wash

REF: Harshbarger (1946, RMO-441)

PLOT #9 (VCA West Reservation Lease)

LOC: Approx. Sec. 8, T40N, R29E
NW Carrizo Mtns.

QUAD: Toh-Atin Mesa 15'; Shiprock NTMS

DEVL: Rim cut

PROD: Total of 3,507 tons @ 1.86% V_2O_5 mined for vanadium content in 1943-44 from VCA west reservation plots 1, 6-13. Also, minor production from here included with VCA west reservation plot 6 total.

GEOL: Mineralization in Salt Wash

REF: Harshbarger (RMO-441, 1946)

PLOT #10 - VCA West Reservation Plot
(Horse Portal, Horse, H & R. Nez, Howard Nez, West Reservation Lease)

LOC: Approx. Sec. 8, T40N, R29E
W. Carrizo Mtn.

QUAD: Toh-Atin Mesa 15'; Shiprock NTMS

DEVL: Underground

PROD: 8 tons @ 0.10%, U_3O_8 1.19% V_2O_5, 1957 Mined from the dumps on Plot #10, but reported as H. & R. Nez. Total of 3,507 tons @ 1.86% V_2O_5 mined for vanadium content in 1943-44 from VCA west reservation plots 1, 6-13. Also, minor production from here included with VCA west reservation plot 6 total.

GEOL: Tyuyamunite-type ore as discontinuous bands and scattered lenses along mudstone-sandstone contacts, sedimentary structures and associated with carbon matter in the Salt Wash member.

REF: D.O.E.
Harshbarger (1946-RMO-441)

PLOT #11 - VCA West Reservation Plot (Two Level Mine)

LOC: Approx. SW¼ Sec. 8, T40N, R29E NW Carrizo Mtns. at head of Rattlesnake Canyon cutting into Black Rock Point.

QUAD: Toh-Atin Mesa 15'; Shiprock NTMS

DEVL: 1 portal, 2 drifts 45° apart and upper level thru raise.

PROD: Total of 3,507 tons @ 1.86% V_2O_5 mined for vanadium content in 1943-44 from VCA west reservation plots 1, 6-13. Also, minor production from here included with VCA west reservation plot 6 total.

GEOL: Mineralization in Salt Wash member

REF: Harshbarger (1946)

PLOT 11 - VCA East Reservation Plot
(White Cap Lease)

LOC: 36° 45' 55"N, 109° 03' 05"W
See Figure on Syracuse Mine area

QUAD: Pastora Peak 15'; Shiprock NTMS
Carrizo Mtns.

DEVL: 2 adits totalling 25 ft. 50 X 150 ft. rim strip area; 10 barren holes on 50-100 ft. centers drilled in 1952 by AEC.

PROD: Any production in 1948-1950 included in East Reservation Lease of VCA.

RAD: 5X

GEOL: Salt Wash member of Morrison Fm., 30-60 ft. above base.

REF: D.O.E.

PLOT #12 - VCA West Reservation Plot
(Rattlesnake #8 Mine, West Reservation Lease, No. 8 Mine)

LOC: Approx. Sec. 13, T40N, R28E
Carrizo Mtns.

QUAD: Toh-Atin Mesa 15'; Shiprock NTMS

DEVL: 12 holes drilled; 3 adits, 935 ft. drifts - room and pillars.

PROD: Total of 3507 tons @ 1.86% V_2O_5 mined for vanadium content in 1943-44 from VCA west reservation plots 1,6-13. Also, minor production from here included with VCA west reservation plot 6 total. See entry on West Reservation lease for minor production in 1948-52 from plots 1 and 12.

GROL: Ore in lenses in sandstone of lower Salt Wash member

REF: Harshbarger, J. (1946, RMO-441)
Hatfield, K. and Maise, C. (1953, RME-9)

PLOT #12 (Syracuse)

PLOT #13 - VCA West Reservation Plot
(West Reservation Lease)

LOC: Approx. Sec. 13, T40N, R28E
NW Carrizo Mtns.

QUAD: Toh-Atin Mesa 15'; Shiprock NTMS

DEVL: Shallow pits on rim

PROD: Total of 3507 tons @ 1.86% V_2O_5 mined for vanadium content in 1943-44 from VCA west reservation plots 1, 6-13.

GEOL: Mineralization in Salt Wash member

REF: Harshbarger (1946, RMO-441)

PLOT #14 (Eurida Mesa Mine)

PLOT #15 (Eurida Mesa Mine)

PLOT #16 (Eurida Mesa Mine)

POPE #1

LOC: Approx. Sec. 6, T40N, R29E
NW Carrizo Mtns.

QUAD: Toh-Atin Mesa 15'; Shiprock NTMS

DEVL: 50 ft., 50° incline, 135 ft. room and pillars; 100 drill holes.

PROD: 432 tons @ 0.33% U_3O_8; 1.80% V_2O_5, 1959

GEOL: Ore is at a depth of 30 ft. in thin argillaceous sandstone lens in Salt Wash member, 30 ft. above Bluff contact. On north flank of Rattlesnake anticline. Adjacent to VCA Rattlesnake (Plot #6).

REF: D.O.E.

PUERCO RIVER

LOC: Enters Arizona 15 miles NE of Sanders

QUAD: Gallup NTMS

RAD: In water, exceeds health standards

ANAL: Greater than 30 picocuries per liter of water

GEOL: Spill of radioactive water into Puerco River from United Nuclear Corp. mill tailings at Church Rock, NM, on 16 July 1979, at a point 50 miles upstream from Arizona border. Apache County residents are warned to not use the river water for drinking or any agricultural or livestock purposes.

REF: Arizona Dept. of Health Services
News Release - 3 June, 80.

R. F. & R (Syracuse)

RATTLESNAKE GROUP

Alias for following VCA West Reservation Mines
Plot #6
Plot #7
Plot #12

Rattlesnake #1 is not a part of the VCA Rattlesnake Group.

RATTLESNAKE INCLINE (Plot #6)

RATTLESNAKE #1 (Shorty #1, Paul Shorty #1, North Mesa Mine)

LOC: Approx. Sec. 16, T40N, R30E
Carrizo Mtns. on prong north of Black Rock Point

QUAD: Pastora Peak 15'; Shiprock NTMS

DEVL: Adits, room and pillar. Strata dip 9° due to Carrizo Laccolith.

PROD: 1,054 tons @ 0.16% U_3O_8; 1.70% V_2O_5, 1948, 1950, and 1955-56.

GEOL: Tyuyamunite ore in mud seams and carbon pockets of lower Salt Wash member.

REF: Stokes, W. (1951); Finch, W. (1967)
Harshbarger (1946, RMO-441)

RATTLESNAKE #5 MINE (Plot #7)

RATTLESNAKE #8 MINE (Plot #12)

RED FEATHER #3 (Upper Red Canyon)

RED ROCK BRIDGE

LOC: Approx. NE¼ Sec. 24, T37N, R31E
Near Redrock Trading Post, on east bank of canyon under new highway bridge.

QUAD: Redrock Valley 15'; Shiprock NTMS

RAD: to 12 X along a zone 50 ft. long and 1 ft. thick.

GEOL: One foot thick band of tyunamunite and vanadium mineralization near base of fine-grained Salt Wash sandstone interbedded with mudstone.

REF: King, J. (1951, RMO-755)

RICHARD KING (Jim Lee #1)

ROCKY SPRING (Jerome Chee)

LOC: Approx. Sec. 6-7, T36N, R31E
E. Carrizo Mtns.

QUAD: Redrock Valley 15'; Shiprock NTMS

DEVL: Rim cut

PROD: 11 tons @ 0.01% U_3O_8; 0.28% V_2O_5, 1951

GEOL: Flecks of tyuyamunite 2 ft. above base of Salt Wash member. Quartzose sandstone with carbonized plant debris and interbedded with mudstone and claystone. Pintadiote and hewettite identified.

REF: PRR-CEBR-24; King, J. (1951, RMO-755)

ROUGH ROCK GROUP (Refer to Dan Taylor#1)

ROUGH ROCK SLOPE #9

LOC: Approx. Sec. 1-2, T34N, R23E
Chilchinbito - Yale Point

QUAD: Rough Rock 7½; Shiprock NTMS

DEVL: Underground

PROD: 67 tons @ 0.25% U_3O_8; 0.94% V_2O_5; 1.15% $CaCO_3$, 1956

GEOL: Carnotite in a sandstone lens directly below a lignitic bed in upper part of the lower sandstone member of the Toreva Fm.

REF: Clinton, J. (1956, RME-91)
D.O.E. preliminary map No. 31

RUBEN #1 (at or near Billie No. 1)

LOC: Approx. Sec. 27, T40N, R30E, East Carrizos
(AEC plot 36° 50' 10"N, 109° 06'00"W

QUAD: Pastora Peak 15'; Shiprock NTMS

DEVL: Rim cut and adit

PROD: 64 tons @ 0.22% U_3O_8; 2.10% V_2O_5, 1955

GEOL: Discontinuous bands and scattered lenses of tyuyamunite along sandstone-mudstone contacts, in sedimentary structure and pockets of carbon matter in Salt Wash member.

REF: D.O.E.

RUIN MESA (Charlie James #1)

SALINA #4 (Charlie James #1)

SAM CHARLEY #1

LOC: Approx. Sec. 36, T34N, R23E
Black Mtn.

QUAD: Sweathouse Peak 7½; Shiprock NTMS

DEVL: 550 X 40 X 5 ft. deep shallow stripped area, some drilling.

GEOL: Ore bearing sandstone in the upper portion of the lower sandstone member, Toreva Fm. is overlain by a 1-2 ft. bed of lignite.

REF: D.O.E.

SAM HARVEY (Syracuse)

SANDY K MINE (Covered by Jimmy Bileen Claims)

LOC: Approx. Sec. 8, T40N, R29E
NW Carrizo - 8 miles west of Old Teec Nos Pos Trading Post

QUAD: Toh-Atin Mesa 15'; Shiprock NTMS

DEVL: 6 X 10 X 2 ft. deep shallow pit

PROD: 7 tons @ 0.13% U_3O_8; 0.57% V_2O_5, 1955

GEOL: Tyuyamunite halos around petrified logs in Salt Wash member.

REF: D.O.E.

SAYTAH CANYON (AEC Plot No. 4)

LOC: Approx. Sec. 31-32, T39N, R29E
Carrizo Mtns.

QUAD: Toh-Atin Mesa and Pastora Peak 15'; Shiprock NTMS

DEVL: Rim cut

PROD: 112 tons @ 0.18% U_3O_8; 1.71% V_2O_5, 1950-51 by VCA under contract with AEC. From 1942 to 1943, Wade, Curran and Company, shipped 2,942 tons @ 2.23% V_2O_5 from the Martin, North Martin, Saytah, Saytah Canyon CBW-MC and Eurida Mines.

GEOL: Ore in Salt Wash member

REF: Harshbarger, J. (1946, RMO-441)

SAYTAH MINE (Geo. Simpson #1A was accessed through Saytah portal)

LOC: Approx. S central Sec. 13, T40N, R28E. Head of Tsitah Wash Canyon-NW Carrizo Mtns.

QUAD: Toh-Atin Mesa 15'; Shiprock NTMS

DEVL: Underground - initial access for the George Simpson #1A was thru the Saytah Mine.

PROD: 1,926 tons @ 0.23% U_3O_8; 1.88% V_2O_5, 1956. From 1942 to 1944, Wade, Curran and Company, shipped 2,942 tons @ 2.23% V_2O_5 from the Martin, North Martin, Saytah, Saytah Canyon, CBW-MC and Eurida Mines.

GEOL: Tyuyamunite in Salt Wash member

REF: Harshbarger, J. (1946, RMO-441)

SCHOOL BOY

LOC: Approx. Sec. 33, T40N, R29E Carrizo Mtns.

QUAD: Pastora Peak 15'; Shiprock NTMS

DEVL: 200 X 30 X 15 ft. deep rim cut, 2 north trending adits from cut, 50 ft. of underground workings.

PROD: 109 tons @ 0.09% U_3O_8; 2.33% V_2O_5, 1955-56.

GEOL: Ore as thin discontinuous bands and scattered lenses along mudstone-sandstone contacts and carbon pockets in basal Salt Wash sandstone.

REF: D.O.E.

SELLS (Cove Mesa mines No. 1 and 2)

SHEEPSKIN MESA (Hanley #1 and #3 claims)

LOC: Approx. Sec. 29, T38N, R28E Carrizo Mtns.

QUAD: Los Gigantes Buttes 15'; Shiprock NTMS

DEVL: 300 ft. of rim stripping; 5 small adits. No. 1 mine on NW side of Mesa, No. 2 mine on NE side.

PROD: 80 tons @ 0.21% U_3O_8; 2.14% V_2O_5, 1950 & 1953

GEOL: Tyuyamunite associated with gray claystone, five feet above base of Salt Wash member.

REF: D.O.E.

SHIPROCK

LOC: Unknown location, possibly from White Cap or Syracuse plots, East Reservation Lease

PROD: 104 tons @ 0.16% U_3O_8; 1.94% V_2O_5 in 1948, included in total for East Reservation Lease in TM-210, (1980)

REF: W. Chenoweth, pers. comm., 1980

SHORTY #1 (Rattlesnake #1)

SILENTMAN #1

LOC: Approx. Sec. 2, T40N, R28E NW Carrizo

QUAD: Toh-Atin Mesa 15'; Shiprock NTMS

DEVL: Surface stripping

PROD: 12 tons @ 0.08% U_3O_8; 0.008% V_2O_5, 1958

GEOL: Tyuyamunite in fossil logs exposed on surface or Salt Wash Fm. Logs are silicified, nor carbonized.

REF: D.O.E.

SIMPSON #1 (George Simpson #1)

SIMPSON #181 (Mesa 4½ Mine)

SITTON LEASE

Sitton was the first white man to acquire some Lukachukai Mtns. ore bodies. Sitton shipped some ore as the Navajo Uranium Company, then sold out to Kerr-McGee, who then renamed the occurrences as Mesa numbers, i.e. Mesa 1,2,.... See RME-118 for history.

SM TRACT #2 (Cato Sells Tract 1S, 2W, 1N)

SNAKE POINT (Tom Joe #7)

STARK-LATHING COMPANY PERMIT

LOC: "Drive north from Crystal, New Mexico for 12 miles. Anomaly lies just north of Whiskey Creek in the valley of a small tributary. Approx. T5N, R5W, on Arizona-New Mexico Border.

QUAD: Sonsela Buttes 15'; Shiprock NTMS

RAD: 10X

GEOL: Basalt boulder alluvium with basalt slightly radioactive.

REF: PRR-EDR-421

STEP MESA MINE

LOC: Approx. N. central Sec. 30, T36N, R29E, Lukachukai Mtns. on west side of ridge

QUAD: Los Gigantes Buttes 15'; Shiprock NTMS

DEVL: Room and pillars

PROD: 8841 tons @ 0.20% U_3O_8; 0.43% V_2O_5, 1962-64

GEOL: Ore in Salt Wash Fm.

REF: D.O.E.

SUNNYSIDE MINE

LOC: Approx. W. side of Sec. 36, T39N, R28E
W. Carrizo Mtns. on Sunnyside Mesa. There is also a Sunnyside Mine in New Mexico

QUAD: Los Gigantes Buttes 15'; Shiprock NTMS

DEVL: Small underground

PROD: 28 tons, @ 0.16% U_3O_8, 3.10% V_2O_5, in 1955. From May to October, 1943, Wade, Curran and Company shipped 475 tons @ 2.75% V_2O_5.

ANAL: 5 samples @ 0.05-0.11% e U_3O_8; 0.03-0.15% U_3O_8; 0.94-5.00% V_2O_5

GEOL: Tyuyamunite-type ore in medium-grained, shaly Salt Wash sandstone with carbon matter and 40-50 ft. above contact with Bluff member.

REF: Webber, B. (1943, RMO-480)
Harshbarger, J. (1946, RMO-441)

SYRACUSE (R. F. & R.: Sam Harvey)

LOC: Approx. Sec. 19, 30, T39N, R31E.
East Carrizo Mtns. on south side of south Tributary of Cottonwood Wash close to New Mexico border. Adjacent to Hazell and Valley View Mines.

QUAD: Pastora Peak 15'; Shiprock NTMS

DEVL: Rim cuts and entries on SW and NE sides of mesa 3 adits on NE, one on SE side connects 2,000 ft. of workings

PROD: 23 barrels of radium ore, very probably from this mine, was shipped through Beclabito T.P. to Colorado in about 1922. The majority of 1500 tons of vanadium ore, shipped by Wade Curran and Co. in 1942-44, came from this mine. And 1954-58, 1964-66 production of 1967 tons @ 0.28% U_3O_8, 2.60% V_2O_5 is also recorded.

GEOL: Ore zone is 4.5 ft. thick in discontinuous bands along sandstone-mudstone contacts and carbon pockets in middle of Salt Wash member about 40-60 ft. above Bluff contact. Upper ore zone also mined.

REF: Stokes, W. (1951)
Finch, W. (1967)
Coleman (1944, RMO-469)

SYRACUSE (East Reservation Lease)(VCA Plot 12)

LOC: Approx. Sec. 19 & 20, T39N, R31E
East Carrizo Mtns. on Arizona-New Mexico Border

QUAD: Pastora Peak 15'; Shiprock NTMS

DEVL: 4 adits totaling about 140 ft., with some stoping, along a 250 ft. distance.

PROD: During 1943 a small amount of ore was mined from the Syracuse plot by VCA (Coleman describes the mine as extant in 1944). In 1949, VCA mined a small amount of ore bypassed in earlier operation. This ore was included in East Reservation Lease shipments mainly from Plot 3 (Shadyside). (Page Edwards, VCA field superintendent, pers. comm. to Chenoweth, 1955.) The 1949 shipment probably amounted to 225 tons @ 0.27% U_3O_8, 2.96% V_2O_5.

GEOL: Tyuyamunite-type mineralization in lower Salt Wash member. Refer to Syracuse (R.F.&R.) nearby.

REF: D.O.E.

T. J. & #9 MINE (Tommy James)

THIRSTY MESA (Hall Mine)

THOMAS CLANI (VCA) (Black Rock Point)

THOMAS BEGAY #1 (Begay #1, adjacent to and continuous with Kasewood Bahe #1)

LOC: Sec. 36, T34N, R23E
Chilchinbito

QUAD: Sweathouse Peak 7½'; Shiprock NTMS

DEVL: 53 holes drilled, 600 ft. rim stripping

PROD: 12 tons @ 0.47% U_3O_8; 0.31% V_2O_5, 1956

GEOL: Carnotite in upper part of lower sandstone member of the Toreva Fm., overlain by 1-2 ft. bed of lignite.

REF: Clinton, J. (1956, RME-91)
D.O.E. Preliminary map No. 31

TODAKONZIE #1

LOC: Approx. Sec. 26-27, T40N, R30E, North Carrizos (AEC plot 36°50' 10" N, 109° 05'40"W)

QUAD: Pastora Peak 15'; Shiprock NTMS

DEVL: 20 X 10 X 6 ft. deep rim cut, heading NE-SW along mineralized outcrop.

PROD: 6 tons @ 0.21%; 1.81% V_2O_5, 1955

GEOL: Tyuyamunite-type ore in thin discontinuous bands, pods and scattered lenses along sandstone-mudstone contacts in Salt Wash member, 30-40 ft. above Bluff contact. This Salt Wash block overlies an igneous mass.

REF: D.O.E.

TODECHEENIE #1, (Frank Todeckeenie)

LOC: Approx. Sec. 35 & 36, T34N, R23E
Black Mtn.

QUAD: Sweathouse Peak 7½'; Shiprock NTMS

DEVL: 600 X 150 X 15 ft. deep, stripped area
720 holes drilled.

PROD: 1,363 tons @ 0.22% U_3O_8; 0.28% V_2O_5, 1955-56.

RAD: 20X

ANAL: Select specimen @ 2.30% e U_3O_8; 2.73% U_3O_8; 0.97% V_2O_5; 0.6% $CaCO_3$.

GEOL: Carnotite in upper portion of lower sandstone member, Toreva Fm., overlain by 1-2 ft. lignite bed. Metatyuyamunite, rauvite and metahewettite in red clay have been identified.

REF: Clinton, J. (1956, RME-91, Ref. #19, Fig. 3, p. 7)
D.O.E. preliminary map #31.

TOHE-THLANY-BEGAY

LOC: Approx. Sec. 34 & 35, T39N, R29E, and Sec. 2 and 3, To 38N, R29E, S. Carrizo Mtns.

QUAD: Redrock Valley 15'; Shiprock NTMS

DEVL: 300 X 30 X 20 ft. deep rim cut; adit with 134 ft. underground workings; 7 holes drilled.

PROD: 254 tons @ 0.16%; 2.66% V_2O_5, 1950-53.

GEOL: Tyuyamunite in lower part of Salt Wash member, adjacent to diorite porphyry intrusive.

REF: D.O.E.

TOM JOE #1 (Also Tom Joe Parcel #1) (Mesa 4½ Mine)

TOM JOE #7 (Snake Point)

LOC: Approx. Sec. 1, 2, 12, 13, T36N, R28E N. Lukachukai Mtns.

QUAD: Los Gigantes Buttes 15'; Shiprock NTMS

DEVL: 8 drill holes

GEOL: Tyuyamunite-type mineralization averaging 3 ft. thick in basal Salt Wash member about 75 ft. from surface.

REF: D.O.E.

TOM JOE #7 PERMIT (Nakai Chee Begay)

TOM KLEE #1 MINE

LOC: Approx. SE¼ Sec. 2, T35N, R22E, and SW¼, Sec. 6, T35N, R23E., about 4.5 mi. NW of Rough Rock

QUAD: Rough Rock NW 7½; Shiprock NTMS

DEVL: Few hundred feet of scattered rim stripping; 70 holes drilled.

PROD: 64 tons @ 1.01% U_3O_8; 0.04% V_2O_5, 1952, 1956-58.

GEOL: Scattered high grade tyuyamunite replacing logs in Salt Wash member sandstone rim.

REF: PRR-GJEBR-76
D.O.E. preliminary map No. 31.

TOM MORGAN #1

LOC: Approx. Sec. 29, T41N, R27E NW Carrizo Mtns.

QUAD: Toh-Atin Mesa 15'; Shiprock NTMS

DEVL: Several shallow prospect pits, 50 ft. of rim stripping.

PROD: 10 tons @ 0.24% U_3O_8; 0.76% V_2O_5, 1955

GEOL: Tyuyamunite-type ore associated with a thin clay seam 20 ft. above Bluff contact in basal Salt Wash member.

REF: D.O.E.

TOM NAKI CHEE (Mexican Cry Mine)

TOM NAKI CHEE #6-8 (Hall Mine)

TOM WILSON, (Jim Hatattly)

LOC: Approx. Sec. 6, T35N, R23E, and Sec. 1, T35N, R22E, Chilchinbito

QUAD: Rough Rock NW 7½'; Shiprock NTMS

DEVL: Pit; rim stripping, 57 holes drilled

PROD: 59 tons @ 0.45% U_3O_8; 0.03% V_2O_5, 1956

GEOL: Tyuyamunite replacing fossil logs in Salt Wash member.

REF: PRR-GJEBR-76
Anthony, M. (1955, RME-82)
D.O.E. preliminary map No. 31.

TOMCAT (Maybe Claims, Lookout Claims)

LOC: Approx. Sec. 18, T11N, R28E 10 miles south of Saint Johns

QUAD: Lyman Lake SW7½; Saint Johns NTMS

DEVL: 200 X 30 X 20 ft. deep rim cut, 2 trenches, 1955

RAD: 50X

GEOL: Carnotite-type mineralization at base of thin argillareous sandstone in lower part, Petrified Forest member, overlain by Bidahocki Fm. and underlain by gray Chinle shale. Carbonized wood fragments, gypsum and copper staining present.

REF: PRR-A-19
PRR-EDR-261 (#24)

TOMMY JAMES MINE (Fall Down Mesa, T.J. #9 Mine)

LOC: Approx. SW¼, Sec. 19, T36N, R29E S. Lukachukai

QUAD: Los Gigantes Buttes 15'; Shiprock NTMS

DEVL: 53 holes drilled underground

PROD: 853 tons @ 0.17% U_3O_8; 0.79% V_2O_5, 1955-56.

GEOL: Bedded lenses and pods of tyuyamunite ore at an average depth of 220 ft. and average thickness of 3.2 ft. in Salt Wash member.

REF: D.O.E.

TONI TUC TRACT #1

LOC: Approx. Sec. 12, T39N, R30E, East Carrizo Mtns. (AEC Plot 36° 48' 03"N, 109° 04' 50"W)

QUAD: Pastora Peak 15'; Shiprock NTMS

DEVL: E-W rim cut 400 X 20 X (10-60) ft. deep. Two short adits.

PROD: 407 tons @ 0.18% U_3O_8, 3.28% V_2O_5, in 1953, 56-57, 1962, 1966.

ANAL: 4 samples @ 0.42-0.13% U_3O_8; 2.41-4.28% V_2O_5; 8.50% $CaCO_3$

GEOL: Tyuyamunite-type ore in bands 1-3 ft. thick in basal Salt Wash member.

REF: Coleman (1944, RMO-469) describes the outcrop.

TOPAHA (Billy Topaha Mine)

TRACT #1 AND #2 (Cato Sells Tracts 1S, 2W, 1N)

TREE MESA (Clani)

LOC: Approx. Sec. 28, T38N, R28E, Carrizo Mtns.

QUAD: Los Gigantes Buttes 15'; Shiprock NTMS

DEVL: Rim cut

PROD: 47 tons @ 0.08% U_3O_8; 0.72% V_2O_5, 1953

GEOL: basal Salt Wash.

REF: D.O.E.
Webber (1943, RMO-480).

TSOSIE #1 (Luke Tsosie #1)

LOC: Approx. Sec. 7, T40N, R28E Carrizo Mtns.

QUAD: Toh-Atin Mesa 15'; Shiprock NTMS

DEVL: 570 ft. of adits, drifts and crosscuts Located by single A.E.C. drillhole.

PROD: 25 tons @0.11% U_3O_8; 1.30% V_2O_5, 1955

GEOL: Carnotite-type ore in basal Salt Wash member with some Petrified Wood.

REF: D.O.E.

TWO LEVEL MINE (VCA West Reservation Plot 11).

UNNAMED A

LOC: NW¼, Sec. 3, T14N, R26E

QUAD: Hunt 15'; Saint Johns NTMS

RAD: 1,000 counts/min.

ANAL: 0.07-0.68% U_3O_8

GEOL: Mineralization in bleached conglomeratic sandstone and siltstone with high mud content, wood, carbon matter and iron staining. Chinle scour and fill channel with buttes capped by travertine.

REF: PRR-EDR-223 (#32); Finch, W. (1967)

UNNAMED B (Might be Hinkson Cattle Co. occurrence)

LOC: Sec. 11, T15N, R24E

QUAD: Adamana 3NE 7½; Saint Johns NTMS

ANAL: 0.031% e U_3O_8; 0.034% U_3O_8

GEOL: Carnotite, chalcedony, gypsum and carbon matter in sandy clay and shale of Chinle Fm.

REF: PRR-w/o #

UNNAMED C

LOC: Approx. W½ Sec. 1 and E½ Sec. 2, T38N, R28E - South Carrizo Mtns. on mesa between tributaries of Alcove Canyon about one mile south of Sunnyside Mesa.

QUAD: Los Gigantes Buttes 15'; Shiprock NTMS

DEVL: Prospect pits

GEOL: Mineralization in Salt Wash member

REF: D.O.E.

UNNAMED D

LOC: Approx. Sec. 13, T9N, R6W, 36° 30' 55"N, 109° 01' 35" W.

QUAD: Redrock Valley 15'; Shiprock NTMS

DEVL: Vanadium ore stockpiled

GEOL: Flecks of carnotite with pintadoite, hewettite, and vanadium minerals in gray, weakly cross-bedded Salt Wash sandstone, 3 ft. above Bluff contact.

REF: PRR-CEBR-24 (#27)

UNNAMED E

LOC: Approx. E½, Sec. 29, T33N, R23E, Caps a cliff-forming sandstone on north side of east flowing tributary to Tah Chee Wash.

QUAD: Tah Chee Wash 7½'; Shiprock NTMS

RAD: Air-borne anomaly

ANAL: 10-30% TiO_2

GEOL: Six inch thick black placer sand in Toreva Fm. and capping a small mesa. Composed of titanium rich placer concentrate with uranium-bearing zircons and thorium-bearing monazite.

REF: Murphy, J. (1956)

UNNAMED F

LOC: Approx. N½, Sec. 11, T32N, R23E, Black Mtn. in west flowing tributary to Burnt Corn Wash on south side of canyon, traceable for one mile.

QUAD: Blue Gap 7½'; Shiprock NTMS

RAD: Air-borne anomaly

ANAL: 10-30% TiO_2

GEOL: Very thin black sand laminae throughout a 13 ft. interval in the Toreva Fm. Uranium in zircons and Thorium in monazite.

REF: Murphy, J. (1956)

UPPER CANYON MINES

LOC: Approx. Sec. 29, and 30, T39N, R31E East Carrizo Mtns.

QUAD: Pastora Peak 15'; Shiprock NTMS

DEVL: Numerous short adits, 400 ft. incline which is flooded, newer access by adit from rim.

PROD: 2,809 tons @ 0.17% U_3O_8; 2.06% V_2O_5, 1950-56, 1961-64.

GEOL: Tyuyamunite mineralization lies in a broad, poorly defined channel in light-gray, fine-grained Salt Wash sandstone, 20 ft. above Bluff contact. Ore is exposed continuously for 85 ft. and discontinuously for 300 ft.
Pintadoite identified on several faces.

REF: D.O.E.
Blaghbrough and Brown (1955, RME-83)

UPPER RED CANYON (Paul Buck, Red Feather #3)

LOC: Approx. Sec. 12, T39N, R30E E. Carrizo Mtns.

QUAD: Pastora Peak 15'; Shiprock NTMS

DEVL: Rim cut and short adit

PROD: 26 tons @ 0.26% U_3O_8; 3.26% V_2O_5, 1950-51

ANAL: 0.08% U_3O_8; 0.7% $CaCO_3$; 0.03% Cu

GEOL: Thin discontinuous bands of tyuyamunite-type mineralization in basal Salt Wash member.

REF: Coleman (1944) discusses outcrop.

UPPER RED WASH (Nakai Chee Begay)

LOC: Approx. SE¼, Sec. 36, T38N, R31E - E. Carrizo Mtns. near Arizona-New Mexico bordet about 3 miles north of Red Rock Trading Post.

QUAD: Redrock Valley 15'; Shiprock NTMS

DEVL: Underground

PROD: 378 tons @ 0.22% U_3O_8; 1.44% V_2O_5 in 1950-53. an addition 442 tons of "no pay ore" (0.08% U_3O_8, 0.21% V_2O_5) was shipped in 1951-53.

GEOL: Tyuyamunite in carbonaceous sandstone as rolls and pods near base of Salt Wash member.

REF: PRR-CEBR-23 (#26)
King, J. (1951, RMO-755)
Anderson, et al. (TM-39, 1952)
D.O.E.

VALLEY VIEW (Valley View Extension)

LOC: Approx. Sec. 19 and 30, T39N, R31E East Carrizo Mtns., adjacent to Syracuse

QUAD: Pastora Peak 15'; Shiprock NTMS

DEVL: Rim cuts and adits

PROD: 73 tons @ 0.09% U_3O_8, 2.29% V_2O_5, 1950

GEOL: Mineralization in Salt Wash member

REF: D.O.E.

VALLEY VIEW EXTENSION (Valley View)

VCA EAST RESERVATION LEASE (East Reservation Lease)

VCA PLOT #10 East Reservation (Oak Springs)

VCA PLOT #12 (Syracuse)

WAITE CLAIM (Harvey Platt Ranch)

VCA EAST RESERVATION LEASE PLOTS

New Mexico:
- Plot 1 Red Wash Point
- Plot 2 King Tutt Point
- Plot 3 Shadyside
- Plot 4 Williams Point
- Plot 5 Fissure
- Plot 6 Franks Point
- Plot 7 Lower Oak Creek (Springs)
- Plot 8 Cottonwood Butte
- Plot 9 Lone Star

Arizona:
- Plot 10 Oak Springs
- Plot 11 White Cap
- Plot 12 Syracuse (adjacent to Lone Star)

VCA WEST RESERVATION LEASE PLOTS

Plot 1 Hogan Mine
Plot 2 (no name)
Plot 3 (No name, no production)
Plot 4 Gila Mine
Plot 5 (no name, no production)
Plot 6 Rattlesnake incline, etc.
Plot 7 Rattlesnake No. 5 Mine
Plot 8 (no name)
Plot 9 (no name)
Plot 10 Horse Mine
Plot 11 Two Level Mine
Plot 12 Rattlesnake No. 8 Mine
Plot 13 (no name)
Plot 14 Eurida Mesa
Plot 15 Eurida Mesa
Plot 16 Eurida Mesa
Plot 17 No name-no production.

WARHOOP #1-8

LOC: S½, Sec. 30, T13N, R29E

QUAD: St. Johns South 7½'; Saint Johns NTMS

DEVL: Open pit

PROD: 576 tons @ 0.13% U_3O_8; 8.5% $CaCO_3$, 1957-61

GEOL: Carnotite in small discontinuous lenses in Amejo sandstone of the Petrified Forest member. Ore zone averages 1.5 ft. thick and is about 5 ft. below the surface. Zeppeite has been identified. "Amejo" is name used by Mullenberger (Texas) students.

REF: D.O.E.

WEST BURNT CORN WASH (Claim #27 & #28)

WEST MESA MINE

LOC: Approx. central Sec. 24, T37N, R28E
SW Carrizo Mtns. on east side of Mesa

QUAD: Los Gigantes Buttes 15'; Shiprock NTMS

DEVL: 65 ft. adit and small crosscut from 200' rim cut.

PROD: 72 tons @ 0.12% U_3O_8; 0.82% V_2O_5, 1955

GEOL: Tyuyamunite in discontinuous lenses along sandstone-mudstone contacts and bedding planes in Morrison Fm.

REF: D.O.E.

WEST RESERVATION LEASE

A total of 5,417 tons @ 0.20% U_3O_8; 1.81% V_2O_5, 1948-52 is reported from West Reservation Lease, including Plots #1,2,4,6-12. Most production came from Plot #6. After 1952 VCA shipped by plot numbers.

WHITE CAP LEASE (VCA East Reservation Plot 11)

WHITE CONE CLAIM

LOC: Poorly located claim reportedly by the PRR: "From Redrock drive 6 mi. to a turnoff to the west; drive a mile on this road to Baye Creek Canyon. White cone claim is west of the H.B. Roy Claim and is accessible by foot."

ANAL: Below 0.05% U_3O_8

GEOL: Mineralization in fractured calcified log and disseminated in fine-grained sandstone around log, in Recapture member of Morrison Fm.

REF: PRR-EDR-394

WILLY WATERS (Monument #2, Supplement; Bee Sho Shee)

LOC: Approx. Sec. 27 and 34, T41N, R23E

QUAD: Dinnehotso 15'; Shiprock NTMS

DEVL: Pit

PROD: 1,990 tons @ 0.23% U_3O_8; 1.23% V_2O_5 in 1954-55

GEOL: Refer to Monument #2

REF: D.O.E.

WILSON PROSPECT (Agua Sal Drilling Permit)

YALE POINT (Dan Taylor #1)

ZEALY-TSO

LOC: Approx. SE¼ Sec. 6, T5N, R9W
Nazlini Canyon

QUAD: Canyon del Muerto 15'; Shiprock NTMS

DEVL: 2 small cuts; 100 ft. of rim stripping, 72 holes drilled

PROD: None recorded by AEC - 40 tons @ .25% reported in writing by Zealy Tso.

RAD: 0.07% e U_3O_8, on ore stockpile

GEOL: Carnotite, malachite and hematite associated with carbonaceous matter in Shinarump Cg. Zone is 30-50 ft. above Moenkopi contact and is a cross-bedded, sandstone with reddish brown mud pellets.

REF: PRR-EDR-521 (#39)

ZONA #1 (Emma #1)

LOC: Approx. NW¼, Sec. 28, T40N, R30E, East Carrizo Mtns. (AEC Plot location: 36° 50' 20"N, 109° 06' 35"W.)

QUAD: Pastora Peak 15'; Shiprock NTMS

DEVL: 3 adits, over 600 ft. of underground workings.

PROD: 2,116 tons @ 0.19% U_3O_8; 2.91% V_2O_5, 1953-55.

RAD: 2 mr/hr.

ANAL: 9.63% $CaCO_3$, Max. 72.0% V_2O_5

GEOL: Tyuyamunite specks and paint in fine-grained, quartzose, sandstone with carbon matter in lower 50 ft. of Salt Wash member. Sandstone block is resting on an igneous sill, which has deformed and altered the sandstone. Barren mudstones separate one foot thick mineralized sandstone lenses. Ore zone dips 16°N and 33°E. Exceptionally rich zones of vanadium ore.

REF: 1 PRR-EDR-262 (#34)

Finch, W. (1967)
Chenoweth and Malan (1973), p. 147, and p. 5 in road log.

Index for Cochise County Uranium Occurrences

		Name
D	23	Bisbee
N	16	Conlig-Tungsten Mine
N	22	Deerhead
D	26	Dipsy Doodle
D	19	Eagle
D	18	Elanna
N	11	First Chance
D	17	Fluorine Hill
T	3	Inez Ellen
D	24	Last Chance
N	13	Little David
D	20	Little Mike
D	25	Little Swede Mine
N	12	Lost Apache Girl
N	(14)	Neglea
T	9	Overlook
S	7	Rattler
T	1	Robles Spring
N	15	Star
S	6	Sturgess
T	2	Terian Basin
S	8	Typest
S	5	Unnamed A
S	10	Unnamed C
S	8	Uranium Hills
S	4	Valley View
N	21	Walnut Mine
N	14	Windmill

D = Douglas
N = Nogales
S = Silver City
T = Tucson
(14)= near 14, not accurately known

COCHISE COUNTY

BADGER #1-5 CLAIMS (Star Group)

BISBEE

LOC: Sec. 16, T23S, R24E

QUAD: NACO 7½, Bisbee 15'; Douglas NTMS

DEVL: Open pit and more than 2000 linear miles of underground workings. Mined from 1878 to 1975.

PROD: Major for Cu, Pb, Zn, Ag, Au. Uranium may be extracted from acid leach solutions in leach recovery system.

RAD: In Paleozoic replacement veins - 2-5X

GEOL: Very fine grained uraninite and possibly pitchblende in slip planes or as crusts in zones through base-metal sulfide ore bodies, mostly in the Paleozoic limestones. There appears to be secondary enrichment of uranium.

REF: Bain, G. (1952)
Arizona Bureau of Geology file

BLUESTONE CLAIMS (Star Group)

CONLIG-TUNGSTEN MINE

LOC: Sec. 25, T18S, R19E
Whetstone Mtns.

QUAD: McGrew Spring 7½'; Nogales NTMS

DEVL: Trenches

ANAL: 0.009% U_3O_8

GEOL: Torbernite within and adjacent to shear zone in alaskite. Metatorbernite on fractures. Zone strikes N70° W, dips 71° N. Fluorite, scheelite, and wolframite noted.

REF: PRR-F8071-UP-542 (#50)

DEERHEAD CLAIMS

LOC: Sec. 9, 16, T23S, R20E
Ramsey Canyon - Huachuca Mtns.

QUAD: Miller Peak 7½'; Nogales NTMS

DEVL: Prospect pits

RAD: 15X

ANAL: 0.01% e U_3O_8

GEOL: Torbernite in fractures within highly fractured and jointed granite near contact with overlying quartzite of middle Cambrian Bolsa Quartzite.

REF: PRR-A-4 (#55)

DIPSY DOODLE CLAIMS

LOC: Sec. 17, T24S, R29E
Douglas area

QUAD: College Peak 15'; Douglas NTMS

RAD: 2X

GEOL: Radioactivity associated with limonite and hematite in shales and sandstone of the Bisbee Group.

REF: RRR-AP-268 (#80)
Gilluly, J. and others (1956)

DRAKE CLAIMS (Star Group)

D.O.E. files note the Drake Claims by Taylor and Drake. Taylor claimed the Star Group. The Drake Claims may be adjacent to or aliases for the Star Group. The Houston #1-3 claims are common to both Drake and Star Groups.

Black Rock #1
Houston #1-3
Santa Cruz #1-2
Santa Fe #1
Whetstone #1
White Rock #1-2

EAGLE #1 & 2

LOC: E½ Sec. 1, T18S, R25E

QUAD: Pearce and Square Top Hills 15'; Douglas NTMS

DEVL: 8 ft. shaft

RAD: 5X

ANAL: 0.20% U_3O_8

REF: D.O.E.

EAST PEAK #1

LOC: Approx. T18S, R19E
"From Richfield Station in E. Benson, go 2.6 mi. on Tombstone Hwy; turn left for 2.7 mi., take right fork for 1.6 mi. Claim is 400 yds. to W. at base of hill.

QUAD: Benson 15'; Nogales NTMS

DEVL: Pit

RAD: 0.02 Mr/hr.

GEOL: Specularite, zircon, with some radioactivity in weathered porphyritic granite.

REF: PRR-A-26

ELANNA

LOC: SW¼ Sec. 35, T17S, R25E
Sulphur Hills-Pearce

QUAD: Pearce 15'; Douglas NTMS

DEVL: Prospect pits; 20 ft. shaft

RAD: 20X

ANAL: 0.15% e U_3O_8; 0.20% U_3O_8

GEOL: Radioactive gouge in shear zone of low angle fault in silicified limey shale near contact with volcanic agglomerate. Purple fluorite.

REF: PRR-AP-335 (#83)
Scarborough, R. and Wilt, J. (1979)

FIRST CHANCE

LOC: N. center Sec. 9, T18S, R19E
Whetstone Mtns.

QUAD: Mescal 7½; Benson 15'; Nogales NTMS

DEVL: Pit

RAD: 100X

ANAL: 0.16% e U_3O_8

GEOL: Radioactivity associated with fluorite, calcite and iron oxide in shear zone in porphyritic granite. Zone strikes N50E, dips 70°N and separates two granites.

REF: PRR-A-57 (#64)
PRR-A-50 (#74)

FLUORINE HILL PROSPECTS

LOC: Sec. 33, 34, T17S, R25E
Pearce

QUAD: Pearce 15'; Douglas NTMS

DEVL: Prospect pits and shallow shaft

RAD: 3X

ANAL: 0.096% e U_3O_8; 0.11% U_3O_8

GEOL: Possibly uranophane or autunite with fluorite in a carbonate vein cutting iron stained, fractured and silicified rhyolite.

REF: PRR-M-1497 (#85)
Granger, H. and Raup, R. (1962)

GRAND JUNCTION (Little Mike Group)

HOUSTON (Star Group)

INEZ ELLEN CLAIMS

LOC: NE¼ SW¼ Sec. 8, T14S, R21E
Johnny Lyon Hills

QUAD: Dragoon 15'; Tucson NTMS

DEVL: Shaft and drift, drilled in mid-1970's

RAD: 20X

ANAL: 0.26% e U_3O_8

GEOL: Radioactivity in dark red-brown colored shear zones cutting across bedding of Martin and Percha Fms. of Paleozoic age.

REF: PRR-A-113 (#68)
Scarborough, R. and Wilt, J. (1979)

LAST CHANCE

LOC: Sec. 4, T 24S, R 29E
Douglas Area

QUAD: College Peaks 15'; Douglas NTMS

DEVL: Drift and prospect pits

RAD: 10X

ANAL: 0.02% e U_3O_8

GEOL: Uranophane along fracture planes in altered rhyolite.

REF: PRR-AP-269 (#81)

LITTLE DAVID CLAIMS

LOC: Sec. 10, T18S, R19E
Benson Area

QUAD: Mescal 7½'; Benson 15'; Nogales NTMS

RAD: 20X

ANAL: 0.052% e U_3O_8

GEOL: Probably torbernite with some malachite and limonite in fractures associated with a quartz vein in granite.

REF: PRR-AP-267 (#79)

LITTLE MIKE GROUP (Salty Dog; Silver Drift, Grand Junction, Yellow Jacket)

LOC: Sec. 22, 23, T20S, R27E

QUAD: Swisshelm Mtn. 15'; Douglas NTMS

DEVL: Prospect pit and location shaft

RAD: 20X

ANAL: 0.62% U_3O_8

GEOL: Euxenite, mica, hematite and beryl associated with alaskite dikes in quartz monzonite.

REF: PRR-A-3 (#54)

LITTLE SWEDE MINE

LOC: Sec. 9, T24S, R29E
Douglas Area

QUAD: College Peaks 15'; Douglas NTMS

DEVL: Prospect shaft

RAD: 4X

ANAL: 0.003% e U_3O_8; 0.011% U_3O_8, thorium

GEOL: Mineralized faults in rhyolite porphyry
Quartz, iron and manganese oxides.

REF: PRR-AP-5

LOST APACHE GIRL

LOC: Approx. Secs. 9, 10, T18S, R19E

QUAD: Mescal 7½; Benson 15'; Nogales NTMS

DEVL: Pits

RAD: 30X

ANAL: 0.13% e U_3O_8

GEOL: Uranophane with vanadium minerals, wulfenite, fluorite and iron oxides in veins, trending S25°W and S83°W, in granite.

REF: PRR-A-24 (#58)
PRR-A-27 (#61)

LUCKY SEVEN #1

LOC: Approx. T18S, R19E
"From Shell Station West Benson go west on Hwy. for 2.3 mi.; turn left on Whetstone Road, and proceed 0.7 mi., take right branch-rough road for 8.1 mi. -- claim on right side of road.

QUAD: Benson 15'; Nogales NTMS

DEVL: 60 ft. shaft and pit

RAD: 120X

GEOL: 4 to 5 ft. vein, trending N25°W (Vertical dip) in porphyritic granite. Fluorite, galena, pyrite and wulfenite.

REF: PRR-A-23 (#57)

MARK PROSPECT (Robles Spring)

NEGLEA CLAIMS

LOC: Somewhere in T18S, R19E, near others of northern claim block.

QUAD: Benson 15'; Nogales NTMS

RAD: 2X

ANAL: 0.02% e U_3O_8

GEOL: 8 to 10 ft. wide, very altered basic dike, striking N60°W, in granite.

REF: PRR-A-2

NOLA (Star Group)

OVERLOOK CLAIM

LOC: Sec. 35, T15S, R22E
Little Dragoon Mtns.

QUAD: Dragoon 15'; Tucson NTMS

DEVL: Prospect pit

RAD: 2X

GEOL: Schist

REF: PRR-AP-288 (#82)

RATTLER GROUP

LOC: Sec. 31, T14S, R28E

QUAD: Dos Cabezas 15', Silver City NTMS

RAD: 10X

GEOL: Radioactivity along shear zones in porphyritic granite. Some aplite dikes and limonite staining.

REF: PRR-A-53 (#63)

REDFIELD CLAIMS (Robles Spring)

ROBLES SPRING CLAIMS (Mark Prospect, Redfield)

LOC: SW¼, Sec. 30, T13S, R19E

QUAD: Redington 15'; Tucson NTMS

DEVL: 10 ft. adit, 25 X 20 X 15 ft. deep pit, drilling

RAD: 50X

ANAL: 0.078% e U_3O_8; 0.004% U_3O_8

GEOL: Uraninite is in gouge and wall rock along a nearly vertical NW trending fault (north of adit) which has placed limestone in contact with schist. Greatest radioactivity is in two fault blocks of carbonaceous, fractured and iron-stained shale. Microscopic blebs of pitchblende noted. Complexly faulted terrain interpreted as Pinal Schist thrusted over Cretaceous Bisbee Group clastic sediments, with thrust dipping NE.

REF: PRR no # (#629)
PRR-A-50 (#62)
Granger, H. and Raup, R. (1962)
Thorman, C. and others (1978)

SALTY DOG (Little Mike Group)

SILVER DRIFT (Little Mike Group)

SKYLINE (Star Group)

SOUTH CHANCE CLAIMS (Refer to Pima Co. listing)

STAR GROUP (Badger #1-5; Bluestone; Drake Group; Houston; Nola; Skyline; Wichita #1-2)

LOC: Sec. 25, 26, T18S, R19E
Star #1 produced in center NE¼ NE¼ Sec. 26.

QUAD: McGrew Spring 7½'; Benson 15'; Nogales NTMS

DEVL: 160 ft. 25° incline; inclined pit

PROD: 46.7 tons @ 0.19% U_3O_8, 1.0% $CaCO_3$.
1958-60.

RAD: 15X

ANAL: 0.14-0.22% e U_3O_8

GEOL: Uraninite or pitchblende occurs along contact between basic dike and granite. Possibly some autunite, kasolite, and tyuyamunite. Probably ground water control of secondary mineralization at shallow depths.

REF: PRR-A-25
Butler, A. & Byers, V. (1969)
D.O.E.

STURGESS PROPERTY

LOC: Sec. 7, T14S, R27E
Dos Cabezas Mtns.

QUAD: Bowie 15'; Silver City, NTMS

RAD: 3X

ANAL: 0.12% e U_3O_8

GEOL: Possibly uraninite with galena and pyrite in quartz veins and fracture fillings along a fault zone in schist and metasediments.

REF: PRR w/o # (#51); Waechter, N. (1979)

SWISSHELM VALLEY

LOC: S½, T20S, R28E
Chiricahua Mtns.

QUAD: Swisshelm Mtns. and Pedregosa Mtns. 15'; Douglas NTMS

RAD: 2X

GEOL: Radioactivity disseminated in friable white altered pumaceous devitrified tuffs and tuffaceous sediments. Faulting complicates stratigraphy.

REF: Scarborough, R. and Wilt, J. (1979)

TERAN BASIN

LOC: SW¼ Sec. 22, NW¼ Sec. 26, T13S, R20E
Southern Galiuro Mtns.

QUAD: Redington 15'; Tucson NTMS

RAD: 3X

GEOL: Radioactivity in mottled, gypsiferous mudstones high in basal half of Teran Basin Sequence. Sedimentary section of conglomerates, sandstones, mudstones and limestones dips steeply eastward and is overlain unconformably by Oligocene Galiuro volcanics.

REF: Scarborough, R. and Wilt, J. (1979)

TYPEST GROUP

LOC: Sec. 32, T14S, R28E
SW Dos Cabezas Mtns.

QUAD: Dos Cabezas 15'; Silver City, NTMS

RAD: 8X

ANAL: 0.01% e U_3O_8

GEOL: Muscovite and dark minerals concentrated along N-S shear zones in porphyritic granite.

REF: PRR-A-58 (#65)

UNNAMED A

LOC: Sec. 7, T14S, R27E
Dos Cabezas - Mineral Park Area

QUAD: Dos Cabezos 15'; Silver City NTMS

DEVL: Extensive Underground workings

RAD: 3X

GEOL: Possibly uraninite with copper carbonates and sulfides is associated with quartz veins in schist along a fault zone striking N80°W and dipping 85°NW. Some gold reported.

REF: PRR-AP-74 (#76)

UNNAMED B

LOC: Poorly located - "8 mi. west of Bowie"

QUAD: Silver City NTMS

ANAL: 0.24% e U_3O_8; 0.198% U_3O_8

REF: D.O.E.

UNNAMED C

LOC: SW¼ Sec. 11, T16E, R30E, along west wall of tributary canyon to Keating Creek.

QUAD: Cochise Head and Vanar 15' quads; Silver City NTMS

RAD: Faraway Ranch Fm. latites -200-250 cps, sediments-80-150 cps.

ANAL: 16 ppm Uranium in brn ls, 0.09% organic carbon.

GEOL: Fluvio-lacustrine sequence (laminar-bedded dark-colored shales, fetid cherty brown limestones) is 30-150 ft. thick, but does not count above adjacent silicic flows and tuffs of Faraway Ranch Fm., of which they are members.

REF: Sabins (1957), page 1326; and ABG file data
N.U.R.E. analysis data

URANIUM HILLS CLAIMS

LOC: Sec. 32, T14S, R28E
SW. Dos Cabezas Mtns.

QUAD: Dos Cabezas 15'; Silver City NTMS

DEVL: 3 small open pits; 4 drill holes

RAD: 5X

ANAL: 0.53-1.27% e U_3O_8; 0.32-1.09% U_3O_8

GEOL: Uranium mineralization and gangue epidote, chlorite, magnetite and fluorite blebs are concentrated in a E-W trending shear zone in a Laramide granite. Nearby to the north, the granite is in high angle fault contact with Cretaceous quartzite. One drill hole encountered shear zone material, assaying @ 0.4% U_3O_8, at depth, which indicates the shear zone is vertical. Granite also contains unmineralized NE Trending 50°NW dipping rhyolite dike and massive faulted aplite mass to the east.

REF: PRR-A-59 (#66
Bissett, D. (1958)

VALLEY VIEW CLAIMS

LOC: SE¼ Sec. 22, T13S, R26E
Dos Cabezas Mtns.

QUAD: Luzena 7½; Silver City NTMS

DEVL: Pits

ANAL: 0.04-0.19% U_3O_8

GEOL: Mineralization (some Fe, Cu, Pb sulfides) is in a dense dark gray rock surrounded by granite. Perhaps mineralized xenolith of limestone.

REF: PRR w/o # (#49)

WALNUT MINE

LOC: Sec. 17, T23S, R20E
Ramsey Canyon - Huachuca Mtns.

QUAD: Miller Peak 7½'; Nogales NTMS

PROD: Old lead - scheelite property

RAD: 12X

ANAL: 0.03% e U_3O_8

GEOL: Uraninite with copper and iron sulfides in irregular, small lenses and quartz veins along fault (N45° E, vertical dip) and fractures (N-S, 75° E dip). Lead and tungsten minerals.

REF: PRR-A-95 (#67)

WICHITA #1-2 (Star Group)

WINDMILL GROUP

LOC: Center E½ Sec. 10, T18S, R19E
Whetstone Mtns.

QUAD: Mescal 7½'; Nogales NTMS

DEVL: Several trenches, drill holes, 107 ft. incline with drifting

PROD: 15 tons @ 0.13% U_3O_8 in 1956

RAD: 60X

ANAL: 0.06-0.46% e U_3O_8; 0.07-0.55% U_3O_8

GEOL: Uranophane, autunite, uraninite, and pitchblende in limonitic fault gouge filling a series of shear zones (N70° W, dip 55°NE) in granite. Zones up to 5 ft. wide.

REF: PRR-A-1 (#52)
Arizona Bureau of Geology file

YELLOW JACKET (Little Mike Group)

Index for Coconino County Uranium Occurrences

(Excludes Cameron District Map)

	Name
F 44	Adolf Maloney
W 36	Airport Mine
F 45	Amos Chee #1-3
M 4	B & B
M 12	Befuddled
M 7	Big Blue
M 25	Black Peak Breccia Pipe
W 38	Blue Bonnet
F 43	Box Springs
F 42	Clover Leaf Mine
W 39	Copper
M 9	Copper King
M 14	Cottonwood
M 5	El Pequito Mine
M 2	England
M 22	F & B
M 32	Grandview Mine
G 26	Hells Hollow
M 30	Icicle
M 15	Jasper
M 11	Jimmy Boone
M 19	Johnson-Barlow
M 17	June
M 18	La Salle
M 1	Lehneer
M 10	M & R
M 29	Martin Johnson
M 31	Max Huskon
W 35	National
G 28	Orphan Mine
W 41	Packrat
M 3	Red Wing
G 27	Ridenour Mine
M 8	Sam
M 6	Sandy
M 24	Saucer
F,M 32A	silica plugs
M 13	Sun Valley
M 21	Thomas
M 16	Tommy
W 33	Twin Tanks
W 34	Unnamed B
M 20	Vermilion #1 Mine
F 40	Ward Terrace
M 23	White Mesa Copper
F 37	Yellow Jeep

G = Grand Canyon
F = Flagstaff sheet
M = Marble Canyon
W = Williams

COCONINO COUNTY

A. MALONEY (Adolf Maloney #2)

A & B #2

LOC: Central Sec. 5, T. 28N, R9E

QUAD: Cameron 15'; Flagstaff NTMS

DEVL: Shallow open cut, 50 X 50 X 5 ft. deep

PROD: 123 tons @ 0.28%, U_3O_8, 0.13% V_2O_5, 1954

RAD: 5X

GEOL: Ore associated with fossil wood fragments in iron-stained sandstone lens in upper Shinarump member.

REF: PRR-EDR-147

A & B #3

LOC: S½, Sec. 21, T29N, R9E

QUAD: Cameron 15'; Flagstaff NTMS

DEVL: 100 X 50 X 40 ft. deep rim cut and small surface scrapings

PROD: 586 tons @ 0.13% U_3O_8, 0.04% V_2O_5, 1954-55

RAD: 40X

ANAL: 0.03-0.18% e U_3O_8; 0.01-0.08 U_3O_8

GEOL: Mineralization in small pods within iron-stained sandstone lenses, 2-10 ft. thick, in upper Shinarump member, Radioactivity associated with fossil logs.

REF: PRR-EDR-1144

A & B #5

LOC: Sec. 3, T. 31N, R. 9E and Sec. 34, T32 N, R9E

QUAD: Moenave SW 7½; Marble Canyon NTMS

DEVL: 150 X 200 X 3 ft. deep pit

PROD: 305 tons @ 0.13% U_3O_8, 0.04% V_2O_5, 1954

RAD: Air anomaly

ANAL: 0.014% e U_3O_8; 0.08% U_3O_8; 2.80% $CaCO_3$

GEOL: Oxidized ore in Shinarump member

REF: PRR-EDR-1145

A & B #7 (Shadow Mountain Collapse)

LOC: SE¼ Sec. 20, T31N, R9E

QUAD: Moenave SW 7½, Marble Canyon NTMS

DEVL: Shallow surface pits and some rim stripping

PROD: 24 tons @ 0.08% U_3O_8; 0.28% V_2O_5, 1954

GEOL: Mineralization is in sandstone containing fossil wood in upper Shinarump Conglomerate.

REF: Chenoweth, pers. com. 1980
Bollin, E. and Kerr, P. (1958)
Kerr, P. (1958); U.S.A.E.C. (1959)

A & B #13

LOC: NW¼ Sec. 14, T31N, R9E

QUAD: Moenave SW 7½"; Marble Canyon NTMS

DEVL: One small open pit

PROD: 51 tons @ 0.09% U_3O_8; 0.09% V_2O_5, 1954

GEOL: Ore in Shinarump member

REF: D.O.E.

A & B #21 (Paul Huskie #21)

ADA AND NORDELL (Nordell)

LOC: SW¼, Sec. 6, T27N, R10E

QUAD: Wupatki NE 7½; Flagstaff NTMS

DEVL: Test pits and trenches

GEOL: Spotty oxidized uranium ore in sandstone lenses in upper Shinarump conglomerate.

REF: D.O.E.

ADOLF MALONEY #2 (Maloney, Adolf Maloney, adjacent to Amos Chee #1-3 claims)

LOC: Sec. 23 and 24, T 25N, R11E

QUAD: Standing Rocks 7½'; Flagstaff NTMS

DEVL: 75 ft. rim stripping and small open cut

PROD: 24 ton @ 0.07% U_3O_8; 0.20% V_2O_5, 1957

GEOL: Secondary minerals in sand lenses in lower Petrified Forest Member

REF: D.O.E.

AIRPORT MINE

LOC: Approx. Sec. 25 and 36, T 30N, R2E
"Mine is 200 yds. east of Grand Canyon Airport and 28 miles north of Williams."

QUAD: Williams NTMS

PROD: 500 tons of copper ore during World War II

ANAL: 0.02 - 0.07% U_3O_8

GEOL: Mineralized zone (1.5 ft. with radioactivity is in thin sandstone and mudstone of Kaibab Fm. Perhaps related to southern extension of Bright Angel fault zone.

REF: PRR-CEBR-41

ALYCE TOLINO #1 & 3

LOC: SE¼, Sec. 24, T29N, R9E

QUAD: Cameron 15'; Flagstaff NTMS

DEVL: 2 open pits, 40 ft. deep 2 shafts 40 ft. deep replaced by 2 open pits.

PROD: 1811 tons @ 0.23% U_3O_8; 0.07% V_2O_5, 1957-60

GEOL: Autunite in north trending paleochannel in lower part of Petrified Forest member. Cobalt-rich pyrite, umohoite, and ilsemannite coatings identified.

REF: U.S.A.E.C. (1959, RME-141)
Bollin, E. and Kerr, P. (1958)

AMOS CHEE #1-3 (Bosley Claims)

LOC: Sec. 24, T25N, R11E
"4½ miles east of Black Falls T.P. on north side of L. Colo. R."

QUAD: Standing Rocks 7½'; Flagstaff NTMS

DEVL: 150 yds. of rim stripping and shallow pits

PROD: 157 tons @ 0.18% U_3O_8; 0.90% V_2O_5, 1954-57

ANAL: 0.04-0.16% e U_3O_8; 0.06-0.25% U_3O_8; 0.2-1.2% V_2O_5; 1.8-2.6% $CaCO_3$

GEOL: Secondary uranium minerals filling fractures associated with abundant carbon matter and fossil logs in Chinle Fm. Abundant gypsum and probable cobalt minerals.

REF: PRR-EDR-282
PRR-AP-42

AMOS CHEE #8

LOC: NE¼, Sec. 34, T27N, R10E

QUAD: Wupatki NE 7½'; Flagstaff NTMS

DEVL: Shallow open pit and surface scrapings

PROD: 101 tons @ 0.19% U_3O_8; 0.04% V_2O_5, 1955-58

GEOL: Ore in Petrified Forest member

REF: D.O.E.

ANITA COPPER MINE

LOC: Approx. Sec. 29, T29N, R2E
poorly located "near Anita, south of Grand Canyon Village."

QUAD: Williams NTMS

DEVL: Open cuts, short drifts, underground to depth of 25 ft.

PROD: Copper ore

RAD: 8X

ANAL: 0.002-0.006% e U_3O_8; 0.002-0.004% U_3O_8

GEOL: Copper carbonates disseminated in sandstone and limestone and concentrated along joints in Kaibab limestone. NW trenching vertical fault is similarly mineralized. Limonite pseudomorphs after pyrite. Seemingly unmineralized wall rock in drifts and stopes count 4-5 X Bkg.

REF: PRR-RG-34
Gibson, R. (1952) RMO-890

ARIZONA CLAIM (White Mesa Copper)

B & B #1 and 2

LOC: Sec. 1, T40N, R7E
"Up Paria Creek, 10 mi. from Marble Canyon lodge"

QUAD: Lees Ferry 15'; Marble Canyon NTMS

DEVL: Prospect pits

RAD: 40X

GEOL: Mineralization in sandstone and clays with scattered carbaceous matter and some petrified wood in Chinle Fm. Some copper minerals noted.

REF: PRR-RR-184

BAKER PROPERTY (Riley Baker Property)

Mill receipts record 1 ton @ 0.26%, U_3O_8; 0.17% V_2O_5 in 1950. In Marble Canyon area, exact locality unknown; may be same area as Cliff Canyon.

BARRANCA DE COLRE

LOC: T27, 28N, R2E, 38 miles north of Williams, near Willaha

QUAD: Grand Canyon NTMS

DEVL: 25 prospect pits

PROD: Some copper ore shipped to Jerome Circa 1910.

RAD: 0.25-0.30% e U_3O_8

GEOL: Pyrrhotite, chalcocite, copper oxides and uranium minerals associated with a hydrothermally altered zone, 3 ft. thick, and a low assymetrical anticline in Kaibab limestone.

REF: D.O.E.

BASS MINE

LOC: Poorly located, reportedly along Bass Trail and near Bass Rapids on North Rim of Grand Canyon

QUAD: Havasupai Point 15'; Grand Canyon NTMS

RAD: 0.12 MR/hr

GEOL: Oxide and sulfide copper minerals believed to be in upper Chuar meta-sediments. Park specimen on display showed radioactivity of 10X.

REF: Breed and Roat (1974), pg. 174

BEFUDDLED CLAIMS

LOC: Sec. 27, 28, 32, 33, T39N, R4E
Vermillion Cliffs

QUAD: Emmett Wash NE 7½'; Marble Canyon NTMS

DEVL: 17 holes drilled

RAD: 10X

GEOL: Sandstone with thin bands of yellow jasper with noted radioactivity in the Petrified Forest member. Minor copper carbonates and pyrite.

REF: PRR-RR-274 and suppl.

BIG BLUE

LOC: Sec. 2, T39N, R6E
Vermillion Cliffs- one mile North of Cliff Dwellers Lodge

QUAD: Lees Ferry 15': Marble Canyon NTMS

DEVL: Small dozer cuts

PROD: 38 tons @ 0.28%, 1954

ANAL: 1.1% e U_3O_8; 1.3% U_3O_8; 0.01% V_2O_5; 0.22% Cu

GEOL: Shaley member of Chinle Fm. contains uranium oxides in sandy lenses.

REF: PRR-RR-162 (1954)

BLACK PEAK BRECCIA PIPE

LOC: Sec. 2, T33N, R9E

QUAD: Moenave NW7½; Marble Canyon NTMS

DEVL: 6 drill holes

GEOL: Anomalous radioactivity is associated with iron-stained and silicified breccia pipe and nearby N-S trending shear zone on silicified knob of Navajo Sandstone.

REF: Barrington, J. & Kerr, P. (1961)
McBirney, A. (1963)

BLACK POINT (Murphy Mine)

BLACKHAIR #4

LOC: Approx. common corner Sec. 9, 10, T28, R9E

QUAD: Cameron 15'; Flagstaff NTMS

RAD: 40X

ANAL: 0.02-0.20% e U_3O_8; 0.02-0.19% U_3O_8

GEOL: Chinle shale on top of Shinarump member contains radioactive black carboniferous material, with possibly metatorbernite.

REF: PRR-AP-231

BLUE BONNET

LOC: Sec. 7 T28N, R2E, poorly located

QUAD: Williams NTMS

DEVL: 12 shallow pits

RAD: 2X

GEOL: Kaibab Limestone contains mineralization near crests of undulating beds. Copper oxides, iron oxides and pyrite present.

REF: PRR-AP-40

BOSLEY CLAIMS (Amos Chee#1-3)

BOSLEY #4 (Box Springs #2)

BOX SPRINGS #2 (Bosley #4, Colorado #1)

LOC: Probably Sec. 10, T25N, R11E, poorly located Black Falls

QUAD: Standing Rocks 7½'; Flagstaff NTMS

RAD: 20X

ANAL: 0.08-0.41% U_3O_8

GEOL: Mineralization in silty sandstone of lower Chinle, containing silicified logs and carbonaceous matter. Yellow orange color observed in radioactive zone might be due to autunite and/or meta-autunite.

REF: PRR-AP-42

BOYD TISI #1

LOC: East central Sec. 31, T28N, R10E

QUAD: Cameron 15'; Flagstaff NTMS

DEVL: Several shallow surface pits and scrapings

PROD: 37 tons @ 0.13% U_3O_8; 0.09% V_2O_5, 1957

GEOL: Uraniferous silty lenses in basal Petrified Forest member.

REF: D.O.E.

BOYD TISI #2 (Adjacent to Juan Horse #3)

LOC: SW¼ Sec. 30, T29N, R10E

QUAD: Cameron 15'; Flagstaff NTMS

DEVL: 150 X 50 X 45 ft. deep pit

PROD: 794 tons @ 0.30% U_3O_8; 0.04% V_2O_5, 1957-58

GEOL: Ore is fine-grained sandstone of Petrified Forest member.

REF: U.S.A.E.C. (1959, RME-141)

C.O. BAR LIVESTOCK COMPANY (Section 9)

CALVIN CHEE

LOC: Approx. NW¼, T22N, R13E, poorly located

QUAD: Leupp 15'; Flagstaff NTMS

GEOL: Mineralization, possibly some schroeckingerite, in sandstone lens containing abundant carbonized plant remains, probably Petrified Forest member.

REF: PRR-EDR-255
Finch, W. (1967)

CASEY #3

LOC: Approx. north central Sec. 3, T29N, R9E

QUAD: Cameron 15'; Flagstaff NTMS

DEVL: Open pits and cuts

PROD: 17 tons @0.12% U_3O_8; 0.04% V_2O_5, 1957

GEOL: Secondary minerals in scattered pods and along bedding planes in Shinarump member.

REF: D.O.E.

CHARLES HUSKON #1 (Huskon #1)

LOC: SE Sec. 23, T29N, R9E

QUAD: Cameron 15'; Flagstaff NTMS

DEVL: Open pit

PROD: 23,127 tons @ 0.22% U_3O_8; 0.11% V_2O_5, 1951-6[illegible]

RAD: 150X

ANAL: 0.002-0.462% e U_3O_8; 0.04-0.53% U_3O_8

GEOL: Somewhat irregular lens-like uniformly mineralized zone, 310 ft. X 200 ft., filling lower part of SW trending Scour Channel in lower Petrified Forest member. Some fracture control of mineralization at angle to channel direction. Meta-autunite occurs in sandy facies containing carbonized fossil plant matter and is highest grade at base of scour channel where bottomed in blue to red mudstone. Carnotite, limonite, halotrichite are noted and considerable Cu, Ba and Sr in ore.

REF: PRR-RA-17 and suppl.
U.S.A.E.C. (1959) RME-141
Bollin, E. and Kerr, P. (1958)
Isachsen, Y. and Evenson, C. (1956)

CHARLES HUSKON #3 (Huskon #3)

LOC: West central Sec. 7, T28N, R10E, and E. central Sec. 12, T28N, R9E

QUAD: Cameron 15'; Flagstaff NTMS

DEVL: Open pit

PROD: 27,249 tons @ 0.20% U_3O_8; 0.02% V_2O_5, 1953-61

GEOL: Carnotite and possibly autunite uniformly distributed in narrow, lens-like bodies in lower part of scour and fill channel, trending NE to E and in lower Petrified Forest member and into Shinarump mbr. Ore zone is 100 ft. wide and over 1,000 ft. long and associated with abundant carbonaceous matter. Some minor faulting through ore body.

REF: U.S.A.E.C. (1959, RME-141)
Bollin, E. and Kerry, P. (1958)
Isachsen, Y. and Evensen, C. (1956)

CHARLES HUSKON #4 (Paul Huskie #3)

LOC: Approx. south central Sec. 11, T26N, R10E

QUAD: Wupatki NE 7½'; Flagstaff NTMS

DEVL: 35 ft. deep open pits, 1000 X 550 ft. in size

PROD: 37,746 tons @ 0.18% U_3O_8; 0.02% V_2O_5. The Charles Huskon #4 pit extends onto the Paul Huskie #3 claim. Charles Huskon production includes 3,925 tons @ 0.20% U_3O_8 from Paul Huskie #3. [illegible] 1953-6[illegible].

GEOL: Irregular lenses and pods of oxidized minerals in scour and fill sediments in channels generally trending N to NE. Abundant carbonized logs and plant remains associated with ore in sandstone-mudstone of lower Petrified Forest member.

REF: U.S.A.E.C. (1959, RME-141)
Bollin, E. and Kerr, P. (1958)

CHARLES HUSKON #5

LOC: Approx. SE Sec. 36, T31N, R9E

QUAD: Moenave SE 7½; Marble Canyon NTMS

DEVL: Open pits

PROD: 321 tons @ 0.26% U_3O_8; 0.17% V_2O_5, 1953 & 1956

RAD: 150X

GEOL: Uraninite and secondary uranium minerals associated with petrified logs and as halos around logs in sandstone - mudstone channel of Petrified Forest member. Some malachite. Some fracturing of beds.

REF: PRR-RA-16
Bollin, E. and Kerr, P. (1958)
U.S.A.E.C. (1959, RME-141)

CHARLES HUSKON #6

LOC: NE¼ Sec. 27, T30N, R9E

QUAD: Cameron 15'; Flagstaff NTMS

DEVL: Open pits

PROD: 747 tons @ 0.20% U_3O_8; 0.02% V_2O_5, in 1953, 56-61

GEOL: Semi-circular body of carnotite in platy, carbonaceous, argillaceous, silicified channel sandstone-mudstone in Shinarump Cong.

REF: Bollin, E. and Kerr, P. (1958)

CHARLES HUSKON #7 MP. #65 (Huskon #7)

LOC: NE ¼, Sec. 19, T28N, R10E

QUAD: Cameron 15'; Flagstaff NTMS

DEVL: Open pit

PROD: 2501 tons @ 0.31% U_3O_8; 0.06 V_2O_5, in 1953, 1956-58

ANAL: 0.30% e U_3O_8; 0.20% U_3O_8; 1.8% $CaCO_3$

GEOL: Uraninite replaces cell walls of petrified wood in a carbonaceous, argillaceous sandstone lens in basal Petrified Forest member. Bulk ore was in a single pod with abundant carbonized plant matter. Uranpspinite, uraniferous asphaltite, metatorbernite and possibly sabugalite are identified.

REF: U.S.A.E.C. (1959, RME-141)
Bollin, E. and Kerr, P. (1958)
Isachsen, Y. and Evenson C. (1956)
Austin, S. (1964, RME-99)

CHARLES HUSKON #7 MP. #357

LOC: Approx. Sec. 3, T31N, R9E

QUAD: Moenave SW 7½; Marble Canyon NTMS

DEVL: Shallow surface workings

PROD: 20 tons stockpiled

ANAL: 0.30% e U_3O_8; 0.20% U_3O_8; 1.8% $CaCO_3$

GEOL: Secondary minerals associated with fossil plant remains in Shinarump Conglomerate.

REF: D.O.E.

CHARLES HUSKON #8 (Huskon #8)

LOC: South central Sec. 30 and north central Sec. 31, T28N, R10E.

QUAD: Cameron 15'; Flagstaff NTMS

DEVL: Trenches and pits

PROD: 626 tons @ 0.23% U_3O_8; 0.04% V_2O_5, [illegible]

GEOL: Secondary minerals in petrified logs and as halos in surrounding sandstone and siltstone of basal Petrified Forest member.

REF: D.O.E.

CHARLES HUSKON #9

LOC: Approx. south center Sec. 35, T27N, R10E

QUAD: Wupatki NE 7½; Flagstaff NTMS

DEVL: Open pit

PROD: 618 tons @ 0.18% U_3O_8; 0.01% V_2O_5, 1954-58

GEOL: Secondary minerals in basal Petrified Forest member

REF: D.O.E.

CHARLES HUSKON #10 (Huskon #10)

LOC: N½, Sec. 29, T28N, R10E

QUAD: Cameron 15'; Flagstaff NTMS

DEVL: 20 ft. deep open pit

PROD: 17,083 tons @ 0.22% U_3O_8; 0.06% V_2O_5, 1953-61
High molybdenum content hampered ore processing

GEOL: Uraninite in carbonaceous sandstone lenses in a irregularly mineralized body 1,450 ft. by about 100 ft. wide. Mineralization is controlled by concentrations of carbonized plant remains and the permeability of the sour and fill sediments in the SW-NE trending channel cut into Petrified Forest member and down into Shinarump member. Minerals noted include carnotite, schroeckingerite, coffinite, zippeite, ilsemmanite stains on halotrichite; high contents of cobalt and molybedenum near ore. Carnotite associated schroeckingerite in buff-pinkish carbonaceous sandstone. Metatorbernite, meta-autinite, uranophane, sabugalite, becquerelite, torbernite, also noted.

REF: U.S.A.E.C. (1959, RME-141)
Bollin, E. and Kerr, P. (1958)
Isachsen, Y and Evensen, C. (1956)
Austin, S. (1954, RME-99)

CHARLES HUSKON #11 (Huskon #11)

LOC: SE edge Sec. 33, T28N, R10E

QUAD: Cameron 15'; Flagstaff NTMS

DEVL: 15 ft. deep pit

PROD: 2,747 tons @0.12% U_3O_8; 195[illegible]-196[illegible]. High molybdenum content hampered ore processing.

GEOL: Carnotite-type rich lens, 500 X 100 ft. in arkosic sandstone in NE trending channel cut in upper Shinarump member. Abundant plant remains. Some metatorbernite, meta-autunite, uraninite, coffinite, ilsemannite, jordisite, and marcasite also present.

REF: U.S.A.E.C. (1959, RME-141)
Bollin, E. and Kerr, P. (1958)

CHARLES HUSKON #12 (Huskon #12)

LOC: Approx. Central Sec. 15, T29N, R9E

QUAD: Cameron 15'; Flagstaff NTMS

DEVL: 10 ft. deep open pit

PROD: 1,780 tons @ 0.18% U_3O_8; 0.02% V_2O_5, 1954-61

ANAL: 0.21-0.98% e U_3O_8; 0.14-0.55% U_3O_8; 0.2-4.5% $CaCO_3$

GEOL: Small elongated lenses of carnotite-type in carbonaceous, argillaceous sandstone in channels cut into upper Shinarump member.

REF: U.S.A.E.C. (1959, RME-141)
Bollin, E. and Kerr, P. (1958)

CHARLES HUSKON #14 (Huskon #14)

LOC: Approx. SW¼, Sec. 36, T29N, R9E

QUAD: Cameron 15'; Flagstaff NTMS

DEVL: Open pit, rim and dozer cuts

PROD: 47 tons @ 0.11% U_3O_8; 0.02% V_2O_5, 195[illegible]

GEOL: Secondary minerals in petrified logs in upper Shinarump member.

REF: D.O.E.

CHARLES HUSKON #17 (Huskon #17)

LOC: Approx. West central Sec. 14, T27N, R10E

QUAD: Wupatki NE 7½'; Flagstaff NTMS

DEVL: 50 ft. deep pit with adits in pit walls

PROD: 4,869 tons @ 0.21% U_3O_8; 0.01% V_2O_5, 1954-62

GEOL: Uraninite in carbonaceous sandstone-mudstone, filling N. trending paleo-channel in lower Petrified Forest member. Buff clay is illite and gray clay is montmorillontic. Boltwoodite replaces detrial grains and cobalt rich minerals noted.

REF: U.S.A.E.C. (1959, RME-141)
Bollin, E. and Kerr, P. (1958)
Austin, S. (1964, RME-99)

CHARLES HUSKON #18

LOC: Approx. SW¼, Sec. 12, T26N, R10E

QUAD: Wupatki NE 7½'; Flagstaff NTMS

DEVEL: Open pit 100 ft. X 100 ft. X 15 ft. deep, adjacent to Harry Walker #16 pit.

PROD: 563 tons @ 0.16% U_3O_8; 0.02% V_2O_5, 1956-58

GEOL: Carnotite-type and uraninite (deep ore) in carbonaceous channel-type sandstone in basal Petrified Forest member.

REF: D.O.E.

CHARLES HUSKON #19

LOC: Approx. central Sec. 11, T29N, R9E
Just N. of Jack Daniels

QUAD: Cameron 15'; Flagstaff NTMS

DEVL: Open pit

PROD: 696 tons @ 0.14% U_3O_8; 0.03% V_2O_5, 1957

GEOL: Uraninite in sandstone of lower Petrified Forest member.

CHARLES HUSKON #20

LOC: Approx. West central Sec. 9, T29N, R10E

QUAD: Cameron 15'; Flagstaff NTMS

DEVL: Pit

PROD: 1,038 tons @ 0.24% U_3O_8; 0.06% V_2O_5, 1957

GEOL: Secondary minerals associated with petrified logs in upper Petrified Forest member. Zippeite, schroeckingerite, and atacamite identified.

REF: Austin, S. (1964, RME-99)
D.O.E.

CHARLES HUSKON #26 (Huskon #26)

LOC: SE¼, Sec. 33, T28N, R10E

QUAD: Cameron 15'; Flagstaff NTMS

DEVL: Small rim cut; this is NE extension of Chas. Huskon No. 11 ore body.

PROD: 18 tons @ 0.12% U_3O_8; 0.03% V_2O_5, 195[illegible]

GEOL: Shinarump member

REF: D.O.E.

CLIFF CANYON (Baker Property; Maggie Baker)

LOC: Poorly located - Marble Canyon Area

PROD: 32 tons @ 0.25% U_3O_8; 0.08% V_2O_5, 1949

GEOL: Ore associated with petrified wood in Chinle Fm.

REF: D.O.E.

CLOVER LEAF #1 MINE

LOC: Sec. 21, T25N, R6E

QUAD: Ebert Mtn. 15'; Flagstaff NTMS

RAD: 2X

GEOL: Radioactivity in basal Moenkopi sandstone and conglomerate, capped by basalt. Silicified and carbonized wood material, jarosite, and limonite present.

REF: PRR-AP-111

COLORADO #1 (Box Springs #2)

COPPER #1 (Doty Group, Willaha Group)

LOC: NW¼ SE¼ Sec. 35, T28N, R1E Willaha Gp in Sec. 26

QUAD: Williams NTMS

DEVL: 50 X 3 X 3 ft. deep pit, old copper workings. From Copper #1 or Willaha Group or both.

PROD: 29 tons @ 0.10% U_3O_8; 0.02% V_2O_5; 9.4% $CaCO_3$, 1956. Illegally shipped from pit on Copper #1 under name of Doty Group.

RAD: 10X

ANAL: 0.42% e U_3O_8; 0.48% U_3O_8

GEOL: Radioactivity concentrated in two foot thick zone in and below copper mineralization in bedded, sandy Kaibab Limestone, with chert nodules along bedding planes. Halos of azurite and malachite surround chalcocite.

REF: PRR-AP-41
Puttuck, H. (1954, RME-2018
Nielson, M. (1953, RME-31)

COPPER KING #1

LOC: Sec. 1, T39N, R6E

QUAD: Lees Ferry 15'; Marble Canyon NTMS

DEVL: Prospect pits

RAD: 25X

GEOL: Radioactivity in sandy bed in the fire clay unit Chinle Fm. Contains numerous stringers of carbonaceous matter.

REF: PRR-RR-214

COPPER MINE TRADING POST AREA

LOC: Poorly located. Trading Post location is 36° 37' 30"N, 111° 26' 50"W, or approx. T38N, R9-10E. "About 27 miles north of the Gap (Hwy. 89) on dirt road."

QUAD: Marble Canyon NTMS

DEVL: Numerous open pits, short adits and drilling holes.

RAD: 15X along fissures associated with copper minerals

GEOL: Copper mineralization (malachite, chrysocolla, calcocite, cuprite, covellite and bornite) filling fault and joint fractures and some along bedding planes in Navajo Sandstone. Fault zone trends NNW with west side down and major joint set trends NE. Sparce metatorbernite with barite.

REF: Gibson, R. (195, RMO-890)

COTTONWOOD # 1 and 2

LOC: Sec. 28, T39N, R6E

QUAD: Paria Plateau and Emmett Wash 15'; Marble Canyon NTMS

DEVL: 2 prospect pits along rim

RAD: 50X

ANAL: 2 samples @ 0.06-0.15% e U_3O_8; 0.07-0.15% U_3O_8; 0.01% V_2O_5; 0.01-0.05% Cu.

GEOL: Possibly carnotite and abundant iron oxides along contact between Moenkopi and Shinarump member.

REF: PRR-RR-160

DENETSO #1 (Jack Daniels #5)

DIAMOND URANIUM CLAIMS (Lemuel Littleman, #1-3, 6-7)

DOTY GROUP (Copper #1 and Willaha Group)

E. LEE #1 (Emmett Lee #1)

E. LEE #3 (Emmett Lee #3)

EARL HUSKON #1-2

LOC: SW¼ Sec., T32N, R9E

QUAD: Moenave SW 7½'; Marble Canyon NTMS

DEVL: Shallow open pits

PROD: 370 tons @ 0.19% U_3O_8; 0.42% V_2O_5; 8% $CaCO_3$, 1954

RAD: 30X

ANAL: 0.22% e U_3O_8; 0.26% U_3O_8; 1.35% V_2O_5

GEOL: Discontinuous carnotite-type mineralization in slabby sandstone in upper Shinarump member.

REF: D.O.E.

EARL HUSKON #3

LOC: SW¼ Sec. 26, T32N, R9E

QUAD: Moenave SW 7½'; Marble Canyon NTMS

DEVL: Open pits

PROD: 1855 tons @ 0.24% U_3O_8; 0.03% V_2O_5, 195[illegible]

GEOL: Discontinuous carnotite-type mineralization in sandstone of upper Shinarump member.

REF: D.O.E.

EARL HUSKON #35 (Evans Huskon #35)

EL PEQUITO MINE (Feheu Claims)

LOC: NW corner Sec. 14 T40 N, R7E, About 2 mi. WNW of Lees Ferry - Vermilion Cliffs.

QUAD: Lees Ferry 15'; Marble Canyon NTMS

DEVL: Trench

PROD: 912 tons @ 0.17% U_3O_8; 1956-57. 0.02-0.06% V_2O_5 197 Tons of 0.09% "no-pay" ore in 1957.

ANAL: 0.22% e U_3O_8; 0.19% U_3O_8; 0.06% V_2O_5; 1.18-6.80% $CaCO_3$

GEOL: Uraninite with pyrite, chalcopyrite in calcite veinlets and oxidized uranium and copper minerals coating pebbles and sand grains and impregnating carbonized wood in spoon-shaped channel of Shinarump Member, removed by erosion both up and down channel.

REF: Phoenix, D.A. (1963)
Tagg (1951) USAEC TM-212

ELWOOD CANYON SHAFT #1

LOC: Approx. West central Sec. 19, T29N, R10E

QUAD: Cameron 15'; Flagstaff NTMS

DEVL: 80 ft. deep shaft and drift

PROD: 874 tons @ 0.21% U_3O_8; 0.01% V_2O_5; 1957-1960

GEOL: Uraninite in carbonaceous sandstone, filling a narrow linear scour in an underlying shale of the lower Petrified Forest member.

REF: U.S.A.E.C. (1959, RME-141)

ELWOOD THOMPSON #1 (Ramco #23)

LOC: Approx. SW¼, Sec. 1, T26N, R10E

QUAD: Wupatki NE 7½'; Flagstaff NTMS

DEVL: Shaft and drift

PROD: 3,261 tons @ 0.24% U_3O_8, 1960-61

GEOL: Uraninite in sandstone lens of basal Petrified Forest member.

REF: D.O.E.

EMMETT LEE #1 (E.Lee#1, Julius Chee #3,4 common pit with Emmett Lee #1

LOC: Approx. NW¼ Sec. 11, T26N, R10E

QUAD: Wupatki NE 7½; Flagstaff NTMS

DEVL: Open pits

PROD: 840 tons @ 0.19% U_3O_8; 0.02% V_2O_5, 1956-58

GEOL: Irregular branching mineralized lenses up to 130 ft. long and 100 ft. wide oriented mainly to NE in braided scour and fill channel and modified by fracturing and permeability characteristic of sandstone and mudstone of lower Petrified Forest member. Uraninite is at depth and autunite near the surface.

REF: U.S.A.E.C. (1959, RME 141)
Bollin, E. and Kerr, P. (1958)

EMMETT LEE #3 (E. Lee #3, Julia Semallie common pit)

LOC: NE¼, Sec. 13 and SE¼ Sec. 12, T26N, R10E

QUAD: Wupatki NE 7½; Flagstaff NTMS

DEVL: 22 ft. deep pit extends onto Julia Semallie claims

PROD: 229 tons @ 0.32% U_3O_8; 0.02% V_2O_5, 1957-58

GEOL: Uraninite in sandstone lens in basal Petrified Forest member.

REF: U.S.A.E.C. (1959, RME-141)

ENGLAND GROUP

LOC: Sec. 3, T40N, R7E
Vermilion Cliffs

QUAD: Lees Ferry 15'; Marble Canyon NTMS

DEVL: Dozer roads up cliff

GEOL: Radioactivity associated with copper carbonates and carbonaceous matter along Moenkopi-Shinarump contact. See Red Wing Claim, located nearby.

REF: PRR-RR-297

EVANS HUSKON #2 (Adjacent to Yazzie #312)

LOC: SW corner Sec. 19, T29N, R10E

QUAD: Cameron 15'; Flagstaff NTMS

DEVL: Open pit

PROD: 11,777 tons @ 0.18% U_3O_8; 0.01% V_2O_5, 1953-1961

GEOL: Secondary uranium minerals in carbonaceous sandstone lenses in Petrified Forest member are in an irregular podlike body, 110 X 300 ft.; in NW trending paleo-channel. Apparent control of mineralization by presence of carbonaceous matter and variation of permeability in scour and fill sediments. Smaltite and ilsemannite have been identified.

REF: U.S.A.E.C. (1959, RME-141)
Bollin, E. and Kerr, P. (1958)
Isachsen, Y. and Evensen, C. (1956)
Austin, S. (1964, RME-99)

EVANS HUSKON #34

LOC: Approx. West central Sec. 9, T29N, R10E

QUAD: Cameron 15'; Flagstaff NTMS

DEVL: Small pits

PROD: 1853 tons @ 0.16% U_3O_8, 0.04% V_2O_5, 1957

GEOL: Carnotite-type in sandstone of the upper Petrified Forest member.

REF: D.O.E.

EVANS HUSKON #35 (Earl Huskon #35)

LOC: Approx. North central Sec. 36 and South central Sec. 25, T28N, R10E.

QUAD: Cameron 15'; Flagstaff NTMS

DEVL: Cuts and open pit

PROD: 64 tons @ 0.13% U_3O_8; 1958

GEOL: Uraninite in carbonaceous siltstone of upper Petrified Forest member.

REF: D.O.E.

F AND B CLAIMS

LOC: Probably approx. E½ Sec. 22, T38N, R7E Echo Cliffs

QUAD: Tanner Wash 15'; Marble Canyon NTMS

GEOL: Becqueralite with natroalunite in Chinle sandstone

REF: Gruner, J. and Knox, J. (1957), RME-3148

FEHEU CLAIMS (El Pequito Mine)

FOLEY #1

LOC: Sec. 11 and 14, T30N, R9E, less than 200 yds. east of Hwy. 89, halfway between Cameron and Tuba City.

QUAD: Cameron 15'; Flagstaff NTMS

DEVL: Drilled only.

GEOL: Radioactivity associated with folded and slightly faulted Petrified Forest member.

REF: D.O.E.

FOLEY #5 (Yazzie #312)

FOLEY BROTHERS #9 (Pat Lynch)

GRANDVIEW MINE (Last Chance Mine)

LOC: Approx. NE¼ Sec. 5, T30N, R4E 36°01'03"N, 111°58'34"W on south side of Grand Canyon

QUAD: Vishnu Temple 15'; Marble Canyon NTMS

DEVL: Underground workings for copper between 1893 and 1916 produced a reported $100,000.

RAD: 20,000 cps.

ANAL: 2.764% e U_3O_8; 1.892% U_3O_8

GEOL: Pipe-like body in upper Redwall limestone and basal Supai Fm. Uranium minerals association with limonite, copper carbonates, silicates and sulfate minerals, also minor pyrite and other sulfides along brecciated, bleached and marblized Redwall Ls. The deposit lies along the Cremation fault which trends WNW. Presence of Kaolinite and fully hydrated zeunerite suggests a temperature of formation below 70°C. Metazeunerite/zeunerite found in limonitic gossan-type.

REF: PRR-RG-33
Gibson, R. (1952, RMO-890)
Leicht, W.C. (1971)
Waesche, H.H. (1934)
Emmons, S. (1905)
Breed and Road (1974) p. 172

GRUB #14

LOC: NE¼, Sec. 16, T27N, R10E

QUAD: Wupatki NE 7½'; Flagstaff NTMS

DEVL: 150 ft. of rim stripping; several shallow pits 60 X 20 X 10 Ft. deep and several small drilling programs.

PROD: 13.1 tons @ 0.16% U_3O_8 (42 lbs U_3O_8 total) in 1956. This is total attributed to Grub claims in W½ Sec. 16. The E½ Sec. 16 produced some of the ore for Section 9 (upgrader) production, possibly about 5-15 tons.

GEOL: Uranium mineralization in carbonaceous siltstone in the upper part of a Shinarump channel. This channel appears to be different than the ore in E½ Sec. 16, which is the southward extension of the Section 9 (upgrader) channel.

REF: D.O.E.

HARRY WALKER #16 (Ramco #24 extends onto Harry Walker #16)

LOC: North central Sec. 12, T26N, R10E

QUAD: Wupatki NE 7½, Flagstaff NTMS

DEVL: Portion of Ramco 24 pit, originally a pit 180 ft. X 70 ft. X 5 ft. deep.

PROD: 51 tons @ 0.12% U_3O_8; 0.15% V_2O_5, 1957

GEOL: Carnotite-type ore in Petrified Forest member sandstone.

REF: D.O.E.

HARVEY BEGAY #1

LOC: Approx. Sec. 19, T29N, R10E

QUAD: Cameron 15'; Flagstaff NTMS

DEVL: Drilled

GEOL: Mineralization, probably uraninite, in Petrified Forest member.

REF: D.O.E.

HELLS HOLLOW

LOC: Approx. Sec. 13, T32N, R8W

QUAD: Vulcans Throne 7½'; Grand Canyon NTMS

DEVL: 3 holes drilled

RAD: 140 cps

GEOL: Radioactivity highest on mudstone horizons in bleached Hermit Shale with iron-manganese nodules, gypsum filled fractures and large scale liesegang rings. Mineralization is apparently associated with 100 ft. diameter sandstone mass cutting the Hermit Shale about 50 ft. below Coconino Sandstone and 800 ft. above Redwall limestone.

REF: D.O.E. data

HENRY SLOAN #1 (Sloan #1)

LOC: South central Sec. 35, T32N, R9E and north central Sec. 2, T31N, R9E.

QUAD: Moenave SW 7½'; Marble Canyon NTMS

DEVL: 2 open pits

PROD: 353 tons @ 0.18% U_3O_8; 0.05% V_2O_5, 1954-56.

ANAL: 0.30% e U_3O_8; 0.26% U_3O_8; 17.5-28.5% $CaCO_3$

GEOL: Uraninite occurs in veins and stringers and associated with marcasite in calcite cemented sandstone bordering carbonaceous wood in Petrified Forest member. Marcasite is high in arsenic.

REF: Austin, S. (1964, RME-99)

HOSTEN NEZ MINING COMPANY (Ward Terrace)

HOWARD #1

LOC: NW¼ Sec. 7, T27N, R10E

QUAD: Wupatki NE 7½'; Flagstaff NTMS

DEVL: Surface pits

PROD: 25 tons @0.26% U_3O_8; 0.10% V_2O_5, 1956

GEOL: Small pods of carnotite-type mineralization associated with carbonaceous matter in sandstone lenses of the upper Shinarump member.

REF: D.O.E.

HUSKON (Charles Huskon)

Huskon is a commonly used alias for Charles Huskon. Huskon #1,3,7,8,10,11,12,14,17,26 are listed as Charles Huskon. Charles Huskon's sons were Earl Huskon, Evans Huskon and Jack Huskon. Mines named after the sons are listed according to their first name.

ICICLE

LOC: Sec. 18, 19, T32N, R9E

QUAD: Blue Spring 15'; Marble Canyon NTMS

DEVL: Drilling and prospect pits

ANAL: 0.09% e U_3O_8; 0.12% U_3O_8; 0.7% $CaCO_3$

GEOL: Carnotite-type in Shinarump Conglomerate.

REF: D.O.E.

J. SEMALLIE (Julia Semallie)

JACK DANIELS #1-5 (Denetso #1)

LOC: South central Sec. 11, T29N, R9E, 300 ft. east of new Hwy 89.

QUAD: Cameron 15'; Flagstaff NTMS

DEVL: Open pit - largest single producer around Cameron.

PROD: Total of 39,808 tons @ 0.22% U_3O_8, <0.05% V_2O_5. Jack Daniels #1-4 claims produced 39,440 tons in 1956-1960 from the main pit. Jack Daniels extension (claim #5, under Old Highway 89) produced 322 tons @ 0.27% U_3O_8 in 1963. No production from Jack Daniels No. 3. Jack Daniels No. 4 produced 34 tons @ 0.14% U_3O_8 and 0.07% V_2O_5 from small dozer cuts and shallow scrapings located about 250 feet south of Jack Daniels No. 1 pit.

GEOL: Mostly uraninite ore disseminated in sandstone and siltstone channel near base of Petrified Forest member. Schroeckingerite coats fractures in sandstone, undergoing oxidation. Boltwoodite has been identified. Carbonized fossil logs containing uraninite are common.

REF: U.S.A.E.C. (1959, RME-141)
Bollin, E. and Kerr, P. (1958)
Austin, S. (1964, RME-99)
D.O.E.

JACK HUSKON #1

LOC: Approx. south central Sec. 10, T28N, R10E

QUAD: Cameron 15'; Flagstaff NTMS

DEVL: Drilled

GEOL: Two horizons of uraninite ore in Petrified Forest member. Upper ore zone is reportedly not in equilibrium.

REF: D.O.E.

JACK HUSKON #3

LOC: Approx. SE corner Sec. 9, T28N, R10E

QUAD: Cameron 15'; Flagstaff NTMS

DEVL: One pit 400 X 100 ft. X 130 ft. deep, one 30' drift in NE pit walls drill holes. Deepest pit in Cameron area.

PROD: 1,264 tons @ 0.19% U_3O_8, 1958-59

GEOL: Uraninite in Petrified Forest member

REF: D.O.E.

JACKPOT #1

LOC: Approx. S. central Sec. 14, T27, R10E

QUAD: Wupatki NE 7½; Flagstaff NTMS

DEVL: Open pit

PROD: 151 tons @ 0.18% U_3O_8; 0.03% V_2O_5, 1956

GEOL: Secondary minerals in carbonaceous sandstone in basal Petrified Forest member.

REF: U.S.A.E.C. (1959, RME-141)

JACKPOT #5

LOC: Approx. central NE¼ Sec. 14, T27N, R10E

QUAD: Wupatki NE 7½; Flagstaff NTMS

DEVL: Open pit

PROD: 77 tons @ 0.26% U_3O_8; 0.02% V_2O_5, 1956-57

GEOL: Secondary minerals in carbonaceous sandstone in basal Petrified Forest member.

REF: U.S.A.E.C. (1959, RME-141)

JACKPOT #6

LOC: Approx. NE¼ Sec. 15, T27N, R10E "7 to 8 miles west of Hwy. 89 and about 4 miles WNW of Shadow Mtn.

QUAD: Wupatki NE 7½; Flagstaff NTMS

ANAL: 0.13% e U_3O_8; 0.17% U_3O_8

GEOL: One foot thick zone in Chinle sandstone with mud lenses. Carbonaceous muddy matter and jarosite and limonite staining.

REF: PRR-EDR-516 (#114)

JACKPOT #7

LOC: Approx. SE¼ Sec. 10, T27N, R10E "Eastside of Moenkopi Wash about 4 mi. NW from Cameron"

QUAD: Wupatki NE 7½; Flagstaff NTMS

ANAL: 0.39% e U_3O_8; 0.53% U_3O_8

GEOL: Sandy Chinle unit contains carbonaceous silty and clay lenses with some limonite-jarosite staining. About one foot zone contains some carnotite and autunite. Outcrop occurs on west side of a small N-S Trending syncline.

REF: PRR-EDR-517 (#115)

JACKPOT #8

LOC: Approx. SW¼, Sec. 11, T27N, R10E "East side of Moenkopi Wash about 3 miles NNE of Jackpot #7"

QUAD: Wupatki NE 7½; Flagstaff NTMS

RAD: 3X

GEOL: Massive Chinle sandstone with clay lenses and jarosite staining. Radioactivity associated with white efflorescence which appears to be magnesium sulfate.

REF: PRR-EDR-515 (#113)

JACKPOT #40

LOC: Approx. east central Sec. 15, T27N, R10E might be same as Jackpot #6.

QUAD: Wupatki NE 7½'; Flagstaff NTMS

DEVL: Open pit

PROD: 152 tons @ 0.20% U_3O_8; 0.07% V_2O_5, 1956-57

GEOL: Secondary minerals in carbonaceous sandstone in basal Petrified Forest member.

REF: D.O.E.

JASPER GROUP

LOC: SW¼ Sec. 27, T39N, R6E Vermilion Cliffs about ½ mile NE of Cliff Dwellers Lodge

QUAD: Tanner Wash 15'; Marble Canyon NTMS

DEVL: Blocks blasted from cliff base

RAD: 200X

ANAL: 0.14-0.16% e U_3O_8 on black carbonaceous matter

GEOL: Yellow uranium mineralization with considerable zurite and malachite and soft black carbonaceous matter in Shinarump channel deposit.

REF: PRR-RR-275 (#161)
Petersen, R (1957-TEI #690)

JAY BIRD CLAIMS (Sun Valley Mine)

JEEPSTER #1

LOC; Approx. North central Sec. 35, T30N, R9E

QUAD: Cameron 15'; Flagstaff NTMS

DEVL: 700 X 150 X 60 ft. deep open pit

PROD: 1,128 tons @ 0.18% U_3O_8; 0.04% V_2O_5, 1956-57

GEOL: Autunite-type mineralization in carbonaceous sandstone lens in basal Petrified Forest member.

REF: D.O.E.

JEFFERSON CANYON #1

LOC: Approx. NE¼ Sec. 5, T28N, R10E

QUAD: Cameron 15'; Flagstaff NTMS

DEVL: 210 drill holes

GEOL: Mineralization in scattered disconnected lenses in Petrified Forest member.

REF: D.O.E.

JIMMY BOONE

LOC: Approx. Sec. 1,12, T39N, R7E

QUAD: Lees Ferry 15'; Marble Canyon NTMS

DEVL: Rim stripping

PROD: 14 tons @ 0.10% U_3O_8, 1955

ANAL: 3 samples @ 0.35-0.65% e U_3O_8, 0.28-0.34% U_3O_8; 3.0-5.3% $CaCO_3$

GEOL: Autunite, malachite, ilsemannite and carbon matter in Shinarump channel cut into upper part of Moenkopi Fm.

REF: D.O.E.

JOHNSON-BARLOW

LOC: Probably near common corner Secs. 16,17,20,21, T38N, R4E, "10 miles east of Houserock Ranch and 1/8 mile south of Hwy. 89", Vermilion Cliffs

QUAD: Emmett Wash 15'; Marble Canyon NTMS

DEVL: 3 shallow dozer cuts

RAD: 30X

GEOL: Radioactivity in remnants of Shinarump Conglomerate with fire yellow sand matrix containing iron oxide, carbonaceous trash, and some petrified wood fragments.

REF: PRR-RR-250 (#157)

JUAN HORSE #3 (Adjacent to Boyd Tisi #2)

LOC: Approx. SW¼, Sec. 30, T29N, R10E

QUAD: Cameron 15'; Flagstaff NTMS

DEVL: 50 ft. deep open pit

PROD: 2343 tons @ 0.19% U_3O_8, 1958-59

ANAL: 0.18% e U_3O_8; 0.25% U_3O_8; 1.20% $CaCO_3$

GEOL: Disseminated uraninite in carbonaceous sandstone of basal Petrified Forest member.

REF: D.O.E.

JUAN HORSE #4

LOC: Approx. NE¼, Sec. 31, T29N, R10E

QUAD: Cameron 15'; Flagstaff NTMS

DEVL: 81 ft. deep open pit

PROD: 2418 tons @ 0.23% U_3O_8; 1958-59

GEOL: Uraninite in arkosic carbonaceous sandstone with clay pellets in sour channel of Petrified Forest member.

REF: D.O.E.

JULIA SEMALLIE (J. Semallie; common pit with Emmett Lee #3)

LOC: SE¼, Sec. 12, T26N, R10E

QUAD: Wupatki NE 7½; Flagstaff NTMS

DEVL: Open pit

PROD: 163.3 tons @ 0.25%, U_3O_8; 0.04% V_2O_5, 1957-58

GEOL: Uraninite in sandstone of the lower Petrified Forest member.

REF: D.O.E.

JULIUS CHEE #2 (Pit common to Emmett Lee #1 and Julius Chee #3 & 4)

LOC: Approx. NW¼, Sec. 11, T26N, R10E

QUAD: Wupatki NE 7½; Flagstaff NTMS

DEVL: 2 pits, 20 ft. deep; drilling. One pit common with other claims.

PROD: 637 tons @ 0.14% U_3O_8, 1957-58

GEOL: Secondary minerals in sandstone of basal Petrified Forest member. Two different sands are mineralized. Much of the radioactivity associated with oxidized logs is probably due to radioactive barite.

REF: Austin, S. (1964, RME-99, pg. 56-58)

JULIUS CHEE #3 (pit common with Julius Chee #4 and Emmett Lee #1)

LOC: Approx. NW¼, Sec. 11, T26N, R10E

QUAD: Wupatki NE 7½; Flagstaff NTMS

DEVL: SW pit (200 X 50 X 30 ft. deep); 80 X 30 X 30 ft. deep pit; drilling

PROD: 218 tons @ 0.17% U_3O_8; 0.01% V_2O_5; 1956-57, 1962-63

GEOL: Carnotite and autunite in carbonaceous sandstone in lower Petrified Forest member. Ore is reported to be out of equilibrium, radiometric readings high. 1963 shipments are the last recorded for the Cameron district.

REF: U.S.A.E.C. (1959, RME-141)

JULIUS CHEE #4 (Commonpit with Emmett Lee #1 and Julius Chee #3)

LOC: Approx. NW¼ Sec. 11, T26N, R10E

QUAD: Wupatki NE 7½'; Flagstaff NTMS

DEVL: 200 X 50 X 30 ft. deep pit, 50 ft. adit from bottom of pit.

PROD: 1042 tons @ 0.18% U_3O_8; 0.01% V_2O_5; 1957-58

GEOL: Mineralization in carbonaceous sandstone of the Petrified Forest member.

REF: U.S.A.E.C. (1959, RME-141)

JUNE CLAIMS (Navajo Springs, adjacent to Tommy)

LOC: Sec. 26, T39N, R7E

QUAD: Lees Ferry 15'; Marble Canyon NTMS

DEVL: 75 X 30 X 15 ft. deep rim stripping

PROD: 23 tons @ 0.22% U_3O_8, 1956

GEOL: Secondary minerals in basal Petrified Forest member

REF: D.O.E.

KACHINA #6

LOC: SW¼, Sec. 2, T29N, R9E

QUAD: Cameron 15½; Flagstaff NTMS

DEVL: 400 X 200 X 40 ft. deep pit with adit in wall

PROD: 1,452 tons @ 0.14% U_3O_8, 1957-60

GEOL: Sandstone lens of carnotite-type in channel deposit near base of Petrified Forest member.

REF: D.O.E.

LA SALLE MINING

LOC: Sec. 18, 21, T39N, R8E
Vermilion Cliffs

QUAD: Lees Ferry 15'; Marble Canyon NTMS. Two miles west of Marble Canyon and up draw with spring at cliff base on bench 400 ft. above Hwy. 89 and ¼ mile to the north.

RAD: 8X

ANAL: 0.03% U_3O_8

GEOL: Radioactivity is near base of Shinarump member channel about 1000 ft. wide and cuts 50-70 ft. into Moenkopi. Much copper staining but carbon matter not abundant.

REF: PRR-EDR-227 (#113)

LAST CHANCE MINE (Grandview Mine)

LEHNEER PROSPECT

LOC: NW¼ Sec. 34, T41N, R7E
In Paria Canyon on North side of Paria River

QUAD: Lees Ferry 15'; Marble Canyon NTMS

DEVL: Short drift

GEOL: Small, tabular occurrence of metatorbernite, torbernite, zippeite and secondary copper minerals associated with sparse black carbonaceous matter, in thicker sandstone in upper and lower strata of Chinle Fm. above Shinarump member.

REF: Phoenix, D. (1963)

LEMUEL LITTLEMAN #1 & 7

LOC: Approx. SE¼ Sec. 27, T30N, R9E

QUAD: Cameron 15'; Flagstaff NTMS

DEVL: Open pit

PROD: 469 tons @ 0.19% U_3O_8; 0.03% V_2O_5, 1956-58, 1960

GEOL: Uraninite with carbon matter and petrified logs in channel sandstone of basal Petrified Forest member.

REF: U.S.A.E.C. (1959, RME-141)

LEMUEL LITTLEMAN #2 (Diamond Uranium Claims)

LOC: Approx. Sec. 24, T29N, R9E

QUAD: Cameron 15'; Flagstaff NTMS

DEVL: Shallow pits

PROD: 5,819 tons @ 0.21% U_3O_8; 0.01% V_2O_5, 1955-60

GEOL: Uraninite associated with carbon matter and petrified logs in paleochannel deposit of lower Petrified Forest member.

REF: U.S.A.E.C. (1959, RME-141)

LEMUEL LITTLEMAN #3 (Diamond Uranium Claims)

LOC: Approx. West central Sec. 35, T29N, R9E

QUAD: Cameron 15'; Flagstaff NTMS

DEVL: Shallow pit

PROD: 12 tons @ 0.24% U_3O_8; 0.07% V_2O_5, 1955

GEOL: Carnotite staining on bedding and fracture planes in small channel deposit of upper Shinarump member.

REF: D.O.E.

LEMUEL LITTLEMAN #6

LOC: SE¼ Sec. 9, T31N, R9E

QUAD: Cameron 15'; Flagstaff NTMS

DEVL: Prospect pits

PROD: 5 tons stockpiled

ANAL: Stockpile sample (fissile shale) @ 0.15% e U_3O_8; 0.16% U_3O_8; 0.40% $CaCO_3$

GEOL: Secondary minerals in Shinarump member

REF: D.O.E.

LIBA GROUP (New Liba)

LLOYD HOUSE

LOC: East central Sec. 27 and West central Sec. 26, T28N, R10e

QUAD: Cameron 15'; Flagstaff NTMS

DEVL: Caved prospect shaft; some drilling

GEOL: Dominantly tyuyamunite in Petrified Forest member.

REF: D.O.E.

LUSTER #1

LOC: SW¼ Sec. 17, T27N, R9E

QUAD: Wupatki NE 7½; Flagstaff NTMS

DEVL: Open pit

PROD: 319 tons @ 0.14% U_3O_8; 0.04% V_2O_5, 1956

GEOL: Sandstone in upper part of Shinarump member

REF: D.O.E.

M. JOHNSTON (Martin Johnson #4 or (Max Johnson Mines #1-10)

M & R CLAIMS

LOC: Sec. 11, T39N, R6E
4 miles NW of Vermilion Cliffs Lodge

QUAD: Lees Ferry 15'; Marble Canyon NTMS

DEVL: Dozer cuts

RAD: 30X

ANAL: 0.45% U_3O_8; 1.7% V_2O_5; 1.0% Cu

GEOL: Mineralized sandstone is very irregular and varies from one foot to 10 feet in thickness. The white silty sandstone matrix from the Petrified Forest member contains nodules, pockets and lenses of carbonaceous muds.

REF: PRR-RR-296 (#165)

MAGGIE BAKER (Cliff Canyon)

MALONEY (Adolf Maloney #2)

MANUEL DENETSONE #2

LOC: Approx. North central Sec. 5, T28N, R10E

QUAD: Cameron 15'; Flagstaff NTMS

DEVL: 50 ft. shaft with drifting

PROD: 338 tons @ 0.20% U_3O_8, 1959

GEOL: Spotty, lenticular occurrences of uraninite in carbonaceous sandstone of basal Petrified Forest member.

REF: U.S.A.E.C. (1959, RME-141)

MARTIN JOHNSON #4 (M. Johnson #4)

LOC: Sec. 11, T32N, R9E

QUAD: Moa Ave NW 7½; Marble Canyon NTMS

DEVL: Rim stripping and shallow pits

PROD: 38 tons @ 0.16% U_3O_8; 0.03% V_2O_5; 1956

GEOL: Secondary minerals in a platy, carbonaceous, limonite stained sandstone of the Shinarump member.

REF: D.O.E.

MAX HUSKON #1-7

LOC: Sec. 23,24,26,27,34,35, T32N, R9E

QUAD: Moa Ave NW and SW 7½; Marble Canyon NTMS

DEVL: Open pits

PROD: 57 tons @ 0.04% U_3O_8; 0.02% V_2O_5, 1955

GEOL: Secondary minerals in the Shinarump member

REF: D.O.E.

MAX JOHNSON #1 (M. Johnson #1)

LOC: Approx. West central Sec. 24, T29N, R9E

QUAD: Cameron 15'; Flagstaff NTMS

DEVL: Open pit

PROD: 5,678 tons @ 0.23% U_3O_8; 0.02% V_2O_5, 1956-57, 1959-60

GEOL: Dominantly autunite with some uraninite in a zone 400 X 120 ft. in SW trending channel of lower Petrified Forest member. Atacamite associated with gypsum.

REF: Austin, S. (1964, RME-99)

MAX JOHNSON #4 (M. Johnson #4)

LOC: SW corner Sec. 30, T27N, R11E

QUAD: Wupatki NE 7½'; Flagstaff NTMS

PROD: 38 tons @ 0.16% U_3O_8; 0.03% V_2O_5, 1956

GEOL: Ore in Petrified Forest member

REF: D.O.E.

MAX JOHNSON #7 (M. Johnson #7)

LOC: Approx. SW¼ Sec. 35, T27N, R10E

QUAD: Wupatki NE 7½'; Flagstaff NTMS

DEVL: 15 ft. deep open pit

PROD: 280 tons @ 0.16% U_3O_8; 0.03% V_2O_5, 1957-59

GEOL: Secondary minerals in carbonaceous sandstone of lower Petrified Forest member. Ore appears to be slightly out of equilibrium in favor of the radiometric assay.

REF: D.O.E.

MAX JOHNSON #9 (M. Johnson #9)

LOC: Approx. SE¼ Sec. 24, T29N, R9E

QUAD: Cameron 15'; Flagstaff NTMS

DEVL: 40 ft. deep open pit

PROD: 1,375 tons @ 0.19% U_3O_8, 1958-60

GEOL: Uraninite as very discontinuous and lenticular deposits in basal carbonaceous sandstone of Petrified Forest member.

REF: D.O.E.

MAX JOHNSON #10

LOC: Approx. SW¼ Sec. 24, T29N, R9E

QUAD: Cameron 15'; Flagstaff NTMS

DEVL: Open pit

PROD: 196 tons @ 0.28% U_3O_8, 1959-60

GEOL: Uraninite in small lenses in lower Petrified Forest member. Some small en echelon faults.

REF: U.S.A.E.C. (1959, RME-141)

MEL GARDNER PROSPECT

LOC: Approx. Central west Sec. 34, T28N, R10E

QUAD: Cameron 15'; Flagstaff NTMS

DEVL: Drilling

GEOL: Uraninite in Shinarump paleochannel

REF: U.S.A.E.C. (1959, RME-141)

MILESTONE #1 MINE (Grub #14)

MONTEZUMA #1

LOC: Approx. south central Sec. 36, T29N, R9E

QUAD: Cameron 15'; Flagstaff NTMS

DEVL: Open pit and stripping

PROD: 11 tons @ 0.10% U_3O_8, 1959

GEOL: Metatyuyamunite in Shinarump Conglomerate

REF: Austin, S. (1964, RME-99)

MONTEZUMA #2

LOC: Approx. SW corner Sec. 3, T30N, R9E

QUAD: Cameron 15'; Flagstaff NTMS

DEVL: Open pits

PROD: 193 tons @ 0.12% U_3O_8, 1955-57

GEOL: Secondary minerals in carbonaceous and argillaceous sandstone of upper Shinarump member. Some uranium tied up in hyalite.

REF: D.O.E.

MONTEZUMA #7A, 7B, 7C

LOC: Approx. central Sec. 4, NE¼ Sec. 5, T29N, R9E, and SW corner Sec. 33, T30N, R.9E, respectively.

QUAD: Cameron 15'; Flagstaff NTMS

DEVL: Open pits

PROD: 57 tons, 38 tons and 36 tons @ 0.12% U_3O_8, in 1956 respectively.

GEOL: Secondary minerals in platty, carbonaceous, argillaceous upper Shinarump with some hyalite.

REF: D.O.E.

MURPHY MINE (Black Point)

LOC: NW¼ Sec. 22, T27N, R10E

QUAD: Wupatki NE 7½; Flagstaff NTMS

DEVL: Open pit

PROD: 1,769 tons @ 0.21% U_3O_8; 0.04% V_2O_5; in 1956-58

GEOL: Scattered channel deposits associated with abundant carbonized logs and plant remains in fine to medium-grained sandstone and mudstone of basal Petrified Forest member and upper Shinarump member. Some migration of uranium mineralization found in Pleistocene gravels. Minerals coating grains include, meta-autunite, uranophane, beta-uranophane, alunite, schoepite, tyuyamunite, betazippeite, cobalt and gypsum; uranium pit now destroyed by gravel operation.

REF: U.S.A.E.C. (1959, RME-14)
Austin, S (1957)
Austin, S. (1964, RME-99, pg. 36-37)

NATIONAL GROUP

LOC: Approx. Sec. 16, T30, R6W
Hualupai Indian Reservation

QUAD: Williams NTMS

PROD: Copper during W.W.I.

RAD: 4X

GEOL: Cherty Kaibab limestone is mineralized along fractures with shallow limestone gossen and copper mineralization.

REF: PRR-AP-115 (#103)

NAVAJO 26 MINE

LOC: South central Sec. 18, T27N, R10E
On north side of Black Point

QUAD: Wupatki NE 7½'; Flagstaff NTMS

DEVL: Rim Stripping and open pit

PROD: 581 tons @ 0.17% U_3O_8, 1958-59

GEOL: Secondary minerals in slump block of basal Petrified Forest member sandstone.

REF: U.S.A.E.C. (1959, RME-141)
Cheneweth and Cooley (1960.

NAVAJO SPRINGS (June and Tommy Claims)

NAVAJO SPRINGS (Tommy Claims)

NEW LIBA (Liba Group, Pretty girl)

LOC: NE ¼ Sec. 4, T27N, R10E

QUAD: Wupatki NE 7½'; Flagstaff NTMS

DEVL: Open pits

PROD: 1,829 tons @ 0.16% U_3O_8; 1955-60

GEOL: Secondary minerals in arkosic sandstone with overlying carbonaceous sandstone in upper Shinarump member. Cobalt, molybdenum and sulfates present, see also Grub #14.

REF: D.O.E.

NORDELL (Ada and Nordell)

ORPHAN LODE MINE

LOC: SW¼ Sec. 14, T31N, R2E
Grand Canyon

QUAD: Bright Angel 15'; Grand Canyon NTMS

DEVL: Vertical shaft and stoping

PROD: 509,025 tons @ 0.43 U_3O_8; (4.36 million lbs. of U_3O_8), plus 6.68 million lbs. of copper, 107,000 ounces of silver, small amounts of vanadium, from 1956-1969.

ANAL: Scattered assays from 1 to 10% U_3O_8 - range of ore shipped is 0.1-0.5% U_3O_8

GEOL: Uraninite and secondary uranium minerals in nearly vertical circular pipe-like body of brecciated, highly fractured Coconino sandstone, and Hermit Shale. Mineralization strongest around periphery and consists of disseminations and vein-like stringers of uraninite in association with sulfides of Fe, Cu, Pb, Zn, Co and Mo. pipe bottoms in Redwall limestone. More detailed information is provided in the discussion on the Orphan Mine, elsewhere in this text.

REF: U.S.A.E.C. (1959, RME-141)
Bowles, C.G. (1977)
Adler, H. (1963)
Granger, H. & Raup, R. (1962)
Miller, D. and Kulp, J. (1963)
Kerr, P. (1958)
Gornitz, V & Kerr, P. (1970)
Kofford, M. (1969)
PRR-AP-52
Magleby, D. (1961, A.E.C. TM-134)

PACKRAT

LOC: Approx. Sec. 12, T26N, R2E

QUAD: Valle 15'; Williams NTMS

DEVL: 2 shallow shafts, incline, some drifting and crosscutting.

PROD: Copper production

RAD: 12X

ANAL: 0.04% e U_3O_8

GEOL: Radioactivity and copper carbonates in a sandstone lens in Kaibab limestone.

REF: PRR-AP-44

PAT LYNCH (Foley Brothers #9)

LOC: Sec. 33, T29N, R10E

QUAD: Cameron 15'; Flagstaff NTMS

DEVL: 90 drill holes

GEOL: Mineralization occurs in iron-stained sandstone in upper part of Petrified Forest member.

REF: D.O.E.

PAUL HUSKIE #1 & 2 (Refer to Paul Huskie #20)

LOC: NE¼ Sec. 22 and NW¼ Sec. 23, T28N, R9E

QUAD: Cameron 15'; Flagstaff NTMS

GEOL: Mineralization in Shinarump channel.

REF: D.O.E.

PAUL HUSKIE #3

LOC: South central Sec. 11, T26N, R10E
Adjacent to Charles Huskon #4

QUAD: Wupatki NE 7½; Flagstaff NTMS
DEVL: Small open pits
PROD: 3,925 tons @ 0.20% U_3O_8, in 1956, 1958
Included in Charles Huskon #4 production

REF: D.O.E.

PAUL HUSKIE #4

LOC: Approx. Sec. 5, T29N, R10E
2000 ft. north of Evans Huskon #34

QUAD: Cameron 15'; Flagstaff NTMS

DEVL: 60 drill holes

GEOL: Bleached sandstone in upper Petrified Forest member.
REF: D.O.E.

PAUL HUSKIE #20 (Refer to Paul Huskie #1 & 2)

LOC: Approx. Sec. 22,23,T28N, R9E

QUAD: Cameron 15'; Flagstaff NTMS

PROD: 22.7 tons @ 0.15% U_3O_8, 1959

GEOL: Scattered mineralized logs in Shinarump member

REF: D.O.E.

PAUL HUSKIE #21 (A & B #21)

LOC: SW¼, Sec. 26, T32N, R9E
Adjacent to Earl Huskon #3

QUAD: Moenave SW 7½; Marble Canyon NTMS

DEVL: 90 X 70 X 8 ft. deep open pit, 6-10-20 ft. shafts

PROD: 273.4 tons @ 0.22% U_3O_8 includes illegal shipment from A & B #21.

GEOL: Uranium in dark brown limonite stained sandstone in upper Shinarump member. Ore is out of equilibrium in favor of radiometric.

REF: D.O.E.

PRETTY GIRL (New Liba)

RAINBOW CLAIM

LOC: Poorly located, Approx. T39N, R2E
Vermilion Cliffs

QUAD: Probably Lees Ferry 15'; Marble Canyon NTMS

DEVL: Dozer cuts

RAD: 200X

GEOL: Possibly Carnotite in medium-coarse sandstone and fossil logs in small channels within Chinle. Series of small E-W Trending faults in area.

REF: PRR-RR-202 (#155)
PRR-RR-106

RAMCO #20 (Common pit with Ramco #22 claim)

LOC: Central to east central edge of Sec. 11, T27N, R10E, Cameron

QUAD: Wupatki NE 7½, Flagstaff NTMS

DEVL: Open pit 70 ft. deep, over 800 drill holes

PROD: 22,642 tons @ 0.22% U_3O_8; 0.04% V_2O_5, 1956-60

GEOL: Mineralization in scour and fill sediments of a ENE Trending channel in Petrified Forest member. Some control to ore deposition along fractures at slight angle to channel. Uraninite replaces cell walls and pyrite replaces cell centers in petrified logs. Gypsum coats secondary uranium minerals in fractures. Boltwoodite and cobalt minerals identified. Same ore body as Ramco #22 and Ryan #2.

REF: Austin, S (1964, RME-99, p. 82-83)

RAMCO #21

LOC: NW¼ Sec. 11, T27N, R.10E
Cameron

QUAD: Wupatki NE 7½, Flagstaff NTMS

DEVL: 2 open pits, 600 X 150 X 40 ft. deep and 300 X 300 X 50 ft. deep and one 100 ft. adit and surface scrapings.

PROD: 5471 tons @ 0.25% U_3O_8; 0.04% V_2O_5, 1956-59

GEOL: Oxidized uranium minerals in scour and fill channels trending NW and NE and in the lower Petrified Forest member. Average thickness of ore was 2 ft. and at a depth of about 36 ft. Abundant carbonized plant debris.

REF: U.S.A.E.C. (1959, RME-141); Bollin, E. and Kerr, P. (1958)

RAMCO #22 (Common pit with Ramco #20)

LOC: Central to east central edge Sec. 11, T27N, R10E
Cameron

QUAD: Wupatki NE 7½, Flagstaff NTMS

DEVL: Open pit 70 ft. deep

PROD: 16,609 tons @ 0.23% U_3O_8; 0.01% V_2O_5, 1956-59

GEOL: Uraninite and secondary uranium minerals in channel fill of Petrified Forest member. Refer to Ramco #20.

RAMCO #23 (Elwood Thompson #1)

RAMCO #24 (Extends onto Harry Walker #16 claim)

LOC: Approx. N. central Sec. 12, T26N, R10E
Cameron

QUAD: Wupatki NE 7½'; Flagstaff NTMS

DEVL: 450 X 250 X 35 ft. deep open pit

PROD: 2,829 tons @ 0.21% U_3O_8; 0.05% V_2O_5, 1957-58

GEOL: Secondary uranium minerals in argillaceous sandstone lens in basal Petrified Forest member.

REF: D.O.E.

RED WING #4 CLAIM

LOC: SW¼ Sec. 34, T41N, R7E and SW¼ Sec. 2, T40N, R7E, Vermilion Cliffs on west side of Paria River

QUAD: Lees Ferry 15'; Marble Canyon NTMS

DEVL: Trenches and short adits

PROD: 46 tons @ 0.47% U_3O_8; 1954, 1956

RAD: 200X

ANAL: 2.3% e U_3O_8; 2.4% U_3O_8 up to 1% Cu

GEOL: Small discontinuous pods and stringers with secondary uranium minerals associated with carbonaceous matter and some copper staining in thin sandstone beds of the Chinle Fm. possibly Petrified Forest Mbr.

REF: PRR-RR-200 (#154)
Tagg (1957
USAEC TM-212

RIDENOUR MINE

LOC: NE¼, Sec. 6, T31N, R8W

QUAD: Vulcans Throne SW 7½'; Grand Canyon NTMS
Underground Inclined shaft

DEVL: 1000 tons copper ore in 1915-1916, mining began in 1870.

PROD: 14 tons @ 0.15% U_3O_8; 2.38% V_2O_5, 1962, mining began in 1870, 1000 tons of Cu in 1915-16.

RAD: 300X

ANAL: As high as 1.76% e U_3O_8; 2.11% U_3O_8; 10.83% V_2O_5 14.15% Cu, trace of cobalt.

GEOL: Uranium mineralization associated with copper carbonates, silicates and sulfides in collapsed, fractured and bleached Supai Fm. Inferred pipe-like body in the Supai Fm. Carnotite is associated with carbon. Thin coatings of metatyuyamunite on stope faces where groundwater seeps, illustrates surface concentration of uranium minerals by evaporation of mine water. Abundant volborthite (green copper vandate).

REF: Miller, R. Lovejoy, E. (1954, RME-2014)
U.S.A.E.C. (RME-2007)
Finch, W. (1967)
PRR-RA-14 (#139)
Breed and Roat (1974) p. 172
Osterwald (1965) p. 132-134

RIVERVIEW GROUP #1-9

LOC: North Central Sec. 8, T26N, R10E
Cameron

QUAD: Wupatki NE 7½; Flagstaff NTMS

DEVL: One 15' deep open pit with a 55' deep shaft from which most ore grade material came.

PROD: 508 tons @ 0.38% U_3O_8; 0.03% V_2O_5, 1956-57, low vanadium, but high copper ore.

ANAL: 3 samples @ 1.01-1.77% e U_3O_8; 1.35-2.48% U_3O_8

GEOL: Metatorbernite with considerable malachite in a 120 ft. diameter pipe-like structure. Chinle sediments have dropped into Moenkopi Fm. Ore in upper 55 ft. of pipe, mostly along a peripheral shear. Only producer pipe around Cameron.

REF: U.S.A.E.C. (1959, RME-141); Kerr, P. (1958)
Bollin, E. and Kerr, P. (1958)
Austin, S. (1964, RME-99)
Chemeweth and Blakemore (1961, Plateau)
Chenoweth (1960, TM-173)
Barrington and Kerr (1973) p. 1248.

RYAN #1

LOC: Approx. SE¼ Sec. 34, T28N, R10E

QUAD: Cameron 15'; Flagstaff NTMS

DEVL: Open pit

PROD: 311 tons @ 0.17% U_3O_8; 0.02% V_2O_5, 1957-58

GEOL: Carnotite-type mineralization in carbonaceous sandstone in the basal Petrified Forest member.

REF: D.O.E.

RYAN #2

LOC: NE¼ Sec. 11, T27N, R10E

QUAD: Wupatki NE 7½; Flagstaff NTMS

DEVL: Open pit common with Ramco #20 and #22

PROD: 2,066 tons @ 0.25% U_3O_8; 0.10% V_2O_5, in 1956-58

GEOL: Uraninite and secondary minerals associated with logs and carbon matter plus disseminated in sandstone of the basal Petrified Forest member. Refer to Ramco #20.

REF: D.O.E.

SAM CLAIMS

LOC: SE¼, Sec. 2, T39N, R6E. Upper Badger Canyon 2 miles NW of Vermilion Cliffs Lodge.

QUAD: Lees Ferry 15'; Marble Canyon NTMS

PROD: 11 tons @ 0.08% U_3O_8; 0.18% V_2O_5, 1957 from Sam #7

RAD: 100X

ANAL: 1.03% e U_3O_8

GEOL: Betazippeite and metatorbernite are interstitial in lenticular pods paralleling bedding in 30 ft. thick gray-red siltstone near top of Petrified Forest member.

REF: PRR-SL-208
Phoenix, D. (1963)

SANDY #1-3 CLAIMS

LOC: West central Sec. 12, T40 N, R7E
Vermilion Cliffs on east side of the Paria River

QUAD: Lees Ferry 15'; Marble Canyon NTMS

DEVL: Small pit

RAD: 80X

ANAL: 0.20% e U_3O_8

GEOL: Metahewettite and possibly other uranium minerals associated with carbon matter plus copper and iron staining in Shinarump channel deposit.

REF: PRR-RR-101 (#147)
PRR-RR-146 (#151)

SAUCER #1

LOC: Approx. Sec. 21, T34N, R4E
on rim of Saddle Canyon

QUAD: Nankoweap 15'; Marble Canyon NTMS

DEVL: Prospect

RAD: 100X

ANAL: 0.02-0.07% e U_3O_8

GEOL: Lens shaped mineralized zone in Coconino sandstone at contact with Hermit Shale. Associated copper carbonates, plus iron and manganese oxides.

REF: PRR-1378
PRR-SL-131

SECTION #1

LOC: Sec. 1, T27N, R9E, near Nordell claims

QUAD: Wupatki NE 7½; Cameron 15'; Flagstaff NTMS

DEVL: Pits

PROD: 79 tons @ 0.22% U_3O_8; 0.14% V_2O_5, 1954, 1959

GEOL: Mineralization in the Shinarump conglomerate

REF: D.O.E.

THOMAS #1

LOC: Sec. 22, T38N, R7E
Echo Cliffs

QUAD: Tanner Wash 15'; Marble Canyon NTMS

DEVL: 100 X 40X 20 ft. deep open pit, rim stripping, 2 small adits.

PROD: 154 tons @0.10% U_3O_8, 1954, 1958, 1960

RAD: 100X

ANAL: 0.05-0.48% e U_3O_8

GEOL: Secondary mineralization in sand and clay lenses of the Petrified Forest member. Beds dip 10 to 15°SE.

REF: PRR-RR-213 (#156)

TOMMY CLAIMS (Navajo Springs, adjacent to June Claims)

LOC: Sec. 23, T39N, R7E

QUAD: Lees Ferry 15'; Marble Canyon NTMS

DEVL: 800 ft. rim stripping with 100 X 20 X 10 ft. deep cut.

PROD: 40 tons @ 0.37% U_3O_8, 1956

GEOL: Secondary mineralization in basal sandstone of the Petrified Forest member.

REF: D.O.E.

TWIN TANKS

LOC: Sec. 14, T30N, R8W
Aubrey Cliffs - north of Peach Springs

QUAD: Prospect Point 7½'; Williams NTMS

DEVL: Small pit worked for copper, probably during WWI

RAD: 3X

GEOL: Hematite and copper carbonates near base of Kaibab limestone.

REF: PRR-AP-117 (#105)

UNNAMED A

LOC: Approx. T40N, R7E
3 miles east of Marble Canyon Lodge on left side of Lees Ferry Raod

QUAD: Lees Ferry 15'; Marble Canyon NTMS

DEVL: Small pit

RAD: 500X

ANAL: 0.12% e U_3O_8; 0.17% U_3O_8

GEOL: Radioactivity associated with copper carbonates and vanadium minerals in Shinarump Conglomerate channels cut into Moenkopi.

REF: PRR-RR-155 (#152)

UNNAMED B

LOC: SE¼, Sec. 13, T30N, R8W

QUAD: Prospect Point 7½; Williams NTMS

DEVL: 12 holes drilled

RAD: 500 cps

GEOL: Conglomerate lens in Kaibab or Toroweap limestone. Copper carbonates coat limestone clasts. Radioactivity associated with iron-stained, vuggy rock of pulverized carbonate.

REF: D.O.E.

UNNAMED C

LOC: Approx. T26N, R2E - 25 miles north of Grand Canyon Junction, ½ mile east of road near south rim of Canyon.

QUAD: Grand Canyon NTMS

DEVL: 2 open pits (10 X 20 ft.) connected by tunnel 40 ft. long and 15 ft. deep.

PROD: Shipped a few tons of copper ore about 1910-1920

RAD: 3X

ANAL: 0.10% U_3O_8; 6.3% Cu

GEOL: Radioactivity in small areas at tunnel portals in copper-stained sandstone of flat-lying Moenkopi as a 1 sq. mi. residual hill on Kaibab limestone.

REF: PRR-UP-349

UNNAMED D

LOC: Approx. 2 miles NW of Calvin Chee Claim over sand dune to prominent cliff

QUAD: Leupp 15'; Flagstaff NTMS

DEVL: Prospect pit

RAD: 20X

ANAL: 0.03% e U_3O_8; 0.03% U_3O_8

GEOL: Mineralization about 1/3 way up 150 ft. cliff of Chinle with abundant carbon matter, fossil wood and limonite staining. Uranium may be in halos around logs.

REF: PRR-EDR-255.

UNNAMED E

LOC: "Take first road west, north of bridge at Leupp, near stone house. Follow this road for 6 miles NNW of Leupp."

QUAD: Probably Grand Falls NE 7½'; Flagstaff NTMS

DEVL: Prospect pit

RAD: 70X

GEOL: Carbonaceous-rich Petrified Forest member with fossil wood, gypsum and specs of possibly schroeckingerite.

REF: PRR-EDR-254

SECTION 9 (Upgrader Property; C.O. Bar Livestock Company, Milestone 1)

LOC: E½ Sec. 9, T27N, R10E
Cameron

QUAD: Wupatki NE 7½; Flagstaff NTMS

DEVL: 3 small pits and low grade ore from dumps from older workings. This is the location of the 1958-1960 "upgrader machine" mail fraud scheme of John Milton Addison and associates who convinced many that the machine could produce sellable grade ore from low grade ore from dumps. A jury trial ending Feb. 17, 1961 convicted six associates of fraud, conspiracy, and federal securities laws violations.

PROD: 386 tons @ 0.13% U_3O_8, 1957-1962, includes about 5 tons from E½ of Sec. 16, south of Sec. 9, in same channel. 22 tons @ 0.16% U_3O_8 from "upgrader" scandle in 1959-60; rest of production is legitimate.

GEOL: Mineralization in southern extension of Shimarump channel containing the Huskon 26, Huskon 11, and New Liba ore bodies.

REF: D.O.E.

SHADOW MOUNTAIN COLLAPSE (A & B#7)

SILICA PLUGS

LOC: Centered 14 miles NW of Cameron townsite in unsurveyed country - see NTMS map locations below.

QUAD: Flagstaff and Marble Canyon NTMS

DEVL: Some minor drilling in 1950's.

GEOL: Radioactivity associated with 9 resistant masses probably representing hydrothermal silica plugs which crop out in Triassic Moenkopi Fm. Pyrite, Fe-Mn-Cu staining, anhydrite, and argillic alteration are associated with the plugs. Moenkopi beds bleached around plugs. Highest radioactivity at plug perimeters.

REF: Barrington and Kerr (1963)

SILVER CLOUD

LOC: Approx. T41, 42N, R12½ E
Cummings Mesa on Arizona-Utah Border

QUAD: Navajo Creek (Arizona) and Cummings Mesa (Utah) 15'; Marble Canyon NTMS

RAD: Airborne anomaly

GEOL: Cummings Mesa is capped by Salt Wash member

REF: Air anomaly map A-14-74
D.O.E.

SLOAN #1 (Henry Sloan #1)

SNAFU CLAIMS

LOC: "Take road north from Rt. 89 about 1½ miles west of Marble Canyon Lodge. Go 5 miles to claims in deeply dissected bench at the base of the Vermilion Cliffs.

QUAD: Lees Ferry 15'; Marble Canyon NTMS

RAD: 40X

ANAL: 0.004 -0.36% e U_3O_8

GEOL: Mineralized argillaceous sandstone in Petrified Forest member bounded above and below by red-purple clay beds. Red-yellow jasper displays needles of uranophane.

REF: PRR-RR-277 (#164)

SUN VALLEY MINE (Jay Bird Claims)

LOC: SW¼ Sec. 6, T38N, R6E
Vermillion Cliffs

QUAD: Emmet Wash 15'; Marble Canyon NTMS

DEVL: 400 ft. of underground workings

PROD: 286 tons @ 0.285% U_3O_8; 1955-56

RAD: 20X

GEOL: Uraninite associated with carbon matter and pyrite, sphalerite, galena. Secondary minerals include zippeite, betazippeite and uranyl phosphate. Molybdenum content is as high as 10%, as ilsemanite and unusually high rhenium @ 0.07 - 1.5%. Mineralization in a Shinarump scour channel in Moenkopi. The chert-quartz pebble conglomerate is in a U-shaped bend, 1,000 ft. long by 400 ft. wide and contains 130 ft. of Shinarump. Best ore in basal 4 feet of channel.

REF: PRR-RR-253 (#158a)
Petersen, R. and others (1959)
Petersen, R. (1960)
U.S.G.S. (1957, TEI-690)
Petersen, R. (1959, TEI-435)
Tagg (1957)
USAEC TM-212

TAYLOR REID #2

LOC: SE¼ Sec. 36, T28N, R9E

QUAD: Cameron 15'; Flagstaff NTMS

DEVL: Shallow cuts

PROD: 91 tons @ 0.32% U_3O_8, 1954

GEOL: Secondary minerals in sandstone of the basal Petrified Forest member.

REF: D.O.E.

UPGRADER PROPERTY (Section 9)

VERMILION #1 MINE

LOC: NE¼ Sec. 20, T38N, R5E
On Emmett Hill South of U.S. 89

QUAD: Emmett Wash 15'; Marble Canyon NTMS

DEVL: Open pit, 12,000 ft. of drilling

PROD: Few tons of low grade ore

GEOL: Metatorbernite in Shinarump conglomerate channel and in siltstones of the Moenkopi. Channel scour is about 300 X 50 X 20 ft. deep. Two parallel channels are present in area. Largest one trends N 25° E through center of Section 17.

REF: Petersen, R. (1957, TEI-690)
Tagg (1957)
USAEC TM-212

WARD TERRACE (Hosteen Nez Mining Company Tract)

LOC: Approx. Sec. 5, T27N, R12E

QUAD: Badger Spring 7½'; Flagstaff NTMS

DEVL: Rim stripping

PROD: 61 tons @ 0.10% U_3O_8; 0.10% V_2O_5, 1950, 1952, 1956

RAD: 6X

ANAL: 0.42% e U_3O_8; 0.44% U_3O_8

GEOL: Black carbonaceous conglomerate and sandy shales in Kayenta Fm. Manganese oxides (psilomelane) and carbonized wood with secondary uranium minerals.

REF: PRR (#89); PRR-UP-76
Ellsworth, P. (1952, TM-7)

WHITE MESA COPPER CLAIM (Arizona Claim)

LOC: Approx. S. center Sec. 5, T37N, R9E

QUAD: Marble Canyon NTMS

DEVL: Old copper mine

GEOL: Torbernite associated with oxidized copper minerals in white to gray, cross-bedded (Navajo) sandstone.

REF: PRR-RG-35-51 (#144)
Emmons, S. (1905) Hill, J. (1914)

WILLAHA GROUP (Copper #1)

YAZZIE #1

LOC: Approx. NE¼ Sec. 15, T27N, R10E
Cameron

QUAD: Wupatki NE 7½'; Flagstaff NTMS

DEVL: 100 X 150 X 30 ft. deep open pit

PROD: 343 tons @ 0.19% U_3O_8; 0.07% V_2O_5, 1956-57

GEOL: Uraninite and secondary uranium minerals in Petrified Forest member. Ilsemannite identified. Ore zone 3.5 ft. thick and at a depth of about 20 ft.

REF: U.S.A.E.C. (1959, RME-141)
Austin, S. (1964, RME-99)

YAZZIE #2

LOC: Approx. NW ¼ Sec. 14, T27N, R10E
Cameron

QUAD: Wupatki NE 7½; Flagstaff NTMS

DEVL: 2 adits in bottom of 170 X 130 X 50 ft. deep pit

PROD: 5,646 tons @ 0.20% U_3O_8; 0.01% V_2O_5, 1957-61

GEOL: Uraninite in Petrified Forest member. Ore zone 4 ft. thick and at a depth of 45 ft.

YAZZIE #101

LOC: Approx. SW¼ Sec. 19, T29N, R10E

QUAD: Cameron 15'; Flagstaff NTMS

DEVL: Open pit

PROD: 4,955 tons @ 0.22% U_3O_8; 0.02% V_2O_5, 1956-58, 1960-61

GEOL: Lens-like mineralized NW trending scour channel in lower Petrified Forest member. Fossil logs, carbon matter, limonite, gypsum and kaolin associated with uranium minerals. Crystalline sulfur in vugs in logs. Halotrichite, jarosite and metasideronatrite identified.

REF: U.S.A.E.C. (1959, RME-141)
Bollin, E. and Kerr, P. (1958)
Austin, S. (1964, RME-99)

YAZZIE #102

LOC: E. central edge Sec. 19, T28N, R10E

QUAD: Cameron 15'; Flagstaff NTMS

DEVL: 190 X 70 X 50 ft. deep pit

PROD: 1,610 tons @ 0.30% U_3O_8; 0.08% V_2O_5, 1956-57, 1960-61

GEOL: Uraninite associated with carbonaceous logs at an average depth of 42 ft. and with average thickness of 2 ft. Coffinite, metazippeite boltwoodite and marcasite identified.

REF: U.S.A.E.C. (1959, RME-141)
Bollin, E. and Kerr, P. (1958)
Austin, S. (1964, RME-99)

YAZZIE #105

LOC: W. central Sec. 29, T28N, R10E

QUAD: Cameron 15'; Flagstaff NTMS

DEVL: Extension of Charles Huskon #10

PROD: Reported with Charles Huskon #10

GEOL: Uraninite in sandstone lens in basal Petrified Forest member.

REF: U.S.A.E.C. (1959, RME-141)

YAZZIE #312 (Foley #5)

LOC: Approx. NW¼ Sec. 30, T29N, R10E

QUAD: Cameron 15'; Flagstaff NTMS

DEVL: 40 ft. deep open pit filled with water

PROD: 7,376 tons @ 0.23% U_3O_8, 1956-61

GEOL: Autunite, uraninite associated with gypsum, chalcedony, jarosite, limonite, calcite and some sulfides in NNW trending paleochannel in lower Petrified Forest member. Schroeckingerite fills fractures in logs undergoing oxidation.

REF: U.S.A.E.C. (1959, RME-141)
Bollin, E. and Kerr, P. (1958)
Austin, S. (1964, RME-99)

YELLOW JEEP

LOC: Approx. Sec. 25, T29N, R11E

QUAD: The landmark 7½'; Flagstaff NTMS

DEVL: Rim stripping and several short adits

PROD: 121 tons @ 0.17% U_3O_8; 0.56% V_2O_5, 1957

ANAL: 0.037% e U_3O_8; 0.035% U_3O_8

GEOL: Uraninite, tyuyamunite and possibly becquerelite associated with carbonized wood and manganese oxides in lenticular bodies up to 70 ft. long and 12 ft. thick. Mineralization also replaces clay pebbles, coats fractures and bedding surfaces in a shaly sandstone of lower Kayenta Fm.

REF: Granger, H. (1951, TEM-304)
Granger, H. and Raup, R. (1962)

Index for Gila County Uranium Occurrences

(Excluding Gila County District Map Occurrences)

Name

H 15 Able Group
M 49 Andy Gump
H 18 Anomaly B6-12
M 37 Anomaly B6-13
M 11 Anomaly B6-14
M 16 Anomaly B6-15
M 61 Anomaly B6-16
M 62 Anomaly B6-17
M 53 Anomaly B6-18
M 64 Ash Creek #1
M 68 Bee Cave
M 79 Black Hawk Shaft
M 71 Black Insurance Claims
M 36 Blevins Canyon Claims
M 84 Boyle
M 82 Bronx Copper
M 47 Brushy Basin Trap
M 70 Carrol Ann
M 75 Castle Dome Copper Mine
M 42 Cataract
M 99 Christmas Copper Mine
M 32 Conway
M 77 Copper Cities Copper Mine
M 97 Dale
M 95 Desert Queen
M 72 Dutch Boy
M 45 Easy
M 34 Fairview
H 1 Fossil Creek
H 8A Frog and Iron
M 78 4 Bagger
M 29 Giger
M 39 Grand Chance
M 69 Grantham and Motley
M 38 Great Gain
M 83 Greystone, Doctor, Frisco
M 93 Grubstake, Iron Hills and Oversight
M 65 Hammes
M 73 Hardrock
M 74 Highway and Highgrade
M 59 Hillside
H 21 Home Mine
H 9 Hot Cinders
H 4 Hot Tomale
H 19 Ichi Ban
M 94 Interstate
M 44 Izzy
H 6 Jack Pot
M 63 Junction
M 30 Juniper Hill
M 86 King
M 98 Kullman-McCool Mines
M 79A Land V
H 2 Little Iodine
H 7 Lonesome John
M 31 Love
M 51 Lucky
M 90 Lucky Boy
M 96 Lucky King
M 67 Lucky Star
M 66 Lucky Strike
M 88 Lulu Belle
M 85 Madera
M 50 Major Hoople
M 26 May #1-6
M 41 May Claims
M 76 Miami Copper Company
M 43 Midget and Blue Bonnet
M 52 Moonshine Gulch
M 48 Navajo
M 13 North Star
M 58 Peacock
M 14 Pranty, Surprise and Sentinal
H 3 Promontory Butte
H 22 Q Ranch
M 91 Ramon
M 57 Regal Asbestos Mine
M 17 Rick

Gila County Uranium Occurrences (Continued)

M 46	Rick Tick and Lady Ester
M 54	Rock Canyon
H 8	Roxy
M 40	S.T. Claims
M 35	Sally May
M 12	Sentinal
M 23	Shepp #2
M 60	Snakebit
M 27	Stago and Bubbling Springs
M 89	Star
M 56	Tomato Juice
H 10	Trek
M 92	Unnamed A
M 55	Unnamed B
M 87	Unnamed C
H 5	Unnamed D
M 25	Unnamed E
M 28	Unnamed G
M 33	Uranium
H 20	Walnut Creek
M 80	Yotambrien, Hamilton, Pinto, Carlotta
M 24	York

M = Mesa
H = Holbrook

GILA COUNTY

ABLE GROUP #1-15

LOC: Approx. SE½ Sec. 25, T8N, R12E or 34° 00'20"N, 111° 04'15" W, Just SE from Buzzard Roost Camp in unnamed tributary To Rock Creek

QUAD: Diamond Butte 15'; Buzzards Roost Mesa 7½'; Holbrook NTMS.

DEVL: 60 X 30 ft. dozer cut and 50 ft. adit.

PROD: 5 tons @ 0.25% U_3O_8 stockpiled in 1957.

RAD: 22X

ANAL: 0.35% e U_3O_8

GEOL: Secondary uranium mineralization noted on floor of canyon in Dripping Spring Quartzite. No diabase closeby.

REF: PRR-AP-351
Schwartz, R. (1957, RME-2071)

ALTA VISTA GROUP

LOC: Approx. Sec. 4,5,8,9, T4N, R14E

QUAD: Rockinstraw Mtn. 15'; Mesa NTMS

DEVL: Dozer trenches and benches

RAD: 20X

ANAL: 0.056% eU_3O_8

GEOL: Radioactivity with limonite - stained N20°E trending fractures with shows of copper carbonates. Faulting to the east.

REF: PRR-AP-250
Granger, H. and Raup, R. (1969 b)

AMERICAN ASBESTOS CEMENT COMPANY CLAIMS

Includes the following claims:
- Buckhorn Mine (Buckhorn #6)
- Cherry Creek Claims
- Home Mine (Wilson #13 claim)*
- No. 1 Mine (Wilson #15 claim)
- No. 2 Mine (Vosberg #18 claim)
- No. 4 Mine (Wolf Spring #2 claim)
- No. 7 Mine (Wolf Spring #8 claim)
- Shepp #1 (Wilson Creek)*
- Smith
- Tony Mine (Wilson #4 claim)
- Walnut Creek (Vosberg claims)*
- Wilson Creek claims
- Wolf Springs Mine (Wolf Springs #4 claim)
- York #1-4 (Stockman Group)*

*Occurrence listed separately.

ANCIENT CLAIMS

LOC: Sec. 23,24, TGN, R14E

QUAD: McFadden Peak 15'; Mesa NTMS

DEVL: 28 ft. drift and pit

RAD: 20X

ANAL: 0.11% e U_3O_8; 2.25% Cu

GEOL: Radioactive zone 6 inches above thin quartz - fluorite veins with chalcopyrite in black slates of the upper siltstone member, Mescal Limestone.

REF: PRR-A-93
U.S.A.E.C. (1970, RME-156), Granger and Raup (1969a) p. 103

ANDY GUMP PROSPECT

LOC: Approx. center N½ Sec. 34, T7N, R14E or 33°54' 40'N; 110°54' 10" W.E. side of Cherry Creek Canyon 0.7 mi. S. of China Spring Creek

QUAD: McFadden Peak 15'; Mesa NTMS

DEVL: 42 ft. adit; 17 ft. crosscut

RAD: 30X

ANAL: 0.13-0.72% U_3O_8

GEOL: Metatorbernite with sparse disseminated pyrite and efflorescent white sulfate in fine-grained black facies of Dripping Spring Quartzite. A E-W trending, 25 ft. wide diabase dike is 200 ft. south of adit. Ore zone is 3 ft. wide along a fracture trending N20°E.

REF: PRR-AP-239
Swartz, R. (1957, RME-2071)
Granger, H. and Raup, R. (1969b)

ANOMALY B6-1

LOC: SW¼ of NE¼ sec 14, T5N, R13E. in west side of canyon draining Mystery Spring

QUAD: McFadden Peak 15'°, Mesa NTMS

RAD: 2X; discovered with airborne radiometric

GEOL: Upper member, Dripping Spring Quartzite, with some weak iron oxide staining.

REF: PRR-EDR-1277

ANOMALY B6-2 (Refer to Anomalies B6-3 and B6-4)

LOC: NW¼ Sec. 19, T5N, R15E

QUAD: McFadden Peak 15'; Mesa NTMS

RAD: 60X-discovered by airborne radiometric

ANAL: 0.05-0.33% e U_3O_8; 0.04-0.08% U_3O_8

GEOL: Upper member, Dripping Spring Quartzite. Limonite staining and pyrite noted.

REF: PRR-EDR-1278

ANOMALY B6-3 (Refer to Anomalies B6-2, B6-4)

LOC: North central part sec 19, T5N, R15E

QUAD: McFadden Peak 15'; Mesa NTMS

RAD: 20X - discovered by airborne radiometric

GEOL: Upper member, Dripping Spring Quartzite. Some iron oxide staining.

REF: PRR-EDR-1279

ANOMALY B6-4 (Refer to Anomalies B-62, B6-3, and Donna Lee)

LOC: East central part sec 13, T4N, R14E

QUAD: McFadden Peak 15'; Mesa NTMS

RAD: 2X - discovered by airborne radiometric

ANAL: 0.17% e U_3O_8

GEOL: Upper member, Dripping Spring Quartzite, some iron oxide staining

REF: PRR-EDR-1280

ANOMALY B6-5

LOC: SW¼, SE¼, SE¼ sec 4, T6N, R14E - near Black Brush claims. Vertical cliffs, west side Cherry Creek

QUAD: McFadden Peak 15'; Mesa NTMS

RAD: 150X - discovered by airborne radiometric
0.38% e U_3O_8; 0.35% U_3O_8

GEOL: Radioactivity in vertical fractures trending N20°E and along bedding planes in black to dark red quartzite of Dripping Spring Quartzite.

REF: PRR-EDR-1281

ANOMALY B6-6

LOC: NW¼, SE¼, SW¼ sec 12, T6N, R14E
near cliff rim, NW side Horse Camp Creek

QUAD: McFadden Peak 15'; Mesa NTMS

RAD: 10X - discovered by airborne radiometric

GEOL: Upper member, Dripping Spring Quartzite, with some iron oxide staining and calcite vein fillings.

REF: PRR-EDR-1282

ANOMALIES B6-7, 8,9,10,11

LOC: NW¼ and SE¼ of NW¼ sec 19, T6N, R14E - at Little Joe Mine, Workman Creek

QUAD: McFadden Peak 15'; Mesa NTMS

RAD: 50X - discovered by airborne radiometric

GEOL: Upper member, Dripping Spring Quartzite. Weak iron oxide staining. Six radiometric anomalies in a favorable zone of the Quartzite average 5-10X over considerable distance.

REF: PRR-EDR-1283-1287

ANOMALY B6-12

LOC: S½ sec 14, T8N, R14E

QUAD: Young 15', Holbrook NTMS

RAD: 7X

ANAL: 0.01% U_3O_8

GEOL: Upper member, Dripping Spring Quartzite. No visible uranium minerals.

REF: PRR-EDR-1303

ANOMALY B6-13

LOC: NE¼ sec 1, T6N, R12E - at Blevins Canyon claims

QUAD: Copper Mtn 7½'; Mesa NTMS

RAD: 3X

ANAL: 0.01% U_3O_8

GEOL: Highest counts obtained along vertical fractures trending N35°W and along adjacent bedding planes in the flat-lying quartzites of Dripping Spring Quartzite.

REF: PRR-EDR-1304

ANOMALY B6-14

LOC: E½ sec. 35, T8N, R11E
Near head of Del Shay Creek -1.6 miles WNW of North Star Claims

QUAD: Picture Mtn. 7½'; Mesa NTMS

RAD: 2X

GEOL: Radioactivity in flat lying beds of upper Dripping Spring Quartzite with some limonite staining.

REF: PRR-EDR-1305 (#337)

ANOMALY B6-15

LOC: 33°59'S5"N; 111°2'45"W
Near Ferky Butte Tank - 0.5 mi. S. of Able Group

QUAD: Copper Mtn. 7½'; Mesa NTMS

RAD: 3X - discovered by airborne radiometric

GEOL: Radioactivity along random fracture planes in upper member, Dripping Spring Quartzite. Some limonite staining present.

REF: PRR-EDR-1306

ANOMALY B6-16 (Refer to Anomaly B6-17)

LOC: Approx. sec. 23, T5N, R17E, 33°46' 08"N, 110° 30' 50" W; 0.2-0.3 miles west of Hwy. 77-60, 0.4 miles

QUAD: Blue House Mtn. 15'; N of turnoff to Regal Asbestos Mine, Mesa NTMS

DEVL: Test pit

RAD: 2X

ANAL: 0.01%, U_3O_8

GEOL: Silty arenaceous horizon at top of Mescal Limestone. Other Apache Group sediments and Redwall Limestone present nearby.

REF: PRR-EDR-1307

ANOMALY B6-17 (Refer to B6-16)

LOC: Approx. Sec. 23, T5N, R17E, 33°46' 00"N, 110° 30' 40" W

QUAD: Blue House Mtn. 15'; Mesa NTMS

RAD: 4X

ANAL: 0.01%, U_3O_8

GEOL: Silty sandy phase of upper portion of Mescal Limestone, overlain by Troy Quartzite and Redwall Limestone.

REF: PRR-EDR-1308

ANOMALY B6-18

LOC: Sec. 21, T6N, R15E, (protracted) 33°51'00" N, 110° 44' 50" W., along Mustang Ridge, 1.3 miles WNW of VABM 6171.

QUAD: Blue House Mtn. 15'; Mesa NTMS

RAD: 15X - discovered by airborne radiometric

ANAL: 0.03% U_3O_8

GEOL: Red silty layer in upper member, Dripping Spring Quartzite where it overlies Precambrian Granite.

REF: PRR-EDR-1309

ASH CREEK #1

LOC: Probably in east flowing tributaries to Ash Creek, west of Chrysotile Mine.

QUAD: Chrysotile 7½; Mesa NTMS

RAD: 3X

GEOL: Radioactivity along vertical fracture planes in the upper, thin-bedded siltstone member of the Dripping Spring Quartzite.

REF: PRR-AP-190

BEAR TRACK (BIG BUCK GROUP)

BEE CAVE #1-10

LOC: Approx. W½ sec. 18, T3N, R17E; 33°36' N; 110° 37' 05" W. South flank of Rock Springs Butte

QUAD: Sevenmile Mtns, 7½'; Mesa NTMS

DEVL: 500 ft. of rim stripping

PROD: 5 tons @ 0.04% U_3O_8; 0.02% V_2O_5, 1955

RAD: 15X

ANAL: 0.10% e U_3O_8

GEOL: Mineralization along fractures in rhyolite intrusive which cuts Precambrian Granite, also intruded by diabase and overlain by basal Apache Group.

REF: PRR-AP-395 (#317)

BIG BUCK GROUP (Bear Track, Cyprus, Snow White)

LOC: Near center S½ sec. 25, T6N, R14E, west side of Cherry Creek ½ mi. S of Cold Spring Canyon

QUAD: McFadden Peak 15'; Mesa NTMS

DEVL: 40 ft. rim stripping and 145 ft. adit trends 520°W

PROD: 279 tons @ 0.17%, U_3O_8, 1956-57

RAD: 100X

ANAL: 0.40%, U_3O_8

GEOL: Uranium along NNE trending limonite filled fractures in fine-grained black facies within silty member of Dripping Spring Quartzite. Ore zone is about 3 ft. wide. Saleeite and Bassetite noted in ore zone along with thin calcite and discontinuous purple fluorite veinlets. Mineralized fractures trend N70" W and N20°E. Deposit very near a major flexure of the Cherry Creek Monocline.

REF: PRR-A-61
Granger, H. and Raup, R. (1969a & b)
Schwartz, R. (1957, RME-2071)

BIG SIX GROUP (Citation #1-5)

LOC: West of center, sec. 4, T6N, R14E - 33°53'28" N; 110°55' 23" W. Near Sorrel Horse and Black Brush - West wall of Cherry Creek Canyon.

QUAD: McFadden Peak 15'; Mesa NTMS

DEVL: 3 adits and drill holes

RAD: 50X

ANAL: 0.16- 2.36% U_3O_8

GEOL: Spotty uranium mineralization with limonite in gray facies of Dripping Spring Quartzite, about 10-35 ft. above diabase. Highest radioactivity associated with N70°W trending fractures. One mile east of Cherry Creek Monocline.

REF: Granger, H. and Raup, R. (1969b, p.10)

BLACK BESS CLAIMS (Yo Tambien)

BLACK BRUSH GROUP

LOC: SE¼ SE¼ sec. 4, T6N, R14E or 33°53'08"N; 110° 54' 53" W, near Sorrel Horse and Big Six

QUAD: McFadden Peak 15'; Mesa NTMS

DEVL: 64 ft. drift, 15 ft. crosscut; benching; 60 ft. drift

PROD: 19 Tons @ 0.09% U_3O_8; 1955-56

ANAL: 1.5% U_3O_8

GEOL: Uraninite associated with minor pyrrhotite, chalcopyrite, marcasite, galena, pyrite and torbernite near surface. Mineralization localized at the intersection of fractures in black facies of Dripping Spring Quartzite. Diabase is 80 ft. below. Ore body averages 1.5 ft. thick and trends NNE along fractures.

REF: PRR-AP-310
Granger, H. and Raup, R. (1969 a & b)
Schwartz, R. (1957, RME-2071)
Sharp, B. (1956, RME -2036)

BLACK DIAMOND GROUP

LOC: South central NE¼ sec. 32, T5N, R14E
0.5 miles NNE of Rainbow Claims

QUAD: Rockinstraw Mtn. 15'; Mesa NTMS

DEVL: Considerable workings and 10 ft. drift along N80° W fracture

PROD: Asbestos prospect

RAD: 50X

GEOL: Autunite, metatorbernite bassetite with minor pyrite and abundant limonite and white fluorescent sulfate in the upper black facies of Dripping Spring Quartzite. Vertical fractures trend WNW.

REF: PRR-AP-337
Granger, H. and Raup, R (1969b)

BLACK HAWK SHAFT (Iron Cap Mine, Williams Shaft)

LOC: Near center SW¼ sec. 15, T IN, R15½E, 33°25' 05"N, 110°46' 05"W

QUAD: Globe 7½'; Mesa NTMS

DEVL: 700 ft. inclined shaft; drifts at 100 and 700 ft. level

PROD: Copper, gold, silver, 1912-1927

RAD: 26X

ANAL: 4% e U_3O_8; 3.67% U_3O_8
0.15-6.2% U_3O_8 - waste dump of the Williams Shaft.

GEOL: Vein along contact of Mescal Limestone and diabase intrusion contains cuprite, malachite and uranium minerals. Strike is ENE and dip 65°NW.

REF: PRR-AP-146
Schwartz, R (1957, RME-2071); Peterson, N. (1962)

BLACK INSURANCE CLAIMS

LOC: 33°31' 10"N, 110° 53'W
Along Hicks Wash, on both sides of Hwy. 88, 0.6 miles W. of BM 3075

QUAD: Rockinstraw Mtn. 15'; Mesa NTMS

RAD: 6X

ANAL: 0.12% e U_3O_8

GEOL: Vein in granite rocks

REF: PRR-AP-220

BLEVINS CANYON CLAIMS

LOC: Approx. NE¼ sec. 1, T6N, R12E or 33°53' 40"N; 111°4' 20" W

QUAD: Copper Mtn. 7½; Mesa NTMS

DEVL: 110 ft. adit; 40 ft. drift; several drill holes

RAD: 100X

ANAL: 0.03 -0.35% e U_3O_8

GEOL: Metatorbernite with abundant copper and limonite staining in fine-grained arkosic sandstone of upper member in paleo channel cut into middle member of Dripping Spring Quartzite. NW trending Copper bearing veins are nearby.

REF: PRR-AP-257
Granger, H. and Raup, R. (1969b)
Schwartz, R. (1957, RME -2071)

BLUE BONNET #1-4 (Midget #1-7)

BLUE EAGLE CLAIMS

LOC: NE¼ sec. 10, T6N, R14E
West side of Cherry Creek

QUAD: McFadden Peak 15'; Mesa NTMS

DEVL: 33 ft. drift and bench

RAD: 36X

ANAL: 0.92% e U_3O_8

GEOL: Radioactivity in a 1 ft. thick zone in the upper part of the lower Dripping Spring Quartzite. Sulphur noted.

REF: PRR-A-105

BLUE ROCK GROUPS (Cherry Creek #4; Rockslide Group)

LOC: NW¼ NE¼ sec. 36, T6N, R14E
East face Cherry Creek Canyon

QUAD: McFadden Peak 15'; Mesa NTMS

DEVL: Several benches, open cuts through slope rubble, crudely aligned in NNE direction.

RAD: 100X

GEOL: At Blue Rock #2, radioactivity surrounding N20°E trending limonite-filled fracture; at Cherry Creek #4, radioactivity in N70°W trending vertical fractures. Some metatorbernite, bassetite, gypsum, and white flurescent sulfate noted. All pits in black facies, 25-70 ft. above barren quartzite. Cherry Creek Monocline about 0.5 mile east of property. Alignment of pits is N 10°E.

REF: PRR-A-106
Granger, H. and Raup, R. (1969b)

BOBCAT (Brushy Basin Trap)

BOYLE GROUP 1 & 2

LOC: South edge sec. 9, T 15, R 14E (or possibly central sec. 10, SW of Miami by 24 miles.

QUAD: Pinal Ranch, 7½'; Mesa NTMS

RAD: 40X

GEOL: Pegmatitic biotite granite with quartz veins and joints. Concentrations of smarskite crystals reported.

REF: PRR-AP-113

BRONX COPPER CLAIMS

LOC: SW¼ sec. b, T15, R 14E

QUAD: Pinal Ranch 7½'; Mesa NTMS

DEVL: 6 shafts, 4 adits, several scattered prospect pits

PROD: Copper

RAD: 16X

ANAL: 0.05% e U_3O_8; 0.08% U_3O_8

GEOL: Quartz veins in biotite, granite porphyry (Schultze Granite). Copper oxides and sulfides in veins, radioactivity is disseminated. Veins strike NE, dip 65° SE.

REF: PRR-AP-156 and 176

BRUSH CLAIMS (Promontory Butte)

BRUSHY BASIN TRAP (Bobcat; also refer to Navajo)

LOC: Approx. NW¼ sec. 27, T7N, R14E or 33°55'36"N; 110°54'20"W

QUAD: McFadden Peak 15'; Mesa NTMS

DEVL: 145 ft. (N10°E) adit; 60 ft. (S30°W) adit, 4 drill holes

RAD: 25 X

ANAL: 0.17% e U_3O_8

GEOL: Disseminated metatorbernite, pyrite, limonite, sulfates with minor bassetite, saleeite and nontronite in upper black facies of Dripping Spring Quartzite.

REF: PRR-AP-366
Granger, H. and Raup R. (1969b, p.22)

BUBBLING SPRINGS (Stago)

BUCKAROO AND MARY ANN CLAIMS

LOC: Secs. 14 and 23, T5N, R13E
on flat mesa top surrounded on 3 sides by canyon walls

QUAD: McFadden Peak 15; Mesa NTMS

DEVL: Prospect pit

RAD: 50X in one spot with disseminated pyrite

GEOL: Upper member, Dripping Spring Quartzite exposed on Mesa Top which is surrounded on 3 sides by Vertical walls. Some scattered disseminated pyrite noted.

REF: PRR-AP-200

BUCKAROO FLATS (Cataract Claims)

BULL CANYON (Sue Claims)

CARLOTTA CLAIMS (Yo Tambien)

CARROL ANN CLAIMS

LOC: Approx. NE¼ sec. 14, T2N, R14E,
south of Lake Roosevelt, 1 mile west of Black Insurance Claims, 2.2 miles SSE of Salt River Peak

QUAD: Rockinstraw 15'; Mesa NTMS

DEVL: Prospect pits

ANAL: 0.30% e U_3O_8

GEOL: Thin, iron-rich, uranium bearing rhyolitic dikes are present in Precambrian Granite or near the Granite-Pioneer Shale contact.

REF: Schwartz, R. (1957, RME-2071, p. 15)
Waechter, N. (1979)

CASTLE DOME COPPER MINE (Red Hill)

LOC: 33° 24' N, 110°57' 30" W,

QUAD: Inspiration 7½'; Mesa NTMS

DEVL: Castle Dome open pit copper mine

RAD: 8X

ANAL: 0.17% e U_3O_8; 0.22% U_3O_8

GEOL: Quartz Monzonite parphyry intruded by diabase sills and dikes. N-S trending fault contains radioactivity minerals. Copper-iron sulfide and oxide minerals are mined. Metatorbernite noted.

REF: PRR-AP-135
Peterson, N. and others (1951)
Ransome (1903)
Weathers (1953)

CATARACT (Buckaroo Flats; Mike #1-4)

LOC: Approx. SE¼ SW¼ sec. 19, TFN, R13E
North slope of Cataract Canyon on southward projecting nose of Middle Mtn.

QUAD: Copper Mtn. 7½'; Mesa NTMS

DEVL: 100 ft. drift and some drilling

RAD: 35X

ANAL: 0.21% e'U_3O_8

GEOL: Metatorbernite, autunite, pyrite, limonite, malachite, chrysocolla and chalcopyrite weakly disseminated and along fractures in Dripping Spring Quartzite. Apparently in lower part of upper member in shallow channel cut in middle member.

REF: PRR-AP-353
Granger, H. and Raup, R. (1969b, p. 24)

CHARLES JR. #1-2 (Suckerite)

CHERRY CREEK #4 (Blue Rock)

CHRISTMAS COPPER MINE

LOC: 33°03' 30"N; 110°44' 30" W

QUAD: Christmas 7½'; Mesa NTMS

DEVL: Large open-pit and extensive underground

PROD: Base metals

RAD: 5X

GEOL: Mineralized Laramide intrusive into Paleozoic Limestones

REF: PRR-AP-198

CITATION #1-5 (Big Six Group)

CONWAY #1-17

LOC: Approx. South Central sec. 27, T7N, R12E, or 33° 55'05" N; 111°06' 47"W SW, slope of Copper Mtn. between Malicious gap and Mud Spring Canyon

QUAD: Copper Mtn. 7½'; Mesa NTMS

RAD: 26X

ANAL: 0.66% e U_3O_8

GEOL: Autunite, metatorbernite and disseminated sulfides in upper member of Dripping Spring Quartzite, cut by copper-bearing quartz vein.

REF: PRR-A-92

COON CREEK GROUP

LOC: 33°41' 30" to 42' 30"N, 110° 52' to 53' W

QUAD: Rockinstraw Mtn. 15; Mesa NTMS

DEVL: Discovery pits

RAD: 30X

ANAL: 0.01% e U_3O_8

GEOL: Dripping Spring Quartzite exposed in canyon walls SE side of Hackberry Mtn, with mountain capped by Mescal Ls.

REF: PRR-AP-241 and 271

COPPER CITIES COPPER MINE

LOC: Sec. 6, TIN, R15E

QUAD: Globe 7½', + Inspiration 7½'; Mesa NTMS

DEVL: Open pit copper mine

PROD: Major producer of copper

RAD: 8X

ANAL: 0.06% U_3O_8

GEOL: N-S trending shears contain metatorbernite and turquoise. And disseminated radioactivity in quartz monzonite of Laramide age in certain parts of pluton.

REF: PRR-AP-136 and 155
Still, A. (1962)

CRYING JEW (Horsehoe)

CYPRUS (Big Buck Group)

DALE 1-5

LOC: Approx. S½ sec. 10, T45, R15E
Northslope of Tam O'Shanton Pk.

QUAD: Hayden 7½'; Mesa NTMS

RAD: 100X

ANAL: 0.05% e U_3O_8

GEOL: Radioactive zone 4 inches thick can be traced for 0.3 mi. around nose of ridge and occurs in upper Dripping Spring Quartzite. Quartzite is in intricately faulted terrain. Diabase is 2000 ft. to the north.

REF: PRR-A-74
Banks, N. and Kreiger, M. (1977)

DEEP CREEK GROUP (Lamanite Deposit)

DEFINITELY (Suckerite)

DESERT QUEEN (Refer to Interstate Group)

LOC: Central part sec. 2, T35, R15E

QUAD: El Capitan 7½'; Mesa NTMS

DEVL: Drilling, shallow pits

ANAL: 0.29% U_3O_8

GEOL: Metatorbernite along fracture in Dripping Spring Quartzite

REF: D.O.E.

DEVILS CHASM (Devils Charm)

LOC: South central sec. 36, T6N, R14E

QUAD: McFadden Peak 15'; Mesa NTMS

GEOL: Refer to Blue Rock Group

REF: Schwartz, R. (1957, RME-2071, Fig. 4)

DON GROUP (Jon Deposit)

DONNA LEE

LOC: E½ SE¼ sec. 13, T5N, R14E
West wall of Deep Canyon near Juniper Claims

QUAD: McFadden Peak 15'; Mesa NTMS

DEVL: 3 adits and crossant

PROD: 12 tons @0.16% U_3O_8, 1959

RAD: 140X

ANAL: 0.29% e U_3O_8

GEOL: Uraninite or pitchblende in strongly weathered and oxidized black facies of the Dripping Spring Quartzite. Metatorbernite, pyrite, secondary copper minerals noted. Major fault to the west and diabase sills below.

REF: PRR-AP-262;
Granger, H. and Raup, R. (1969b, p. 27)
Schwartz, R. (1957, RME -2071)

DUTCH BOY CLAIMS

LOC: Approx. sec. 31, T3N, R16E or 33°33'N, 110° 43' 30" W, up Corral Creek 3/4 mile from old highway.

QUAD: Chrome Butte, Az. 7½'; Mesa NTMS

DEVL: Location pit

RAD: 20X

ANAL: 0.30% e U_3O_8

GEOL: Precambrian coarse grained granite intruded by thin sheets of fine-grained granophyre which carries specularite and some invisible uranium mineralization. Pioneer shale contact is 50 ft. above workings.

REF: PRR-AP-329
Waechter, N. (1979)
Schwartz & Mase (1955)

EASTER GROUP (Refer to Coon Creek Claims)

LOC: In Coon and Cougar Canyons, 2-4 miles NW of Cherry Creek Access Road, 4-6 miles east from Red Bluff deposit. Exact location not known.

QUAD: Rockinstraw Mtn. 15'; Mesa NTMS, Gila Co. detailed occurrence map.

DEVL: Discovery pit

RAD: 20X
0.1% e U_3O_8

GEOL: Upper member Dripping Spring Quartzite, 200 ft. below contact with Mescal Limestone. Highest readings from a zone 1 ft. thick.

REF: PRR-AP-223

EASY CLAIMS

LOC: Approx. SE¼ sec. 35, + 7N, R13E
SW slope of McFadden Peak, 1¼ mi. WSW of lookout Tower

QUAD: McFadden Peak 15'; Mesa NTMS

DEVL: 70 ft. opencut and drilling

RAD: 12X

ANAL: 0.02 - 0.42% e U_3O_8

GEOL: Metatorbernite, uraniferous opal, saleeite, bassetite, metazeunerite, covellite and limonite coating fractures and bedding planes in gray to pink siltstones of Dripping Spring Quartzite. Finely disseminated pyrite and chalcopyrite distributed also through 3 ft. interval of upper-part of middle member.

REF: PRR-A-6
Granger, H. and Raup, R. (1957, RME-2071)

ESCONDIDO CLAIMS

LOC: Center N½, sec. 9, T6N, R14E, on steep slopes of eastern scarp of McFadden Horse Mtn.

QUAD: McFadden Peak 15, Mesa NTMS

DEVL: Prospect pits

GEOL: See geology of nearby Sorrel Horse and Black Brush claims

REF: Schwartz, R. (1957, RME-2071, Fig. 4)

FAIRVIEW CLAIMS

LOC: Approx. South Central Sec. 12, T6N, R12E or 33° 52' 19", 111° 4' 42" W

QUAD: Armer Mtn. 7½'; Mesa NTMS

DEVL: Drilling; pit

RAD: 150X

ANAL: 0.56% e U_3O_8

GEOL: Autunite, metatorbernite, bassetite, uraniferous hyalite and uranophane in 1 ft. zone of upper Dripping Spring Quartzite. Strong fracturing, Diabase above and to NE

REF: PRR-AP-336
Granger, H. and Raup, R. (1969b, p. 32)
Schwartz, R. (1957, RME -2071)
Granger, H. and Raup, R. (1959)

FIRST CHANCE DEPOSITS

LOC: NE¼ SE¼ Sec. 1, TSN, R13E
Sierra Ancha 0.4 mi. north of Parker Canyon Experimental Station

QUAD: McFadden Peak 15'; Mesa NTMS

DEVL: 3 adits (NNE trending)

PROD: 35.53 tons @ 0.08% U_3O_8, 1957

RAD: 50X

ANAL: 0.20% e U_3O_8; 0.21% U_3O_8

GEO: Metatorbernite, bassetite, uraniferous hyalite, malachite, azurite on fractures with limonite, chalcanthite, and sulfate. Chalcocite pyrite and chalcopyrite disseminated. NNE trending fractures are in black facies of Dripping Spring Quartzite.

REF: Granger, H. & Raup, R. (1969a & b)
PRR-AP-207
Granger, H e Raup, R. (1959)
Mead, W. and Wells, R. (1953, RME-4037)

FOSSIL CREEK

LOC: Elev. 5120 ft., 1.0 mile west of High Point of Nash Point, 34° 25' 15" N. 111° 33' 45" W. and at elev. 4640-80 ft. east side of Mud Tank Draw, 0.5 mile N. of Fossil Creek, 34° 26' 18"N, 111° 34' 00" W.

QUAD: Strawberry 7½"

DEVL: Prospected for coal bed in 1960's - one large open-pit

ANAL: 0.3% Cu; 3-8 ppm U by weight in sandstone.

GEOL: Supai Fm, 500-600 ft. below Ft. Apache Limestone. Associated with limestone pebble conglomerate close to carbonaceous shale and thin coaly seams.

REF: Peirce, H. and others (1970)
Peirce, H. and others (1977)

FOUR BAGGER

LOC: North central edge SW¼ sec. 2, TIN, R15½ E

QUAD: Globe 7½'; Mesa NTMS

RAD: 7X

GEOL: Dripping Spring Quartzite with iron stained fractures and intruded to the north and west by diabase.

REF: PRR-AP-131

FRAN #1-5 (Interstate Group)

FRINGE (Grand Chance)

FROG and IRON claims

LOC: Secs 3,4,9,10 and common corner Secs 8,9,16,17, T9N, R15E.

QUAD: Young 15', Holbrook NTMS

RAD: 3-5X.

GEOL: Anomalous radio activity in the upper dark member of Dripping Spring Quartzite just below iron oxide mineralization in the lower Mescal Limestone.

REF: ABG file data

GEM #2 (Hope)

GENERAL #1

LOC: Center Sec. 13, T5N, R13E
1-8 mi. NW of Asbestos Point near Buckaroo Claims

QUAD: McFadden Peak 15'; Mesa NTMS

RAD: 30X

ANAL: 0.03% e U_3O_8

GEOL: Radioactivity along fractures in Dripping Springs Quartzite. Bed strike N10°W and dip 10°NE. Fractures strike N75°E, dipping 86°SE and N20-30°E dip 80°NW

REF: PRR-AP-189

GIGER CLAIMS

LOC: SW¼ SE¼ Sec. 5 and NW¼ Sec. 8, T6N, R11E east edge of Tonto Basin - east of Pumkin Center

QUAD: Picture Mtn. 7½'; Mesa NTMS

DEVL: Drilling

RAD: 400X

ANAL: 0.5% U_3O_8 in lignite

GEOL: Late Miocene - Pliocene fine grained clastic sediments are depositional on Precambrian Granite and are somewhat locally deformed. Tuffaceous clastics, mudstones, and several black lignitic beds are present. Certain mudstones and the lignitic beds count. Other radioactive lignites outcrop in NW¼ SE¼ Sec. 8, T6N, R11E.

REF: PRR-AP-339
Arizona Bureau of Geology Data
Waechter, N. (1979)

GRAND CHANCE (Fringe; Late Comer

LOC: Approx. SE¼ Sec. 25, T7N, R12E
1.2 miles NNW of Buck Pk below Buckaroo Tank

QUAD: Copper Mtn. 7½'; Mesa NTMS

RAD: 3X

GEOL: Metatorbernite in the upper member of Dripping Springs Quartzite

REF: PRR-AP-237

GRAND GAIN (Great Gain)

GRAND VIEW CLAIMS

LOC: NE¼ SE¼ Sec. 18, T5N, R14E

QUAD: McFadden Peak 15'; Mesa NTMS

DEVL: 60 ft. drift trends ENE

RAD: 14X

GEOL: Radioactivity, associated with fractures in Dripping Spring Quartzite cut by thin aplitic and pegmatitic dikes. The quartzite is metamorphosed and about 15 ft. above diabase.

REF: PRR-AP-249
Granger, H. and Raup, R. (1969b, p. 39)

GRANDVIEW (Tomato Juice)

GRANITE #1-28 CLAIMS

LOC: West edge Sec. 22 and east edge Sec. 21, T4N, R14E; 33°40' 30" N, 110° 55'10-30" W.

QUAD: Rockinstraw Mtn. 15'; Mesa NTMS

RAD: 8X

ANAL: 0.04% e U_3O_8

GEOL: Highest counts in specular hematite in "rhyolite intrusions" cutting granite. Shattered zone along low angle thrust near base of Apache Group.

REF: PRR-A-44

GRANTHAM AND MOTIEY

LOC: Approx. Sec. 36, T3N, R14E
Sierra Ancha - along Pinal Creek

QUAD: Rockinstraw Mtn. 15'; Mesa NTMS

DEVL: Prospect pits

RAD: 4X

GEOL: Calcite and chert breccia filling fractures in Mescal Limestone, trenching N55°W and dipping 40° NE. Fractures trend N30°W and dip 35° SW.

REF: PRR-AP-142

GREAT GAIN (Grand Gain; Spring Creek)

LOC: Approx. SW¼ SW¼ SE¼ Sec. 30, + 7N, R13E, 33° 54' 52"N; 111° 3' 32" W south side of JR Canyon 0.93 miles NNE of Buck Pk.

QUAD: Copper Mtn. 7½'; Mesa NTMS

DEVL: 30 ft. adit, pits, drilling

ANAL: 0.06% e U_3O_8 on stockpile

GEOL: Metatorbernite, meta-autunite, urainferous hyalite and limonite along fractures and disseminated in Dripping Spring Quartzite at bottom of middle member.

REF: Granger, H. and Raup, R. (1969b, p. 40)

GREYSTONE, DOCTOR, FRISCO, et. al.

LOC: Sec. 18-19, T. 1S, R 14E

QUAD: Pinal Ranch 7½'; Mesa NTMS

DEVL: Copper and gold mines

RAD: 9X

GEOL: Veins in granite and Pinal Schist

REF: RME-156
Waechter, N. (1979)

GRINDSTONE CLAIMS

LOC: NE¼ NW¼ Sec. 25, T6N, R14E
West side of Cherry Creek

QUAD: McFadden Peak 15'; Mesa NTMS

DEVL: Surface scrapings and pits

RAD: 100X

ANAL: 0.19% e U_3O_8; 0.11% U_3O_8

GEOL: Uraniferous hyalite, pyrite, pyrrhotite limonite along fractures trenching NNE and WNW in moderately metamorphosed back facies of Dripping Spring Quartzite.

REF: PRR-A-28
Granger, H. and Raup, R. (1969b, p. 43)

GROUP 2 (Ichi Ban #1-17)

GRUBSTEAK, IRON HILLS AND OVERSIGHT CLAIMS

LOC: Sec. 34, + 2S, RISE and Sec. 3, T3S, RISE

QUAD: El Capitan 7½', Mesa NTMS

DEVL: Several drifts and shafts

PROD: Gold, silver, copper

RAD: 4X

GEOL: Mineralization along faults in Dripping Spring Quartzite overlain by Mescal Limestone and underlain by diabase sill. Faults trend NNW and beds dip 20°SW.

REF: PRR-A-30

HAMILTON CLAIMS (Yo Tambien)

LOC; 33° 42' 40"N, 110° 38' W, claims up Bronson Canyon 11.0 miles is along Haystack Butte Road from Hwy. 77, about 1 mile south of Haystack Butte.

QUAD: Haystack Butte 7½'; Mesa NTMS

RAD: 4X

GEOL: Strata within silicified Pioneer Shale are anomalous, near its base of deposition upon older granites. Beds around claims dip 10-30°N. Diabase intrudes the granite in area.

REF: PRR-A-99

HARDROCK #1-12

LOC: 33° 30' 20"N; 110° 43' 40" W
1.3 miles SW of Richmond Mtn.

QUAD: Chrome Butte 7½'; Mesa NTMS

DEVL: Prospect pits

RAD: 20X

ANAL: 0.28% e U_3O_8

GEOL: Thin micropegmatitic intrusion along contact between granite capped by silicified Pioneer Shale.

REF: PRR-AP-272

HEIGH POWER CLAIMS

LOC: SE¼ Sec. 1 or NE¼ Sec. 12, T5N, R13E

QUAD: McFadden Peak 15', Mesa NTMS,

DEVL: One exploration pit, one drill hole

RAD: 50X

ANAL: 0.06% e U_3O_8

GEOL: Upper Dripping Spring Quartzite, exposed on SW flank of ridge between Carr Mt. and Grantham Pk. Iron taining, pyrite, chalcopyrite, and sparce metatorbernite noted.

REF: PRR-AP-321

HIGHGRADE (Highway)

HIGHWAY AND HIGHGRADE GROUP

LOC: NE edge of Sec. 6, T1N, R16E
about 2 mi. east of Quartzite Pk.

QUAD: Cammerman Wash 7½'; Mesa NTMS

RAD: 4X

GEOL: Tilted block of Dripping Spring Quartzite and Mescal Limestone intruded by diabase. Local dips up to 25°SW.

REF: PRR-AP-253

HILLSIDE #1-10

LOC: 33° 47-48'N, 110° 36-37'W on hilltop bounded on west by cliffs, 1.5-2 miles SSW of Regal Asbestos Mine.

WUAD: Blue House Mtn. 15'; Mesa NTMS

DEVL: Discovery pit

RAD: 20X

ANAL: 0.268% e U_3O_8

GEOL: Radioactivity associated with disseminated pyrite, gypsum and calcite in upper member of Dripping Spring Quartzite. Diabase is below and Mescal Limestone above.

REF: PRR-AP-233

HOME MINE (American Asbestos Cement Co.)

LOC: 800 ft. east of center of Sec. 20, T8N, R15E
0.5 miles west of Wilson Creek

QUAD: Young 15'; Holbrook NTMS

DEVL: Home Mine, developed for asbestos

PROD: None for uranium

RAD: 20X on limonite alteration at surface; 5X underground

ANAL: 10 samples: 0.01-0.22% e U_3O_8

GEOL: Mescal Limestone intruded by thin diabase sills one small area of intense limonite mineralization exposed near surface. Asbestos serpentine, magnetite and calcite present.

REF: PRR-AP-152

HOPE (Gem #2)

LOC: E½ NE½ Sec. 30, TGN, R14E
NE slope of Workman Creek about 1.5 miles upstream from Young-Globe Raod

QUAD: McFadden Pk. 15'; Mesa NTMS

DEVL: 4 adits in excess of 1000 ft. of workings

PROD: 9056 Tons @ 0.30%, 1955-57 and 1960
Largest producer in Sierra Anchas.

GEOL: Uraninite is main ore mineral disseminated and as stringers and pods paralleling stratification of hornfels. Pyrrhotite, molybdenite, sphalerite, chalcopyrite, galena, pyrite, and marcasite noted. Minor uranophane and metatorbernite noted. Ore in upper member of Dripping Spring Quartzite in at least three steeply dipping vein zones of NNE trend. Adit No. 1 follows a zone of brecciation that is filled with pale red hornfels, with degree of metamorphism increasing upward. Ore zone is concentrated about 5-30 ft. above underlying diabase sill.

REF: PRR-AP-289
Granger, H. and Raup, R. (1969a & b)
Schwartz, R. (1957, RME -2071)

HORSEHOE MINE (Crying Jew)

LOC: Sec. 10, T6N, R14E
West side of Cherry Creek

QUAD: McFadden Peak 15'; Mesa NTMS

DEVL: 150 ft. drift

PROD: 23 tons @ 0.19% U_3O_8 plus
14 tons @ 0.09% U_3O_8 " no pay ore" in 1955-56.

RAD: 100X

ANAL: 0.45% e U_3O_8

GEOL: Small pods of ore and pyrite filled fractures in Dripping Spring Quartzite. Paper thin veins of Sphalerite along partings and bedding planes. Claims on down-dropped block fault. Radioactivity follows shattered and contorted strata. Ore zone is 2 to 8 ft. thick and lies within 1-4 ft. of the hanging wall of a NNE trending reverse fault which dips 45°W.

REF: PRR-A-102
Granger, H. and Raup, R. (1969a & b)
Schwartz, R. (1957, RME-2071)

HOT CINDERS 1-5

LOC: Sec. 5, T8N, R11E, in Brushy Hollow Canyon, NE of Cottonwood Mtn., 1.7 miles E of Tonto Creek.

QUAD: Gisela 7½'; Holbrook NTMS

RAD: 15X

ANAL: 0.14% e U_3O_8; 0.13% U_3O_8

GEOL: Highly metamorphased older Precambrian Quartzite, foliation strikes N40°E with vertical dip. Radioactivity in thin limonitic band. Quartz stringers parallel to foliation.

REF: Schwartz, R. (1957, RME-2071, Fig. 4)

HOT ROCK CLAIMS (Promontory Butte)

HOT SPOT

LOC: West Sec. 4.9, T6N, R14E
West wall of Cherry Creek

QUAD: McFadden Peak 15'; Mesa NTMS

RAD: 50X

GEOL: Radioactivity and iron oxides in upper member of Dripping Spring Quartzite.

REF: PRR-AP-219

HOT TOMALE CLAIMS

LOC: Sec. 33, T11N, R13E
Steep walls of Christopher Creek along N flank Christopher Mtn.

QUAD: Woods Canyon 15'; Holbrook NTMS

RAD: 3X

GEOL: Upper Dripping Spring Quartzite, beneath Troy Quartzite is thin bedded, shaley silicified siltstone with muscovite in shale partings. Units dip 40° SE. Some Limonite after pyrite noted.

REF: PRR-AP-324

ICHI BAN #1-17 (Group 2)

LOC: Sec. 14, T8N, R14E
1 mile east of Cherry Creek

QUAD: Young 15'; Holbrook NTMS

DEVL: Pit

RAD: 12X

GEOL: Anamalous radioactivity over 50 ft. stratigraphic interval in lower Dripping Spring Quartzite. Group 2 claims across Cherry Creek have high counts in Troy Quartzite.

REF: PRR-AP-365

INTERSTATE GROUP (Sky #1-5; Fran #1-5; Zora #1-5, Peanuts; see also Desert Queen)

LOC: E½ Sec. 3, W½ Sec. 2, T3S, RI5E

QUAD: El Capitan 7½'; Mesa NTMS

DEVL: Short adit, shallow pit, drilling

RAD: 15X

GEOL: Metatorbernite along fractures and bedding planes in silty upper member of Dripping Spring Quartzite. Some pyrite, malachite, limonite, gypsum and barite noted. Beds dip 20 to 30°S.

REF: PRR-AP-229;
Granger, H. and Raup, R. (1969b, p. 118)
Cornwall, H. and Kreiger, M. (1978)

IRIS CLAIM

LOC: Approx. NE¼ Sec. 3, T4N, R14E
In bottom of tributary canyon ½ mi. west of Oak Creek Canyon, one mile north of Couger Canyon

QUAD: Rockinstraw Mtn. 15'; Mesa NTMS

DEVL: Several pits; 95 ft. adit (South trending)

RAD: 100X

ANAL: 0.29% e U_3O_8; 0.24% U_3O_8

GEOL: Metatorbernite, uranophane and pyrite disseminated and along fractures in gray facies of Dripping Spring Quartzite. Beds dip 5° ENE.

REF: PRR-AP-290
Granger, H. and Raup, R. (1969b)

IRISH BARCO (Alta Vista Group)

IRON CAP MINE (Black Hawk Shaft)

IRON HILLS CLAIMS (Grubstack)

IZZY CLAIMS

LOC: Approx. in north central Sec. 28, T. 7N., R.13E
On rim of canyon at SE corner of Redman Mesa, 2.1 miles SE of hill 5954 (Middle Mtn.)

QUAD: Copper Mtn, 7½'; Mesa NTMS

RAD: 20X
0.2% e U_3O_8

GEOL: Metatorbernite, iron oxides and pyrite in upper member of Dripping Spring Quartzite.

REF: PRR-AP-369

JACK POT CLAIMS

LOC: Approx. Sec. 6, TION, R14E
Along Chamberlain Trail in steep walled part of Haigler Creek

QUAD: Young 15'; Holbrook NTMS

RAD: 3X

GEOL: Dripping Spring Quartzite with low easterly dip

REF: PRR-AP-260

JACKIE #1-4 (Ludsy Chance; Uranium)

LOC: 33° 42'10" N; 110°55' 20"W
SE of Alta Vista #2 Group, about 1.3 miles NW of Hackberry Mtn.

QUAD: Rockinstraw Mtn. 15'; Mesa NTMS

DEVL: Small pits and shallow trenches

RAD: 15X

ANAL: 0.21% e U_3O_8; 0.48% Cu

GEOL: Radioactivity and copper oxides along obscure NNE Trending vertical fracture and disseminated in a zone 0.5 to 1.5 ft. away from fractures, in upper member of Dripping Springs Quartzite.

REF: PRR-AP-180 and A-109

JIM #1

LOC: Center Southern Boundary SW¼ Sec. 30, T5N, R14E
First Water Canyon

QUAD: Rockinstraw Mtn. 15'; Mesa NTMS

DEVL: 20 ft. drift along limonite-stained fractures

RAD: 7X

ANAL: 0.045% e U_3O_8

GEOL: Irregular vein-like mineralization in lower 20 ft. of gray facies of Dripping Spring Quartzite. Some pyrite, abundant limonite and sulfate efflorescence noted.

REF: PRR-AP-238 and 202
Granger, H. and Raup, R. (1969b, p. 59)

JON MINE (Don Group)

LOC: S½ SW¼ Sec. 29, T6N, R14E, on NE side of Workman Creek about 1.7 miles upstream from Globe-Young Road

QUAD: McFadden Pk. 15'; Mesa NTMS

DEVL: 180 ft. adit with workings now flooded

PROD: 206 Tons @ 0.10% U_3O_8, 1956

ANAL: 0.06% e U_3O_8; 0.07% U_3O_8 -
chemical assays overaged 20-30% higher than radiometric assays - typical of the Workman Creek Deposits.

GEOL: Uranium, pyrite, sphalerite, galena, and pyrrhotite in NNE trending fracture fillings in hornfel and gray facies of Dripping Spring Quartzite - 12 ft. above diabase sill. Strong faulting, and some aplite dikes. Ore zone about 2 ft. thick.

REF: PRR-AP-225
Granger, H. and Raup, R. (1969a & b)
Schwartz, R. (1957; RME-2071)

JUNCTION CLAIM

LOC: 33° 44' 25"N, 110°34'05"W, along Ash Creek, about 0.7 mile south of north boundary of quadrangle, 1.0 miles SE of hill 5758.

QUAD: Chrysotile 7½', Mesa NTMS

DEVL: Trenching and benching

RAD: 3X

ANAL: 0.18% U_3O_8

GEOL: Thin bedded, upper siltstone member of Dripping Spring Quartzite contains vertical radioactive fracture planes.

REF: PRR-AP-190
Schwartz, R. (1957, RME -2071)

JUNIPER #4

LOC: NE¼ NE¼ Sec. 23, T5N, R14E, on Mesa Tops between Coon and Deep Creeks

QUAD: McFadden Peak 15'; Mesa NTMS

RAD: 20X

ANAL: 0.04% e U_3O_8

GEOL: 16 inch thick zone in upper member, Dripping Spring Quartzite, 200 ft. below Mescal Limestone. Refer to Donna Lee Claims

REF: PRR-AP-224

JUNIPER HILL 1-10

LOC: 33° 56'15", 111° 10' 30"W, on south flank of Juniper Mtn.

QUAD: Picture Mtn. 7½'; Mesa NTMS

RAD: 7X

GEOL: Radioactivity and some disseminated pyrite in unoxidized beds of upper member of Dripping Spring Quartzite.

REF: PRR-AP-312

KING 1-3

LOC: NW¼ Sec. 7TIS, R14½E. (33° 21' 32" N, 110° 52' 45" W) south of Miami to Cherry Flat Picnic area - up common 1/3 mile from Warnica Picnic Area

QUAD: Pinal Ranch 7½'; Mesa NTMS

DEVL: 2 adits to 280 ft., one shaft, one open trench 1000 ft. to SE along cat road.

RAD: 70X

ANAL: 0.41% e U_3O_8

GEOL: Five foot wide quartz vein trends N40°W, dips 65° NE through Precambrian Solitude Granite. 1.5 ft. wide vein counts, and has minute fractures partially sealed with copper oxides. Metatorbernite was recognized in vein system, and radioactivity has persisted along strike of the vein.

REF: PRR-AP-96; Weathers, G. (1954, RME-2016)
WAECHTER, N. (1979)

KING SNAKE CLAIM (Tomato Juice)

KULLMAN - McCOOL MINES

LOC: NE¼ of SE¼ Sec. 28, T4S, R15E. 1.6 miles due west of Toronado Peak

QUAD: Hayden 7½'; Mesa NTMS

DEVL: Kullman-McCool Mines, operated for copper and lead. Upper workings are two parallel adits 150 ft. long, 125 ft. crosscut, 100 ft. winze. Lower workings are several small adits, cuts and stopes along 400 ft. of outcrop.

PROD: Copper

RAD: 3X

GEOL: ENE trending fault contact between Miss. Penn. Limestones and late Cretaceous Volcanics, with related sills and dikes intruding the limestones. Crosscut in upper working contains pod which counts to 3X. Pyrite, chalcopyrite, cerrusite, wulfenite, vanadinite, malachite, tenorite, manganese stains.

REF: PRR-M-905
Banks, N. and Kreiger M. (1977)

L and V prospect

LOC: Secs 27, W½26, S½22, T1N, R15½E

QUAD: Globe 7.5', Mesa NTMS

DEVL: Considerable prospecting

RAD: 3X

GEOL: Radioactivity in areas of Dripping Spring and Troy Quartzites, and an anomalous vein.

REF: ABG file data

LADY ESTER (Rick Tick)

LAMANITE (Deep Creek Group)

LOC: Approx. S. Sec. 18 and N. Sec. 19, T5N, RISE and NE¼ Sec. 24, T5N, R14E.

QUAD: McFadden Peak 15'; Mesa NTMS

DEVL: Drilling

RAD: 200X

ANAL: 0.25% U_3O_8

GEOL: Uraninite with other sulfides in 1-2 ft. wide zone along NNE trending vertical fracture zone in Dripping Spring Quartzite.

REF: PRR-AP-274
Schwartz, R. (1957, RME -2071)

LATE COMER (Grand Chance)

LITTLE IODINE CLAIMS

LOC: South central Sec. 21, T11N, R12E
N. flank Saddle Mtn. about 0.5 mile S 10°E of Kohls Ranch.

QUAD: Promontory Butte 15'; Holbrook NTMS

RAD: 3X

GEOL: Red-colored granite in fault or intrusive contact with Paleozoic Limestone. Granite contains large quartz "blebs". No mineralization of copper, etc. noted.

REF: PRR-AP-325

LITTLE JOE

LOC: NE¼ SW¼ Sec. 19, T6N, R14E, on north side of Workman Creek about 0.5 mi. E of Globe-Young Road

QUAD: McFadden Peak 15'; Mesa NTMS

DEVL: 5 adits, open cuts

PROD: 2703 tons @ 0.20% U_3O_8, 1956-1960

ANAL: 0.30% e U_3O_8

GEOL: Most ore comes from NNE trending zones sometimes marked by pyrite oxidation to limonite. Obvious fractures do not seem to control mineralization. Uraninite occurs as small streaks parallel to relict bedding and as blebs in feldspar crystals in brecciated hornfels. Minor urarophane and metatorbernite.

REF: PRR-AP-311
Granger, H. and Raup, R. (1959, 1969a & b)
Schwartz, R. (1957, RME-2071)

LITTLE SIX #1 (Alta Vista Group)

LOBO (Sorrel Horse)

LONESOME JOHN

LOC: SW¼ Sec. 4, or NW¼ Sec. 9, T9N, R14E

QUAD: Young 15', Holbrook NTMS

RAD: 65X

ANAL: 0.09% e U_3O_8

GEOL: Precambrian Granite containing white quartz veins and radioactive pods or lenses of fine-grained maroon-colored intrusive material. Same occurrence type as Dutch Boy claims (A-P-329) and Hardrock claims (AP-272)

REF: PRR-AP-368

LORIAN (Lost Dog)

LOST DOG (Melinda Mine; Lorian)

LOC: SW¼ NE¼ Sec. 30, T6N, R14E
South side of Workman Creek about 1 mile upstream from Globe-Young Road near Lucky Stop.

QUAD: McFadden Peak 15'; Mesa NTMS

DEVL: 4 adits and open cut

PROD: 1562 tons @ 0.13% U_3O_8; 0.15% V_2O_5, 1954-56

ANAL: 0.04% e U_3O_8; 0.04% U_3O_8

GEOL: Metatorbernite along fractures and bedding planes in Dripping Spring Quartzite with diabase sill 10-30 ft. below. Also noted are uraniferous hyalite, pyrite, chalcopyrite and galena. Vertically tabular ore zone trends NNE.

REF: PRR-AP-232
Granger, H. and Raup, R. (1959, 1969a & B)

LOVE #1-10 CLAIMS

LOC: Approx. Sec. 23, T7N, R12E; 33°56-57'N, 111°5-6 W along Jakes Tank Canyon, 0.5 to 1 mile north of Copper Mtn.

QUAD: Copper MTN. 7½'; Mesa NTMS

RAD: 7X

GEOL: Upper Dripping Spring Quartzite overlain by Mescal Limestone and dipping gently east.

REF: PRR-A-29

LUCKY #1-8

LOC: Approx. Sec. 18, T5N, R12E

QUAD: Armer Mtn. 7½'; Mesa NTMS

RAD: 5X

GEOL: Flat lying Dripping Spring Quartzite with diabase sill below.

REF: PRR-AP-263

LUCKY BOY

LOC: North central Sec. 31, 32, T2S, R15E
½ mile W. of Old Pioneer Stage Station Raod in Mescal Mtns.

QUAD: El Capitan Mtn. 7½; Mesa NTMS

DEVL: 2 adits and workings

PROD: 2336 tons @ 0.17% U_3O_8 1956-57
In excess of 10,000 lbs. U_3O_8 brine concentrate in 1979.

GEOL: Finely disseminated uraninite associated with mica in a chloritic shear zone with concordant bedding in Dripping Spring Quartzite. Pyrite, pyrrhotite, chalcopyrite, metatorbernite, bassetite, fluorescent opal, uranophane, limonite, gypsum and jarosite noted. Ore zone is a part of a tilted fault block, dipping 20-30°W and 50 ft. above a concordant diabase sill. Ore zone stratigraphically controlled with secondary control being along numerous NE trending fractures. Main ore body is in equilibrium, but dark zone above ore body and containing metatorbernite is out of equilibrium (high radiometric)

REF: PRR-AP-211
Granger, H. and Raup, R. (1969a & b)
Schwartz, R. (1957, RME-2071)
Cornwall, H. and Krieger, M. (1978)
Arizona Bureau of Geology Data

LUCKY CHANCE CLAIMS

LOC: Referred to as near Jackie claims of the Red Bluff Area in PRR-A-P-180 (1954)

LUCKY KING

LOC: Approx. SE¼ Sec. 36, T 2S, RISE
North slope of El Capitan Mtn.

QUAD: El Capitan Mtn. 7½'; Mesa NTMS

RAD: 20X

ANAL: 0.08% e U_3O_8

GEOL: Dripping Spring Quartzite dips 20° SW and is overlain by Mescal Limestone to the SW and intruded by diabase. Metatorbernite, pyrite, manganese and iron oxides noted.

REF: PRR-AP-355
Cornwall, H. and Krieger, M. (1978)

LUCKY STAR #1-14

LOC: Approx. 33°38'N, 110° 01'W,
along south side of Roosevelt Lake

QUAD: Windy Hill 7½'; Mesa NTMS

DEVL: Tungsten prospect

RAD: 3X

GEOL: Thin shale beds in Troy or Dripping Spring Quartzites are radioactive. Magnetite, ilmanite and Wolframite black sand in wash. Diabase exposed in canyon floor.

REF: PRR-AP-327

LUCKY STOP

LOC: NE¼ NW¼ Sec. 30, T6N, R14E,
SW side of Workman Creek about 0.6 mi. upstream from Globe-Young Road

QUAD: McFadden Peak 15'; Mesa NTMS

DEVL: 1000 ft. drift and crosscuts; 5 aits

PROD: 2847 Tons @ 0.16% U_3O_8, 1955-57

ANAL: 0.30% e U_3O_8; 0.32% U_3O_8

GEOL: Uraninite pyrite, sphene diopside marcasite along obscure NNE trending fractures and disseminated in black facies of Dripping Spring Quartzite. Some NNE veins of this property continue onto the Lost Dog property, just to the east. All the uraniferous veins on these properties terminate abruptly downward in barren quartzite and are developed vertically for no more than 40 ft. Veins appear to be in an en echelon pattern.

REF: PRR-AP-222
Granger, H. and Raup, R. (1969a & b)
Schwartz, R. (1957, RME-2071)

LUCKY STRIKE #1-25

LOC: 33° 41' 40"N; 110° 33' W
1.4 mile ENE of Timber Camp on Hwy. 60.

QUAD: Chrysotile 7½'; Mesa NTMS

DEVL: Shallow pits

RAD: 17X

ANAL: 0.042% e U_3O_8

GEOL: Highly oxidized Dripping Spring Quartzite

REF: PRR-AP-264

LULU BELLE #7 CLAIM

LOC: Probably NE¼ Sec. 21, TIS, RISE
Pinal Mtns.

QUAD: Pinal Peak, Az. 7½'; Mesa NTMS

DEVL: 2 inclined shafts, about 80 ft. deep, several drifts totalling 200 ft., portals caved in 1955.

PROD: $12,000 in Au, Ag, Cu during 1924-1927

RAD: Ore pile shaft counts 35X

ANAL: 5.2% Cu, 2.3% Ag, 0.2-0.7% e U_3O_8; 0.3-0.7% U_3O_8

GEOL: Fissure vein in Pinal sericite schists contain pyrite, chalcopyrite, bornite, galena, and gold, and is radioactive. Uranophane and uraninite noted as discontinuous blebs along fissure. Fissure vein trends E-W (± 40°), dips generally 50° northward, and is offset near bottom of mine by NNE trending fault.

REF: PRR-AP-36 (#496); Wells, (1955, RME-2026)
Waechter, N. (1979)

MACK CLAIMS

LOC: Approx. NE¼ Sec. 2, T6N, R13E; 33° 53' HO"N; 110° 59' 10"W.

QUAD: McFadden Pk. 15, Mesa NTMS

DEVL: Discovery pit

RAD: 12X

ANAL: 0.18% e U_3O_8

GEOL: Metatorbernite with iron oxides in thin silty lenses at or near the contact of upper and lower members of Dripping Spring Quartzite.

REF: PRR-A-101

MADERA #15

LOC: Sec. 24, TIS, R 14½ E, probably in Pinto Creek, SW of Madera Peak

QUAD: Pinal Ranch 7½'; Mesa NTMS

DEVL: One 40 ft. adit into hillside trends NNE

RAD: 7X

ANAL: 0.03% e U_3O_8

GEOL: Vein in Madera Diorite contains Cu, Fe minerals and anomalous radioactivity.

REF: PRR-AP-145

MAJOR HOOPLE

LOC: Near center S½ Sec. 26, T7N, R14E, on tributary of China Spring Creek about 1 mi. E of Cherry Creek

QUAD: McFadden Pk. 15'; Mesa NTMS

DEVL: 28 ft. adit (550°E) w/ several benches

RAD: 70X

GEOL: Autunite, metatorbernite, and some pyrite along fractures and bedding planes in gray facies of Dripping Spring Quartzite. N 70° W vertical fractures are most anomalous. Major faulting to the east.

REF: PRR-AP-354
Granger, H. and Raup, R. (1969b)

MARY #1

LOC: Center of N½, Sec. 12, T5N, R13E, claim just SW of Parker Creek Forest Service Experimentation Station along Roosevelt Dam, Globe Road.

QUAD: McFadden Peak 15; Mesa NTMS

DEVL: One prospect pit

RAD: 15X

ANAL: 0.05% e U_3O_8; 0.07% U_3O_8

GEOL: Dripping Spring Quartzite broken by ENE, N-S, and WNW trending fractures with some radioactive showings.

REF: PRR-AP-132

MARY ANN (Buckaroo Claims)

MAY CLAIMS

LOC: Approx. SE¼ NW¼ Sec. 31, T7N, R13E ½ Mi. ENE of Buck Pk.

QUAD: Copper Mtn. 7½; Mesa NTMS

DEVL: 2 small pits and drill hole

RAD: 20X

ANAL: 0.08% e U_3O_8

GEOL: Uraniferous hyalite, sparse metatorbernite and disseminated pyrite in Dripping Spring Quartzite. Discordant diabase along fault 100 ft. east. Some aplitic dikes.

REF: PRR-AP-349
Granger, H. and Raup, R. (1969b)

MAY 1-6 CLAIMS (American Asbestos Cement Co.)

LOC: Near center NE¼ Sec. 1, T7N, R14E, on walls of Rough Creek Canyon, 0.7 miles upstream from confluence of Wilson Creek. 0.8 miles SSW of Shepp No. 1 claims.

QUAD: McFadden Peak 15'; Mesa NTMS

GEOL: Dripping Spring Quartzite on mid slope of canyon, with Mescal Limestone capping further up hill. Radioactive zones some distance upslope from stream bottom.

REF: D.O.E.

MAYBE (Sorrel Horse)

MELINDA MINE (Lost Dog)

MIAMI COPPER COMPANY PROPERTIES

LOC: Sec. 7-18, T1N, R 14E

QUAD: Inspiration 7½; Mesa NTMS

DEVL: Copper mines

PROD: Base metals

RAD: 3X

GEOL: Veins in quartz monzonite

REF: U.S.A.E.C. (1970, RME-156, p. 44)

MIDGET #1-7 AND BLUE BONNET #1-4

LOC: 33° 55-56'N, 111° 02-03'W
In Canyons along steep southern slope of Redman Mesa-Spring Creek

QUAD: Copper Mtn. 7½'; Mesa NTMS

RAD: 6X

GEOL: Upper member of Dripping Spring Quartzite

REF: PRR-AP-370

MIKE #1-4 CLAIMS (Cataract Claims)

MONO (Snakebit)

MOONSHINE GULCH #1-18

LOC: NE¼ Sec. 28, T6N, R15E, 33° 50' 30"N, 110° 49'W. Rounded top and upper ledges of steeply sloping Hog Mountain

QUAD: McFadden Peak 15'; Mesa NTMS

RAD: 25X

GEOL: Upper member Dripping Spring Quartzite, beneath Mescal Ls. cap on Hog Mountain. Diabase dikes appear in Moonshine Gulch. Radioactive zones up to 2 ft. thick in sandstone, and concentrated along N75°W fractures.

REF: PRR-A-75

MYRTLE CLAIMS (Promontory Butte)

NAVAJO CLAIMS

LOC: Approx. N central Sec. 27, T 7N, R14E; 33°55'25"N, 110°54' 14"WE side near bottom of Cherry Creek-0.5 mi. N. of China Spring Creek.

QUAD: McFadden Pk 15'; Mesa NTMS

DEVL: 30 ft. adit and benching

RAD: 20X

GEOL: Sparse metatorbernite, abundant limonite in black facies of Dripping Spring Quartzite. N10° E fractures are anamalous.

REF: PRR-AP-240
Granger, H. and Raup, R. (1969b, p. 92)

NEPTUNE CLAIMS (Promontory Butte)

NORTH STAR CLAIMS

LOC: Approx. Center NW¼ Sec. 6, T7N, R12E Gun Creek; 5 mi. NW of Copper Mtn.

QUAD: Picture Mtn. 7½'; Mesa NTMS

DEVL: 40 ft. adit (SSW), drill holes

RAD: 40X

GEOL: Metatorbernite, saleeite, and bassetite with limonite and sparse pyrite in Dripping Spring Quartzite. Secondary mineralization is along NNE trending fractures in gray facies.

REF: PRR-AP-265
Granger, H. and Raup, R. (1969b, p. 94)

OAK CREEK #1-4

LOC: E½ Sec. 34, T5N, R14E
West facing wall of Oak Creek Canyon

QUAD: Rockinstraw Mtn. 15'; Mesa NTMS

DEVL: One 70 ft. drift trending east, dug in 1955 or earlier.

RAD: 4X

GEOL: In cliff face of Dripping Spring Quartzite. Diabase dikes striking N30°E are in vicinity. Hematite, limonite staining in faces of drift.

REF: PRR-A-10 (#178)

OVERSIGHT CLAIMS (Grubstack)

PAMELA CLAIMS

LOC: Near center N½ Sec. 1, T5N, R14E, about 0.5 mile NE down canyon from Moody Point

QUAD: McFadden Peak 15, Mesa NTMS

DEVL: Prospected

GEOL: Upper member Dripping Spring Quartzite

REF: Schwartz, R. (1957, RME-2071, Fig. 4)

PEACOCK CLAIMS

LOC: 33°49' 17"N, 110° 32' 45"W
Southside Salt River Canyon

QUAD: Blue House Mtn. 15'; Mesa NTMS

DEVL: 4 small cuts

RAD: 20X

ANAL: 0.04-0.08% e U_3O_8 a 0.1-0.2% U_3O_8

GEOL: Uraniferous opal, pyrite and limonite in black facies of Dripping Spring Quartzite. N18°E fracture plane most radioactive.

REF: PRR-AP-258
Granger, H. and Raup, R. (1969b, p. 95)
Schwartz, R. (1957, RME-2071)

PEANUTS CLAIM (Interstate Group)

PINTO CLAIMS (Yo Tambien)

PRANTY, SURPRISE AND SENTINAL GROUP

LOC: Approx. S. Sec. 6, T7N, R12E

QUAD: Picture Mtn. 7½'; Mesa NTMS

DEVL: Drilling

RAD: 30X

GEOL: Metatorbernite in Dripping Spring Quartzite with low dip to SE.

REF: PRR-AP-236

PROMONTORY BUTTE (Neptune; Myrtle; Brush; and Hot Rock Claims)

LOC: NW¼, NE¼ and near center Sec. 24, T11N, R12E

QUAD: Promontory Butte 15'; Holbrook NTMS

DEVL: Short adit; large open cut; numerous small cuts; drilling

PROD: Less than 500 tons of low grade ore from Neptune property in 1979.

RAD: 40X

ANAL: 0.07% e U_3O_8; 0.07% U_3O_8; 55% $CaCO_3$

GEOL: Uraninite and Copper carbonates in gray sandy shales associated with limestone pebble conglomerate lenses and interbedded sandy redbeds, ascribed to Naco-Supai Fm. Abundant carbonized plant remains noted.

REF: PRR-A-55
Finch, W. (1967)
Peirce, H. and others (1977)
Blazey, E. (1971)

Q RANCH CLAIMS

LOC: SW¼ of SW¼ Sec. 15, T8N, R15E, 1.8 miles due south of Q Ranch headquarters.

QUAD: Young 15, Holbrook NTMS

DEVL: Prospects

GEOL: Upper Dripping Spring Quartzite

REF: Schwartz, R. (1957, RME-2071)

QUARTSITE CLAIMS

LOC: NW¼ Sec. 12 and parts of Sec. 1,2,11, T6N, R14E East wall of Cherry Creek, 1 mile north of Horse Camp Creek; Mesa, between Cherry and Horse Camp Canyons.

QUAD: McFadden Peak 15'; Mesa NTMS

DEVL: 150 ft. bench; one pit

RAD: 5X

ANAL: 0.26% U_3O_8

GEOL: Metatorbernite, iron oxides, malachite and minor pyrite in black facies of Dripping Spring Quartzite. Mineralization is along bedding planes and jointing.

REF: PRR-A-87
Granger, H. and Raup, R. (1969b, p. 97)

RAINBOW

LOC: NW¼ SE¼ Sec. 32, T5N, R14E, on small nose just south of Oak Creek

QUAD: Rockinstraw Mtn. 15'; Mesa NTMS

DEVL: 70 ft. adit

ANAL: 0.50% e U_3O_8

GEOL: Metatorbernite along fractures with disseminated pyrite and some graphite. One foot zone trends NNE in partly recrystallized black facies, Dripping Spring Quartzite.

REF: PRR-AP-179
Granger, H. and Raup, R. (1969a & b, 1959)
Schwartz, R. (1957, RME-2071)

RAMON

LOC: 33°13-14'N, 110° 49-50'W, about one mile east of Pioneer Pass Road - Pinal Mtns.

QUAD: El Capitan Mtn. 7½'; Mesa NTMS

RAD: 4X

GEOL: Dripping Spring Quartzite, with some limonite staining and striking N70°W, dip 30° 5W.

REF: PRR- AP-141

RED BLUFF MINE

LOC: W½NE¼ SE¼ Sec. 31, T5N, R14E
West side of Warm Creek

QUAD: Rockinstraw Mtn. 15'; Mesa NTMS

DEVL: 11 adits, drilled

PROD: 3009 Tons @ 0.19% U_3O_8; 0.03% V_2O_5; 1953-55
Third largest producer in Sierra Anchas.

ANAL: 0.04 -0.70% e U_3O_8 and to 2.0% U_3O_8

GEOL: Uraninite, metatorbernite, bassetite, meta-autunite, beta-uranophane, saleeite, kasolite, uraniferous opal, malachite, pyrite, chalcopyrite, galena, limonite disseminated and along fractures in Dripping Spring Quartzite. Mineralization in upper gray facies and lower black facies, along N20°E and N70°E sets of fractures. N20°E fractures parallel fault which is intruded by 150 ft. thick diabase dike with apparent 250 ft. eastside down movement. Ore grade appears to decrease away from dike.

REF: Kaiser, E. (1951, TEM-210)
Granger, H. and Raup, R. (1969a & b, 1959)
Schwartz, R. (1957, RME -2071)

RED CLIFF #1 MINE

LOC: West central Sec. 11, T.5N, R13E in Connor Canyon

QUAD: McFadden Peak 15'; Mesa NTMS

PROD: 7.4 tons @ 0.21% U_3O_8, 1955

RAD: 15X

GEOL: Dripping Spring Quartzite dipping 15°NE along Sierra Ancha monocline

REF: PRR-AP-208
Schwartz, R. (1957, RME-2071)
Granger, H. and Raup, R. (1969a, Fig. 1)

RED HILL (Castle Dome)

REGAL ASBESTOS MINE

LOC: 110° 36'W, 33°48'N.
In Regal Canyon, south side of Salt River, about 6.5 air miles NW of Seneca on Hwy. 60-77; elevation 4300'.

QUAD: Blue House Mtn 15'; Mesa NTMS

DEVL: Area detected by airborne radiometric - 2 diamond drill holes over anomaly.

PROD: Asbestos

RAD: 50X
0.88% e U_3O_8

GEOL: Flat lying Dripping Spring Quartzite intruded by diabase dikes and sills. Asbestos mined in nearby metamorphosed Mescal Ls.

REF: PRR-AP-251 (#270)

RICK CLAIMS

LOC: Sec. 1, T7N, R13E,
along Dinner Creek, N. slope of Pine Mtn.

QUAD: McFadden Peak 15', Mesa NTMS

DEVL: Dozer cuts on hillside

RAD: 25X

ANAL: 0.21% e U_3O_8

GEOL: Upper member, Dripping Spring Quartzite dips 20°E
Torbernite was noted in 8 inch silty and claying bed. Exact stratigraphic position unknown - lower DS quartzite and Mescal Ls not seen in vicinity.

REF: PRR-A-31

RICK TICK AND LADY ESTER

LOC: Central Sec. 22, T7N, R14E, on west wall of Cherry Creek Canyon, about 0.8 to 1.1 miles upstream of PB Creek.

QUAD: McFadden Peak 15'; Mesa NTMS

RAD: 55X

ANAL: 0.11% e U_3O_8

GEOL: Upper Dripping Spring Quartzite, overlain by Mescal Limestone, locally intruded by diabase. Units here dip gently SE. Autunite, metatorbernite, and limonite after pyrite were noted.

REF: PRR-AP-352

ROCK CANYON PROSPECT

LOC: 33°49'46"N; 110°37' 08"W; NW¼ Sec. 14, T5N, RiGE
Bottom of Rock Creek Canyon about 0.4 mi. N. of Salt River

QUAD: Blue House Mtn. 15'; Mesa NTMS

DEVL: Open cut and 2 prospect pits

PROD: 5 tons stockpiled

RAD: 100X

ANAL: 0.4% e U_3O_8

GEOL: Ankerite -filled fractures with uraninite, limonite, sulfates and pyrite in black facies of Dripping Spring Quartzite. Mineralization controlled by N20°E trending fractures. The ankerite-pyrite rich part of NE trending fissure zone contains anamalous tin concentration, as cassiterite. Refer to Tomato Juice, with similar mineralogy. Occurrence on east flank of N-S trending Rock Canyon monocline, in strata dipping 13° towards S75°E.

REF: PRR-AP-144 and PRR-A-79
Granger, H. and Raup, R. (1969b, p. 110)

ROCKSLIDE CLAIMS (Blue Rock)

LOC: SW¼ NW¼ Sec. 34, T9N, RISE

QUAD: Young 15'; Holbrook NTMS

DEVL: Trench, open cuts

RAD: 100X - airborne anomaly #24

ANAL: 0.29% e U_3O_8

GEOL: Metatorbernite, uraniferous opal, saleeite, and limonite as coatings randomly oriented fractures in Dripping Spring Quartzite.

REF: PRR-AP-323; Schwartz, R. (1957, RME-2071)
Granger, H. and Raup, R. (1969a & b)

S.T. CLAIMS #1-4

LOC: Approx. Central Sec. 31, T7N, R13E, on east slope of Buck Peak

QUAD: Copper Mtn. 7½'; Mesa NTMS

RAD: 40X

ANAL: 0.02% e U_3O_8

GEOL: Metorbernite, autunite, meta-autunite, and pyrite in upper Dripping Spring Quartzite, dipping gently eastward.

SALLY MAY #2-5

LOC: NE¼ Sec. 2, T6N, R12E
0.5 mile SE from top of Greenback Pk

QUAD: Copper Mtn. 7½'; Mesa NTMS

DEVL: Pits

RAD: 10X

GEOL: Upper Dripping Spring Quartzite underlain by diabase and overlain by Mescal Limestone.

REF: PRR-AP-350

SENTINEL CLAIMS

LOC: Approx. 33°59' 20"N, 111°09' 30" W, on dissected mesas about 1 mile NW of Chalk Mtn.

QUAD: Picture Mtn. 7½'; Mesa NTMS

GEOL: Upper member Dripping Spring Quartzite
See Pranty and North Star Claims

REF: Schwartz, R. (1957, RME-2071, Fig. 4)

SHEPP #2 (American Asbestos Cement Co., Stockman Group, Wilson Creek)

LOC: Center Wedge Sec. 31, T8N, RISE and center edge Sec. 36, T8N, R14E.
Wilson Creek about 1.4 mi. ENE of Cherry Creek

QUAD: McFadden Peak 15'; Mesa NTMS

DEVL: 4 adits and 300 ft. tramway from creek to cliff tops.

PROD: 35 tons @ 0.15% stockpiled

RAD: 100X

ANAL: 0.17% e U_3O_8

GEOL: Uraninite metatorbernite, limonite, pyrite, chalcopyrite, and malachite in fractures and along bedding in Dripping Spring Quartzite.

REF: PRR-AP-43
PRR-D-718
Granger, H. & Raup, R. (1969a & b)
Schwartz, R. (1957, RME -2071)

SKY #1-5 (Interstate Group)

SNAKEBIT CLAIMS (Mono, Sunset)

LOC: 33°46' 38" N, 110°35', 27"W,
on North side of deep tributary to Ash Creek

QUAD: Blue Horse Mtn. 15'; Mesa NTMS

DEVL: 80 ft. adit (NW trending); bench

RAD: 20X

ANAL: 0.16% U_3O_8 from open cut

GEOL: Metatorbernite with limonite and disseminated pyrite, chalcopyrite, galena and sphalerite. Uranium along fractures in Dripping Spring Quartzite.

REF: PRR-AP-234
Granger, H. and Raup, R. (1969b, p. 120)

SNOW WHITE (Big Buck Group)

SORREL HORSE (Citation, Lobo, Maybe, T-Bone)

LOC: Center S½ Sec. 4, T6N, R14E
Tributary to Cherry Creek

QUAD: McFadden Peak 15'; Mesa NTMS

DEVL: 3 short adits and prospect pit

RAD: 14X

ANAL: 0.57% e U_3O_8

GEOL: Radioactivity in gray facies of Dripping Spring Quartzite. Some veinlets along various fractures containing quartz, siderite, fluorite, pyrite, chalcopyrite, galena and sphalerite. Some barren aplite dikes invade the sediments from the underlying diabase sill.

REF: PRR-A-62
PRR-A-100
Granger, H. and Raup, R. (1969b, p. 122)

SPRING CREEK (Great Gain)

STAGO AND BUBBLING SPRINGS GROUPS

LOC: SE¼ Sec. 10, T7N, R14E
(along Cherry Creek, 0.5 miles south of mouth of Ash Creek

QUAD: McFadden Peak 15'; Measa NTMS

DEVL: Discovery pit

RAD: 40X

ANAL: 0.02% e U_3O_8

GEOL: Flat lying upper Dripping Spring Quartzite, and radioactive springs in area.

REF: PRR-AP-235

STAR 1-3

LOC: N½ Sec. 15, T2S, R15E, upper steeply sloped ridges, about 0.5 miles SE of summit of Pioneer Pass of Sec. 10, T2S, R15E.

QUAD: Pinal Peak 7½'; Mesa NTMS

DEVL: Some ore stockpiled in 1955

RAD: 12X

ANAL: 0.22% U_3O_8 in select sample after magnetite removal by magnet.

GEOL: Pendant of Pinal Schist surrounded by Madera Diorite is intruded by dikes. Unidentified uranium minerals along dike contacts in Pinal and extends into the Madera Diorite for short distance. Uraniferous veins contain magnetite, rutile.

REF: PRR-A-7

STOCKMAN GROUP (Shepp #2)

Includes: Shepp #1-2
Walnut Creek #1-3
York #1-4

SUCKERITE CLAIMS (Charles Jr. #1-2; Definitely)

LOC: Approx. S. center Sec. 24, T6N, R13E, 300 ft. S. of Workman Creek and 0.3 mi. W of Globe-Young Rd.

QUAD: McFadden Pk. 15'; Mesa NTMS

DEVL: 2 adits, drill holes

PROD: 2,603 tons @ 0.23% U_3O_8; 40% C_a CO_3, 1956-57
Second largest producer in Sierra Anchas.

RAD: 30X

GEOL: Uraninite, pyrite, molybdenite, chalcopyrite, and galena in short veinlets and disseminated in Dripping Springs Quartzite - Mescal Limestone block totally enclosed in diabase. Ore zone dips 55° and is about 1-4 ft. thick.

REF: PRR-AP-252
Granger, H. and Raup, R. (1969a & b, 1959)
Schwartz, R. (1957, RME-2071)

SUE CLAIMS (Bull Canyon)

LOC: Approx. SE border Sec. 24, T5N, R14E and SW border Sec. 19, T5N, RISE. South slope of Bull Canyon.

QUAD: McFadden Peak 15'; Mesa NTMS

DEVL: 2 adits; drifting

PROD: 450 tons @ 0.21% U_3O_8; 1955-56

RAD: Apparently not in equilibrium

ANAL: 0.01-3.47%, U_3O_8

GEOL: Metatorbernite, bassetite, meta-autunite, limonite, and pyrite in fractured, weakly recrystallized black facies of Dripping Spring Quartzite. Ore zone is about 3 ft. thick and host strata dips 5°SW.

REF: PRR-AP-273
Granger, H. & Raup, R. (1969b, p. 129)
Schwartz, R. (1957, RME-2071)

SUNSET (Snakebit)

SURPRISE (Pranty)

T-BONE (Sorrel Horse)

TIPPY CLAIMS

LOC: SW¼ Sec. 16, T6N, R14E

QUAD: McFadden Peak 15'; Mesa NTMS

DEVL: Prospected

GEOL: Upper member Dripping Spring Quartzite

REF: Schwartz, R. (1957, RME-2071, Fig. 4)

TOMATO JUICE (Grandview; King Snake)

LOC: 33°49' 16"N; 110° 36' 20"W
Regal Canyon 900 ft. SE of Salt River

QUAD: Blue Horse Mtn. 15'; Mesa NTMS

DEVL: 2 adits trending NNE; 400 ft. bucket tramway

PROD: 140 tons @ 0.16% U_3O_8, 1956

GEOL: Disseminated uraninite and minor uranophane in Dripping Spring Quartzite within 10 ft. or so and symmetrically disposed about a narrow well-defined fissure vein less than 0.5 inches wide and filled with ankerite, minor sulfides, and purple fluorite. Ore zone is vertical, tabular, trends NNE, is about 1.5 ft. thick and is truncated upward by a bedding plane fault. Like the Rock Canyon occurrence, the uraninite is seen only in the adjacent quartzite and not in the fissure vein itself.

REF: PRR-AP-364
Granger, H. and Raup, R. (1969a & b)
Schwartz, R. (1957, RME -2071)

TREK CLAIMS

LOC: SE¼ Sec. 19, T8N, R10E

QUAD: Payson 15'; Holbrook NTMS

RAD: 30X

ANAL: 0.18% e U_3O_8

GEOL: Meta-volcanics and metasediments of older Precambrian Alder series, displaying WNW and NE fracture sets. Fluorescent autunite noted.

REF: PRR-AP-322

UNNAMED A

LOC: East of center, Sec. 4, T3S, R15E, probably 0.5 miles WSW of El Capitan Mine-Pinal Mtns.

QUAD: El Capitan 7½'; Mesa NTMS

DEVL: 4 short adits

RAD: 4X

GEOL: Dripping Spring Quartzite with intrusive diabase, limonite and copper oxide shows.

REF: PRR-AP-149
Cornwall, H. and Krieger, M. (1978)

UNNAMED B

LOC: Approx. T5N, R16E, 33°49' 40"N, 110° 36' 15"W about 8 miles downstream from Hwy. 77 bridge across Salt River, about 20' above river level.

QUAD: Blue House Mtn. 15'; Mesa NTMS

RAD: 14X

GEOL: Spring deposit consisting of $CaCO_3$, iron oxides, NaCL 20 ft. above Salt River or north bank. Goethite is uranium-bearing constituent.

REF: PRR-AP-144

UNNAMED C

LOC: Center Sec. 7, T1S, RISE 1.7 mi. NE of Madera Peak

QUAD: Pinal Pk 7½; Mesa NTMS

DEVL: Small adits, caved shaft

PROD: Copper

RAD: 6X

GEOL: Copper carbonate vein in Pinal Schist

REF: PRR-AP-158

UNNAMED D

LOC: SE¼ SE¼ Sec. 35, T11N, R13E Colcord Rd.-1.5 miles NNW of Turkey Pk.

QUAD: Woods Canyon 15'; Holbrook NTMS

DEVL: One small pit just west of a N-S trending side road.

ANAL: 1.4% Cu, 0.001% Ag, 7-14 ppm U by weight in grab sample

GEOL: Pennsylvanian -Permian Naco -Supai Formations contain lenses of limestone pebble conglomerate and fossil plant trash in a sandstone section.

REF: Peirce, W. and others (1977)

UNNAMED E

LOC: 33° 58'58", 110° 17' 13"W in road cut along Highway 60-77, 0.5 mile of Highway bridge crossing of Carrizo Creek.

QUAD: Carrizo 7.5; Mesa AMS

DEVL: Highway roadcut

ANAL: 0.03-0.11% Cu, 5-15 ppm V, 10-14 ppm uranium by weight

GEOL: 30 ft. thick conglomeratic channel with rare plant impressions gives above analyses for mudstones, and conglomerates; in Penn-Permian Naco-Supai formations.

REF: Peirce, W. and others (1977)

UNNAMED F

LOC: Center of N½ of SW¼, Sec. 24, T5N, R13E, 1.7 miles WSW of Asbestos Creek on east cliff above Parker Creek.

QUAD: McFadden Peak 15'; Mesa NTMS

DEVL: 2 shallow rim cuts, 3 prospect pits along very edge of canyon rim.

RAD: 6X, along N70° W trending fractures

GEOL: Upper member of Dripping Spring Quartzite is exposed on bench in Section 24. Prospects were cut into cliff edge along N70°W fractures (to 6X) and N65° fractures (to 4X), entire area around here slightly anomalous in radioactivity (150-300 cps on Mt. Sopris scintillometer)

REF: Kaiser (1951), p.8.
Arizona Bureau of Geology data

UNNAMED G

LOC: Sec. 7-8, T7N, R10E

QUAD: Kayler Butte 7½'; Mesa NTMS

RAD: 2X

GEOL: Rhyolite exposed in roadcut

REF: Waechter, N. (1979)

URANIUM No. 1 (Jackie)

referred to as near Jackie Claims of Red Bluff area in PRR-A-P-180 (1954)

URANIUM #1-17

LOC: Approx. NW¼ Sec. 2, T6N, R12E, W. rim of Sierra Ancha Mtns., 1.9 mi. WSW of Buck (Lauffer) Pk.

QUAD: Copper Mtn. 7½'; Mesa NTMS

RAD: 6X

GEOL: Metatorbernite in upper member of Dripping Spring Quartzite under diabase sill.

REF: PRR-AP-242

WALNUT CREEK (American Asbestos Cement Co.)

LOC: NE¼ Sec. 25, T8N, R14E,
along Walnut Creek upstream from Cherry Creek

QUAD: Young 15'; Holbrook NTMS

RAD: 12X

ANAL: 0.2% e U_3O_8; 0.2% U_3O_8

GEOL: Uranophane and torbernite with limonite in upper member of Dripping Spring Quartzite.

REF: PRR-AP-43
PRR-D-717

WILLIAMS SHAFT (Black Hawk)

WILSON CREEK (Shepp)

WORKMAN MINE (Refer to Little Joe and Hope Claims)

LOC: NE¼ SW¼ Sec. 19, T6N, R14E,
NE side of Workman Creek about 0.65 miles E of Globe-Young Rd.

QUAD: McFadden Peak 15'; Mesa NTMS

DEVL: 3 adits, stopes

PROD: 258 tons @ 0.11% U_3O_8, 1955-56 from W-1 adit only.

GEOL: Uraninite and coffinite are primary ore minerals and occur as veinlets and blebs along NNE trending zone. Pyrite, molybdenite, chalcopyrite, marcasite and pyrrhotite disseminated in host rock. Quartzite is beneath Mescal Limestone and underlain by diabase.

REF: PRR-AP-221
Granger, H. and Raup, R. (1959, 1969 a and b)

YO TAMBIEN, HAMILTON, PINTO, CARLOTTA, AND BLACK BESS

LOC: 33° 22' 30" to 23' 20" N; 110° 58' to 111° 00'W

QUAD: Inspiration 7½'; Mesa NTMS

DEVL: Pits, shafts, adits

PROD: Copper

RAD: 3X

GEOL: Mineralized quartz veins in granite, granodiorite, schist and limestone.

REF: PRR-AP-157

YORK #1-4 CLAIMS (American Asbestos Cement Co.)

LOC: Very near center of Sec. 31, T8N, R15E, about 0.5 miles upstream from Shepp No. 1 claims, both on Wilson Creek.

QUAD: McFadden Peak 15'; Mesa NTMS

GEOL: Dripping Spring Quartzite

REF: Arizona Bureau of Geology Data

ZORA CLAIMS (Interstate Group)

GRAHAM COUNTY

ATHABASKA CLAIMS

LOC: Sec. 33, T7S, R21E
Aravaipa

QUAD: Buford Hill 7½'; Tucson NTMS

DEVL: Prospect pit and 30 ft. adit

RAD: 5X

GEOL: Iron oxide stained quartz vein in granite

REF: PRR-AP-377 (#374)

BIG LOAD AND WHITE ROCK CLAIMS

LOC: SE¼ Sec. 20, T10S, R25E, around Cove Spring

QUAD: Stockton Pass 7½; Silver City NTMS

DEVL: Six small prospect pits

RAD: 50X on soil

ANAL: 0.26% e U_3O_8

GEOL: Most radioactivity in residual soil near spring in highly fractured Precambrian granite. Spring water at Cove Spring is radioactive due to radon, and assays to 150 ppm uranium in water.

REF: PRR-AP-358 (#368)

BLUE BIRD CLAIMS

LOC: 32° 40' 10"; 109° 44' 03"
Probably SW¼ of Sec. 6 T9S, R26E

QUAD: Artesia 7½; Silver City NTMS

DEVL: Prospect pits

RAD: 25X

ANAL: 0.07% e U_3O_8

GEOL: Pegmatite dike in Precambrian granite.

REF: PRR-AP-373 #370

BLUFF

LOC: Sec. 28, T5S, R21E
Turnbull

QUAD: Jackson Mtn. 7½'; Tucson NTMS

DEVL: Prospect pit

RAD: 11X

ANAL: 0.015% e U_3O_8

GEOL: Small mineralized fracture in coarse-grained granite.

REF: PRR-AP-275 (#361)

BRUSHY BASIN

LOC: Sec. 9, T5S, R21E
Turnbull

QUAD: Bylas 15'; Mesa NTMS

RAD: 12X

ANAL: 0.013% e U_3O_8

GEOL: Radioactivity associated with iron oxides in altered zone near contact of a diabase intrusive in Precambrian quartzite.

REF: PRR-AP-277 (#363)

CACTUS #1 CLAIM

LOC: Sec. 28, T7S, R21E
Near Larson and McBride Claims

QUAD: Buford Hill 7½; Tucson NTMS

DEVL: Shallow pit

RAD: 15X

ANAL: 0.07% e U_3O_8; 0.025% U_3O_8

GEOL: Quartz vein in granite

REF: PRR-AP-191

CANUK GROUP

LOC: Probably SW¼ Sec. 26 and NW¼ Sec. 35, T8S, R28E

QUAD: Dry Mtn. 7½'; Silver City NTMS

DEVL: Prospect pits

RAD: 20X

ANAL: 5 samples @ 0.01- 0.07% e U_3O_8

GEOL: Carnotite-type mineral coatings on fractures in opalized beds in lake sediments, tuffs and gravels of Pliocene age.

REF: PRR-AP-375 (#373)

DENNY CLAIMS

LOC: Sec. 14, T7S, R21E

QUAD: Buford Hill 7½'; Tucson NTMS

DEVL: 3 prospect pits

RAD: 40X

ANAL: 0.07% e U_3O_8

GEOL: Pegmatite with iron oxides in Precambrian granite.

REF: PRR-AP-374 (#371)

FLAT TIRE GROUP

LOC: SW¼ NW¼ Sec. 27, T8S, R28E (revised location from PRR) on old 111 Ranch (32° 42' 38"N, 109° 28' 30"W)

QUAD: Dry Mtn. 7½; Silver City NTMS

DEVL: 30 ft. shaft and 3 trenches

PROD: 4 tons @ 0.02% U_3O_8 in 1955, 9 tons @ 0.11% U_3O_8 in 1958.

RAD: 35X

ANAL: 0.81% e U_3O_8 and 1.38% U_3O_8

GEOL: Carnotite coating fractures and disseminated in 12-15 ft. bed of hard greenish-brown clay of Pliocene lacustrine and paludal sedimentary sequence. A brown hard limestone bed 5-10 ft. above mined layers counts to 10X in several adjacent areas and assays 0.1% Uran. and 0.1% organic carbon. Some strata near the claims are anomalous over a considerable area. (NURE data)

REF: PRR-AP-381 (524), ABG field work

FLUORITE CLAIMS

LOC: Sec. 29, T11S, R26E
Teviston

QUAD: Luzena 15'; Silver City NTMS

DEVL: 12 ft. shaft and pits

ANAL: 0.017% e U_3O_8

GEOL: 1 ft. wide shear zone in granite with fluorite and iron oxides. Strike is NNE, dip 78°W.

REF: PRR-AP-254 (#360)

GOLONDRINA CLAIMS

LOC: Approx. SE¼ Sec. 13, T11S, R25E
Pinaleno Mtns.

QUAD: Luzena 15'; Silver City NTMS

DEVL: 2 shafts, caved adits, prospect pits

PROD: Small amount of Cu, Pb, Ag

RAD: 2X

ANAL: 0.26% e U_3O_8 and 0.603% U_3O_8

GEOL: Broad shear zone in dark volcanic porphry with 1 inch long feldspar phenocrysts. Porphyry is cut by granite dike nearby. Radioactive pyromorphite, quartz and limonite in cavities and fractures. Also some radioactivity in volcanic agglomerate layer. Analysis of ore indicates high Pb, Zn, As, Cd, low Mo and Cu, and 100 ppm U (NURE data).

REF: PRR-AP-68 (#356)
PRR-1940 USGS (#351)
Granger, H. and Raup, R. (1962)
Wright, R. J. (1950, RMO-590-RMO-679)
Kaiser, E. P. (TEM-219)
NURE data

HIGH NOON GROUP

LOC: Sec. 24, T11S, R26S
Teviston

QUAD: Luzena 15'; Silver City NTMS

DEVL: Dozed area

RAD: 40X

ANAL: 0.05% e U_3O_8

GEOL: 1-3 ft. wide vein and altered zone in granite. Copper and iron sulfides and iron oxides.

REF: PRR-AP-380 (#377)

HOT ROCKS CLAIM

LOC: Approx. E½, T9S, R25E

QUAD: Mt. Graham 15'; Silver City NTMS

DEVL: Dozer cuts and pits

RAD: 7X

ANAL: 0.06% e U_3O_8

GEOL: Faulted rhyolite dike in Precambrian granite. Mineralization occurs in several echelon faults.

REF: PRR-AP-372 (#369)

LARSON AND MC BRIDE

LOC: Sec. 28, T7S, R21E
Near Cactus Claims

QUAD: Buford Hill 7½'; Tucson NTMS

RAD: 13X

ANAL: 0.04% e U_3O_8

GEOL: Radioactivity in quartz vein with purple fluorite in altered granite.

REF: PRR-AP-165

LAST CHANCE GROUP

LOC: Probably NE¼ Sec. 28, T8S, R28E

QUAD: Dry Mtn. 7½'; Silver City, NTMS

DEVL: Location work

RAD: 42X

ANAL: 0.02% e U_3O_8

GEOL: Carnotite-type coatings in opalized seams in bedded clay and tuff, capped by rhyolite flow.

REF: PRR-AP-379 (#376)

LUCKY STRIKE #1

LOC: Sec. 28, T7S, R21E
Pinaleno Mtns.

QUAD: Buford Hills 7½'; Tucson NTMS

DEVL: Prospect pit

RAD: 3X

ANAL: Assay showed predominance of thorium

REF: PRR-AP-196 (#359)

McBRIDE (Larson)

MOSS CLAIMS

LOC: Sec. 16, T7S, R21E
Santa Teresas Mtns.-Mt. Turnbull

QUAD: Buford Hill 7½'; Tucson NTMS

DEVL: Prospect pits

RAD: 4X

GEOL: Radioactivity associated with fractures coated with hematite in a quartz vein in granite.

REF: PRR-AP-278 (#364)

PLUTO GROUP

LOC: Probably central Sec. 27, T8S, R28E

QUAD: Dry Mtn. 7½'; Silver City NTMS

DEVL: Dozer cut

RAD: 10X

ANAL: 0.01% e U_3O_8

GEOL: Radioactivity associated with interbedded clays and tuffs in Late Cenozoic sediments.

REF: PRR-AP-378 (#375)

ROYAL JOHN

LOC: Probably central Sec. 27, T8S, R28E
Gila River

QUAD: Dry Mtn. 7½'; Silver City NTMS

DEVL: Dozer cuts and pit

RAD: 10X

ANAL: 0.01% e U_3O_8

GEOL: Carnotite-type mineralization in interbedded clays and tuffs in lake bed sediments of Late Cenozoic age.

S & W CLAIM

LOC: Probably SW¼ Sec. 5, T10S, R26E
west of Baker Peak

QUAD: Gillespie Mtn. 7½'; Silver City NTMS

DEVL: One large and several small pits

RAD: 5X

GEOL: Small crystals of samarskite associated with smoky quartz and orthoclase in a pematite dike in granite.

REF: PRR-AP-313 (#365)

SKY HIGH CLAIM

LOC: Sec. 28, T7S, R21E
Klondike

QUAD: Buford Hill 7½; Tucson NTMS

DEVL: Prospect pit

RAD: 4X

ANAL: 0.081% e U_3O_8

GEOL: Radioactivity associated with smoky quartz in a quartz vein in granite porphyry. Fracture surfaces coated with hematite.

REF: PRR-AP-276 (#362)

STONY PEAK CLAIMS

LOC: NW¼ Sec. 21, T10S, R25E, at about 5,250 ft. elevation, 1.0 mile ENE of Cove Spring on hillside.

QUAD: Stockton Pass 7½'; Silver City NTMS

DEVL: Prospect pits

RAD: 200X

ANAL: 0.14 - 0.27% U_3O_8

GEOL: Radioactivity concentrated along N40-50°E striking fractures in granite. Stringers of fluorite and associated autunite and uranophane.

REF: PRR-A-110 (#354)

TRIBAL CLAIM

LOC: Approx. Sec. 33, T2S, R22E
San Carlos Indian Reservation

QUAD: Bylas 15'; Mesa NTMS

DEVL: Open cut and shallow pit

RAD: 2X

GEOL: Radioactivity in porphyritic dike associated with fault zone cutting limestone and quartzite. Stringers of chalcopyrite and copper carbonates in fault zone.

REF: PRR-D-607 (#381)

UNNAMED A

LOC: Sec. 20, T8S, R28E

QUAD: Artesia NE 7½'; Silver City NTMS

DEVL: Drilling

GEOL: Mineralization in E-W trending gravel channels in basin fill under Pleistocene gravel caps.

REF: Arizona Bureau of Geology file data

UNNAMED B

LOC: 33° 17-18'N, 110° 20-25'W
near San Carlos Lake north of Hwy. 70

QUAD: San Carlos and Mt. Triplet 7½'; Mesa NTMS

DEVL: Drilled 1977-78

RAD: 4X

GEOL: Disseminated radioactive mineral(s) in mudstones and marls of Pliocene lake beds.

REF: Arizona Bureau of Geology file data

UNNAMED C - STOCKTON PASS

LOC: Southern Sec. 16, northern Sec. 21, T10S, R25E (protracted) (See nearby Stony Peak locality)

QUAD: Mt. Graham 15'; Silver City NTMS

DEVL: Several N55°W elongate dozer cuts

RAD: 10-30X

ANAL: 0.05 - 0.10% on select along dozer cuts

GEOL: N55°W trending splinter faults of Stockton Pass fault zone cut Precambrian granite. Black uranium minerals present. Nearby Cove Spring (SE¼ Sec. 20) has radon and assays to 150 ppm chemical uranium.

REF: ABG files.

WHITE BLUFFS URANIUM AREA

LOC: NW¼ NE¼ NE¼ Sec. 33, T8S, R28E
111 Ranch Area (32° 41' 54" N, 109° 28' 49"W)

QUAD: Dry Mtn. 7½'; Silver City NTMS

DEVL: Dozer cuts, prospect pits

RAD: 3-10X

ANAL: 0.08% e U_3O_8

GEOL: Uranophane coatings along bedding planes and on fractures in siliceous lake beds interbedded with diatomaceous earth, bentonitic clay, mudstones, and thin vitric ash-fall tuffs of Pliocene paludal sediments. Yellow stained opal lenses in diatomite and disseminated radioactivity in light-colored calcic paludal beds. Dark chert contains 150-450 ppm uranium.

REF: PRR-AP-330 (#366)
ABG file data

WHITE ROCK (Big Load)

Greenlee County listing

MORENCI DISTRICT

LOC: S½, T3S, R29E, N½, T4S, R29E

QUAD: Clifton 15'; Clifton NTMS

DEVL: Major open pit copper mine operated by Phelps Dodge Corp.

PROD: Some uranium may be recoverable from leach solutions

GEOL: Uranium minerals associated with quartz monzonite porphyry copper deposit. Details lacking.

REF: PRR-AP-73 (#385)

MARICOPA COUNTY

AGUILA (Refer to Black Butte, Milton Ray and Jar)

ALTUDA MINE

LOC: SW¼ Sec. 19, T7S, R1W

QUAD: Estrello 15'; Ajo NTMS

DEVL: 150 ft. and 200 ft. shaft and incline; surface pits, gold and silver prospect.

RAD: 3X

GEOL: Quartz veins in coarsely prophyritic granitic rock in contact with schist and gneiss.

REF: PRR-AP-98 (#409)

ARROWHEAD (Faith-in-Group; Rusty Point)

LOC: Sec. 31, T1S, R3W

QUAD: Avondale SW 7½'; Phoenix NTMS

RAD: 80X

ANAL: 0.07-3.61% e U_3O_8; 0.04-2.55% U_3O_8

GEOL: Uranium-titanium rare-earth minerals in pegmatite dike and quartz veins intruding sheared and weathered granite. Pegmatite is 10-15 ft. wide and trends N3°E. Gummite, columbite, and euxenite noted. Titanium, columbium, yttrium and thorium spectroscopically identified.

REF: PRR-AP-295 (#419)
D.O.E.

B & M (Bickle and Manley)

BALANCED ROCK #1

LOC: Sec. 5, T2S, R3W

QUAD: Avondale SW7½'; Phoenix NTMS

DEVL: Discovery pit

RAD: 25X

ANAL: 0.06-0.24% e U_3O_8; 0.105-0.191% U_3O_8

GEOL: Radioactivity in pegmatite dikes up to 10 ft. wide and trending N10-20°E intruding sheared and weathered granite. Altered zircons, fergusonite and polycrase noted. Thorium also present.

REF: PRR-AP-296 (#420)
D.O.E.

BICKLE AND MANLEY (B & M)

LOC: Approx. SW¼ Sec. 12, T6N, R5E
Blue Wash Creek

QUAD: Humbolt Mtn. 7½'; Mesa NTMS

DEVL: 35 ft. vertical shaft in creek bed, now filled with sand. Surface pit on edge of creek produced ore.

PROD: 32 tons @ 0.17% U_3O_8, 1955; 2 equal size shipments of 0.06 and 0.22% U_3O_8

RAD: 500X. Some thorium in pegmatites.

ANAL: 0.01-1.52% e U_3O_8; 0.05-1.05% U_3O_8; and 0.88-1.24% ThO_2

GEOL: Mineralization occurs at the intersection of two NE and NW trending shears, 10 ft. west of vertical fault zone. Pegmatite also intrudes the coarse-grained biotite granite. Uranothorite noted. Yellow uranium mineral noted with fluorite and calcite.

REF: PRR-AP-340 (#421)
D.O.E.

BLACK BUTTE

LOC: Sec. 19, 20, T6N, R7W

QUAD: Vulture Mtns. 15'; Phoenix NTMS

DEVL: Trenching

RAD: 3X

ANAL: 0.013% e U_3O_8

GEOL: Secondary uranium minerals occur in fractures and bedding planes in basalt capped tertiary lake bed sediments and tuffs. Beds strike N20°W to N70°W and dip 25-65°S.

REF: PRR-AP-343 (#424)

BLACK MAGIC CLAIMS

LOC: Approx. S½, T4N, R9W

QUAD: Big Horn Mtns. 15'; Phoenix

DEVL: Prospect pits

RAD: 4X

ANAL: 0.012% e U_3O_8; 0.009% U_3O_8

GEOL: Radioactivity in placer sands due to uranium bearing sphene and zircon.

REF: PRR-AP-2 (#406)

BLACK MOUNTAIN #4 & 6 (Black Mtn. Vanadium #22)

LOC: Probably Sec. 14, T6N, R7W

QUAD: Vulture Mtns. 15'; Phoenix

RAD: 5X

GEOL: Carnotite and gypsum on fracture surfaces in shaley marl underlain by metamorphic rocks and overlain by thin basalt flow.

REF: PRR-189 (#387)

BLACK MOUNTAIN VANADIUM #22 (Refer to Black Mountain)

BLUE JAY CLAIMS

LOC: Probably T7N, R5W, "Go west from Wickenburg on Hwy 60-70 2.3 mi. past underpass, turn left on Vulture Mine Road, go 5.7 mi., turn left on Jeep Road; proceed 1.8 mi. to property.

QUAD: Vulture Mtns. 15'; Phoenix NTMS

RAD: 2X

GEOL: Pegmatite dike in granite

BLUE SPRINGS CANYON (Malapai)

CAVE CREEK AREA

LOC: S½ NW¼ Sec. 15, T6N, R4E
Willow Springs Wash

QUAD: Cave Creek 7½; Mesa NTMS

RAD: 7X

GEOL: Radioactivity associated with siliceous stringers and veinlets and a few limey beds. Section contains mudstones, limey beds, vitric ash beds all dipping 30-50° SW and overlain by conglomerate with clasts of Precambrian schist and Tertiary volcanics.

REF: Scarborough, R. & Wilt, J. (1979)

COPPER KID GROUP

LOC: Sec. 10, T6N, R4E

QUAD: Cave Creek and New River Mesa 7½'; Mesa NTMS

DEVL: 70 ft. shaft and pits - lead and silver prospect.

RAD: 17X

ANAL: 0.66-1.13% e U_3O_8; 0.77% U_3O_8

GEOL: Uraninite and/or pitchblende associated with base metal sulfides in aplitic and basic dikes, intruding shear zone in Yavapai schist. Red jasper zone contains uraninite, copper carbonates, galena and barite.

REF: PRR-AP-280 (#418)

COTTONWOOD CLAIMS (Lime Creek Group; Horseshoe Prospects, Fault Claims, Verde Claims)

LOC: S½ Sec. 3, T8N, R6E, and Sec. 4, T7N, R6E
Verde River-Horseshoe Dam near Maricopa-Yavapai Co. line.

QUAD: Humbolt Mtn. 7½'; Mesa NTMS

DEVL: 105 ft. drift, 70 ft. shaft, drilling

PROD: 25 tons @ 0.10% U_3O_8, 1956-57
53 tons @ 0.10-0.15% U_3O_8 stockpiled

RAD: 85X

ANAL: 0.52% e U_3O_8; 0.03-0.56% U_3O_8

GEOL: Pitchblende and autunite occurs along shear zone in Precambrian granite. Fault strikes NE and dips 80° SE. Fault breccia includes material from highly altered rhyolite dike.

REF: PRR-AP-341 (#422)
Gatten, O. (1977)
D.O.E.

COUGAR CLAIMS (Lucky Find Group)

DALE-COMPTON #5 and #8

LOC: Sec. 24, T1S, R3W and Sec. 21, T1S, R3W, respectively.

QUAD: Buckeye 7½'; Phoenix NTMS

DEVL: 2 location pits

RAD: 24X

GEOL: Possibly samarskite with copper and iron stain in a pegmatite vein cutting schistose granite.

REF: PRR-AP-133 (#415)

DREAMER GROUP #1-39

LOC: Approx. SE¼ Sec. 21, T40N, R16W
Virgin Valley

QUAD: Mesquite (Nevada-Arizona) 7½; Las Vegas NTMS

DEVL: Prospect pits

RAD: 5X

ANAL: 0.02% e U_3O_8; 0.026% U_3O_8

GEOL: Carnotite-type minerals along fracture planes in Tertiary sandstone of the "Littlefield Fm."

REF: PRR-RR-285 (#450)
Blair, W. & Armstrong, A. (1979)

DUKE, WHITE AND HYDER CLAIMS

LOC: Approx. Sec. 36, T2S, R10W

QUAD: Dendora Valley 15'; Phoenix NTMS

DEVL: Discovery shaft and drill holes

RAD: 4X

ANAL: 0.01% e U_3O_8

GEOL: Radioactivity in Tertiary shale - mudstone lake bed sediments capped by tuff and volcanics and intruded by Northwest trending dikes.

REF: PRR-AP-382 (#482)

FAITH-IN-GROUP (Arrowhead)

FAULT CLAIMS (Cottonwood Claims)

GOLDEN DUCK GROUP (Shamrock Mining and Development Co.)

LOC: E½ Sec. 19, T7N, R2W
Wickenburg area on Maricopa-Yavapai County line

QUAD: Red Picacho and Garfias Mtn. 7½', Phoenix NTMS

DEVL: Shafts, adits, prospects

PROD: Copper and gold

RAD: 100X

ANAL: 0.03-0.55% e U_3O_8; 0.14-0.57% U_3O_8

GEOL: Fractures in pegmatite cutting Precambrian complex are coated with yellow uranium minerals. Tertiary volcanic series of pyroclastics and flow with basal conglomerate covers Precambrian complex. Pods of torbernite, metaautunite, schroekingerite and uranocircite in porphyritic rhyolite tuff in vent complex. Spotty uranium minerals, chalky turquoise, chrysocolla, iron oxides, and secondary quartz disseminated in fault gouge along shear zone, trending N30°W.

REF: PRR-A-77 (#402)
PRR-AP-347 (#831)
Finch, W. (1967)
Arizona Bureau of Geology data

GYPSY QUEEN

LOC: Sec. 9, T4N, R5E

QUAD: McDowell Peak 7½'; Mesa NTMS

RAD: 4X

GEOL: Decomposed granite

REF: PRR-A-47 (#390)

HORSESHOE DAM (Refer to Horseshoe Prospects)

LOC: Approx. 33° 58.S'N, 111° 44'W
Lower Verde River

QUAD: Horseshoe Dam 7½'; Mesa NTMS

RAD: 5X

GEOL: Radioactivity in limestone beds and in silicified zones near high angle faults. Intense silicification. Tuff and limestone sequences underlain by basalts and in fault contact to the west with Precambrian granite and to south with younger flat lying basalt capped sediments.

REF: Scarborough, R. & Wilt, J. (1979)

HORSESHOE PROSPECTS (Cottonwood, Lucky Find, Cougar)

HOWELL PROSPECT

LOC: SW¼, NE ¼, Sec. 28, T7N, R4E

QUAD: New River Mesa 7½; Mesa NTMS

RAD: 6X

ANAL: 0.02% U_3O_8

GEOL: Radioactive basalt cobbles with brown bentonite matrix in 50 X 50 ft. area surrounding a spring. Dull yellow stain on rocks. Thick tuff beds to north on New River Mesa.

REF: Waechter, N. (1979)

HYDER (Duke, White and Hyder)

JAR

LOC: Sec. 13, 14, T6N, R8W
Black Butte, Vulture Mtns.

QUAD: Aguilla 15'; Phoenix NTMS

DEVL: Test pits

RAD: 7X

ANAL: 0.01% e U_3O_8; 0.01% U_3O_8

GEOL: Carnotite coating fractures and bedding planes in Tertiary lake beds. Sediments consist of marls, limestones, thinly bedded greenish mudstone and sandstone, capped by vesicular basalt and intruded by dikes. Lake beds strike NW, dip 25-45°S and are locally overturned.

REF: PRR-AP-342 (#423)

LIME CREEK (Cottonwood, Cougar)

LOS CUATROS GROUP

LOC: Sec. 32, 33, T7N, R3E, Sec. 5, T6N, R3E
New River

QUAD: Daisy Mtn. 7½'; Phoenix NTMS

DEVL: Drilled

RAD: 5X

ANAL: 0.06% U_3O_8

GEOL: Mineralization disseminated in aphanitic dolomite beds interbedded with mudstones, and sparce volcanic ash beds. This section also in fault contact to the west along west edge of Section 32 with tilted basalt-tuff-mudstone section. Section down faulted against Yavapai schist to north.

REF: PRR-A-76 (#401)
Scarborough and Wilt (1979)

LUCKY FIND GROUP (Cougar Claims; Horseshoe Prospects)

LOC: Sec. 25, 36, T8N, R6E; Sec. 31, T8N, R7E, Sec. 1, T7N, R6E, Sec. 5, 6, T7N, R7E.

QUAD: Horseshoe Dam and Chalk Mtn. 7½; Mesa NTMS near Maricopa-Yavapai Co. line.

DEVL: Prospect pits

PROD: 5 tons @ 0.12% U_3O_8 stockpiled

RAD: 70X

ANAL: 0.06-0.49% e U_3O_8-0.26% U_3O_8

GEOL: Uraninite, allanite and secondary green fluorescent uranium mineral associated with a fault zone and altered dike in Precambrian granite.

REF: PRR-A-96 (#404)
PRR-A-48 (#400)
Gatten, O. (1977)

MALAPAI #1 (Blue Springs Canyon)

LOC: Approx. 33° 35'45"N, 111°26'15"W

QUAD: Mormon Flat Dam 7½'; Mesa NTMS

DEVL: Pits

PROD: 8 tons @ 0.02% U_3O_8; 0.04% V_2O_5, 1955

GEOL: Uranium disseminated in Precambrian granite and granite derived sediments.

REF: D.O.E.

MILTON RAY CLAIMS

LOC: Sec. 21, 22, T6N, R7W

QUAD: Vulture Mtns. 15'; Phoenix NTMS

DEVL: Numerous small cuts and trenches

RAD: 7X

ANAL: May be out of equilibrium in favor of count rate

GEOL: Carnotite occurs as fracture coatings and along bedding planes in Tertiary vitric tuff and clastic sediments. Tuffs, clastics, arkosic conglomerate and andesite flows are deposited on a granite and capped by basalt.

REF: PRR-AP-83 (#408)
Finch, W. (1967)

NAPSACK

LOC: SW¼ Sec. 33, T7N, R5E

QUAD: Humbolt Mtn. 7½'; Mesa NTMS

DEVL: 8 adits, raises and stopes

PROD: Gold

RAD: 10X

GEOL: Radioactivity associated with quartz veins and granitic intrusive in schist, capped by basalt.

REF: PRR-AP-129 (#413)

PLOW SADDLE CLAIMS #1-20

LOC: 33° 31'N, 111° 10'30" W
Superstition Mtns.

QUAD: Pinyon Mtn. 7½'; Mesa NTMS

DEVL: 2 small workings

RAD: 25X

GEOL: Radioactivity in Tertiary gravels and sands capped by basalt and appear to lie on eroded surface cut into Precambrian Apache Group.

REF: PRR-AP-367

RED ROVER MINE

LOC: Approx. 34° 35'N, 111° 50' 40" W

QUAD: Rover Peak 7½'; Holbrook NTMS

DEVL: 3 shafts (one 850 ft. deep), several adits

PROD: 760,000 lbs Cu, 300,000 oz. Ag, 73 oz Au between 1913-1970.

RAD: 3X

GEOL: Veins along fault zone in schist

REF: PRR-AP-128 (#412)

RIFLE RANGE SECTION

LOC: Sec. 3, 4, T5N, R2E, Sec. 33, 34, T6N, R2E
Isolated Hill at I-17 and Carefree Hwy.

QUAD: Biscuit Flats 7½; Phoenix NTMS

RAD: 3X

GEOL: Radioactivity associated with chert pods and stringers in 2 dolomite beds in northward dipping section of lower arkosic sediments, capped by dark volcanic section. Dolomites near base of volcanics.

REF: Scarborough, R. and Wilt, J. (1979)

RUSTY POINT (Arrowhead)

SHAMROCK MINING AND DEVELOPMENT CO. (Golden Duck)

STRIPPED MOUNTAIN CLAIMS

LOC: Sec. 10, T2S, R4W
Buckeye

QUAD: Hassayampa 7½'; Phoenix NTMS

DEVL: Small prospect pits

RAD: 100X

ANAL: 0.01-0.38% e U_3O_8; 0.006-0.018% U_3O_8
pegmatite @ 0.01-0.74% U_3O_8; 1.8% Te_2O_5; 10.5% Ni_2O_5

GEOL: Possibly euxenite, samarskite, monazite and rare earth minerals in pegmatite dike complex intruding granite.

REF: PRR-AP-1 (#405)

SUNSET #1-3

LOC: Sec. 31, T1S, R3W

QUAD: Buckeye 7½'; Phoenix NTMS

DEVL: Small pits

RAD: 0.5 mr/hr.

ANAL: 0.39% e U_3O_8; 0.38% U_3O_8

GEOL: Brannerite in quartz veins cutting granodiorite

REF: PRR-AP-243 (#416)

TELEGRAPH

LOC: Approx. 33° 43'N, 111° 32' 35"W
near Tarantula and Twin Delta Claims

QUAD: Adams Mesa 7½'; Mesa NTMS

DEVL: Location pit

RAD: 20X

GEOL: Radioactivity associated with pocket of oxidized biotite in pegmatites cutting Precambrian granite.

REF: PRR-A-68

TARANTULA AND TWIN DELTA CLAIMS

LOC: Approx. 32° 42' 30"N, 111° 33' 00"W
T4N, R7E, 8 mi. up Sycamore Creek from its junction with the Verde River.

QUAD: Adams Mesa 7½'; Mesa NTMS

DEVL: Several location pits

RAD: 50X

ANAL: 0.08-0.57% e U_3O_8

GEOL: Small pockets of allanite and oxidized biotite in pegmatite in Precambrian granite porphyry.

REF: PRR-A-80 (#403)

TWIN DELTA (Refer to Tarantula)

VALCARCE CLAIM

LOC: Sec. 4, T6N, R4E

QUAD: New River Mesa 7½'; Mesa NTMS

RAD: 4 mr/hr.

ANAL: 0.08-0.29% e U_3O_8

GEOL: Radioactivity associated with altered pink feldspar in biotite granite. Altered thorite noted.

REF: PRR-AP-279 (#417)

VERDE CLAIMS (Cottonwood)

WHITE (Duke, White and Hyder)

WHITE POINT GROUP

LOC: Approx. 33° 43' 30"N, 111° 55'W
5 miles NE of Bickle and Manley Claim

QUAD: Horseshoe Dam 7½'; Mesa NTMS

DEVL: Prospect pits and dozer cuts

RAD: 5X

ANAL: 3.92% e U_3O_8; 5.75% U_3O_8
contains U, Th, Yt, Cr, Zr, Mn, Fe

GEOL: Pegmatite cutting granite.

REF: PRR-A-11 (#388)

Index for Mohave County Uranium Occurrences

	Name
K 44	Banner
W 66A	Big Ledge Mine
K 45	Big Silica Mine
W 63	Blazing Star
K 30	Blendina
P 79	Blue Smoke
K 39	Bobtail Mine
K 46	Bunker Hill
P 76	Candy Bar
P 68	Catherine and Michaels
L 13	Cedar Wash
K 48	Cerbat Mine
K 56	Champion Mine
G 21	Chapel
P 80	Cheryl M.
K 26	Cisco
G 22	Copper House
G 22	Copper House Colition
G 23	Copper Mountain Mine
K 29	Corley, Lind, and Ellington Mine
G 18	Cunningham Mine
K 52	Cupal Mine
K 25	Dab #1 and Dagmar
K 43	Dela Fontaine Mine
G 4	Delta
W 65	Democrat Mine
K 37	Detroit
K 55	Diplomat
L 2	Dreamer
P 74	Ester Basin
K 59	Eva, Marion, Esther & White Elephant
G 9	Fredonia
K 54	Frontier and Frontier #2
K 53	Gold Nugget
W 35	H.E.C. Prospect
G 15	Hack Canyon Mine
W 33	Hillside & Quartz Mountain
K 61	Hopkins-Feldspar
G 12	Iris
K 51	J.C. and Fort Lee
K 31	Jessie Belle
K 49	Jim Kane
G 1	Kaibab Indian Reservation Lease
G 10	Katy
G 5	Kim
K 28	Kisse-Mitchell
P 71	Kistler
G 8	Little Three
P 72	Lucky Four
K 24	Lucky 44
K 57	Lucky Friday
P 69	Madrill and Ievial
K 60	Mammoth
P 75	Masterson
K 50	Midday
K 62	Mineral X
W 36	Mohave Fluorspar
K 47	Mohawk Mine
G 14	Mustang
K 41	Primrose Mine
K 40	Prosperity
W 66	Quartzite
G 6	Radon
G 7	Rainbow
K 27	Rainyday
P 78	Red Hills
G 20	Red Wing
G 16	S.S. 58
G 17	Savannic Mine
G 19	School Section
P 70	State Mine
K 38	Summit Mine
N 77	Triple H
W 34	U.S. Government Property
G 11	Unnamed A
N 67	Unnamed B
W 64	Uranium Basin
K 42	Victory Mine
K 58	Western Union
L 3	Wharton
P 73	White Owl

L = Las Vegas
K = Kingman
N = Needles
P = Prescott
G = Grand Canyon
W = Williams

MOHAVE COUNTY

BANNER

LOC: Sec. 4, T22N, R17W
Cerbat Mtns.

QUAD: Stockton Hill 7½'; Kingman NTMS

DEVL: Extensive surface and underground workings

PROD: Base metals

RAD: 10X in gouge and in pool of water

GEOL: Radioactivity associated with base metal mineralization along quartz veins in fault zone with much gouge and some brecciation.

REF: PRR-AR-57 (#514)

BIG LEDGE MINE

LOC: SW¼ sec. 32, T20N, R12W

QUAD: Austin Peak 7½'; Williams NTMS

DEVL: Old mine workings

PROD: Base metals

RAD: 8X

GEOL: Radioactivity in red brecciated and recemented jasper along hanging wall. Granitic rocks cut by shear zone which contains base metal sulfides and carbonates. Other shears in nearby sec. 30 do not count. Shears trend N45°W and N80°E.

REF: PRR-RA-9 (#543 and #438)
Walker and Osterwald (1963)
Wright (1950, RMO-679)
NURE data

BIG SILICA MINE

LOC: Sec. 4, T22N, R17W
Cerbat Mtns.

QUAD: Stockton Hill 7½'; Kingman NTMS

ANAL: 0.10% e U_3O_8

GEOL: Allanite, gadolinite and rare earth beryllium silicate(s)

REF: D.O.E.

BLAZING STAR GROUP

LOC: Approx. NW¼ Sec. 35, T21N, R13W

QUAD: Tin Mtn. NW 7½'; William NTMS

DEVL: 8 ft. deep pit

RAD: 10X

GEOL: Fluoritized and strongly jointed granite weakly anomalous over large area. Radioactivity probably due to accessory minerals, perhaps allanite.

REF: PRR-AP-305 (#454)
Waechter, N. (1979)

BLENDINA GROUP (Plendina)

LOC: Sec. 32, 33, T29N, R22W, and Sec. 4,5, T28N, R22W

QUAD: Willow Beach 7½'; Kingman NTMS

DEVL: Sample cuts

RAD: 15X

ANAL: 0.19% U_3O_8; 0.43% ThO_2 and rare earths

GEOL: Monazite disseminated with magnetite in quartz-feldspar pegmatite cutting granite and metamorphic rocks.

REF: PRR-C-22 (#432)
Waechter, N. (1979)

BLUE SMOKE CLAIM

LOC: NE¼ Sec. 15 and SE¼ Sec. 10, T11N, R14W
Fools Peak area

QUAD: Artillery Peak 15'; Prescott NTMS

DEVL: Drilling

RAD: 10X

ANAL: 0.07% e U_3O_8

GEOL: Radioactivity associated with a klippe of Jurassic or Precambian Granite above low angle east dipping fault or decollement zone.

REF: PRR-AP-228 (#579)
Arizona Bureau of Geology data
Waechter, N. (1979)

BOBTAIL MINE

LOC: SW¼ Sec. 31, T23N, R17W

QUAD: Cerbat 7½'; Kingman NTMS

DEVL: 85 ft. shaft; 200 ft. drift; surface pits and trenches

PROD: Zinc, copper, lead

RAD: 18X

ANAL: 0.093% e U_3O_8; 0.077% U_3O_8

GEOL: Probably uraninite occurs as finely disseminated coatings along shear planes of fault zone. Quartz veins and base metal sulfides associated with this structure which strikes N40°W and dips nearly vertical.

REF: PRR-AP-26 (#488); Hart, O. (1955, RME-2029)
Hart, O. and Hetland, D. (1953, RME - 4026)

BROOKLYN CLAIMS (Detroit Group)

BUNDY PROSPECT (Chapel)

BUNKER HILL

LOC: Sec. 6, T22N, R17W

QUAD: Cerbat 7½'; Kingman NTMS

DEVL: Two drifts and some stoping

RAD: 2X

GEOL: Radioactivity associated with fault gouge and quartz along fault, striking N70°W, dipping 70°N. Heavy bleaching and alteration borders sides of 1 to 3 ft. wide vein. Gold and copper noted.

REF: PRR-AR-71 (#528)

CANDY BAR GROUP

LOC: Approx. N½ Sec. 13, T12N, R13W

QUAD: Artillery Peak 15°; Prescott NTMS

DEVL: 10 ft. adit

RAD: 45X

ANAL: 0.07% e U_3O_8

GEOL: Radioactivity in 3 to 5 ft., thick beds of mudstones and sandstone of the Artillery Fm. overlain by red volcanic flows and underlain by red arkosic conglomerate. Step faulting indicated by repetition of beds in highly faulted area.

REF: PRR-A-81 (#428)

CATHERINE AND MICHAELS

LOC: SE½ Sec. 35, T17N, R12W

QUAD: Tule Wash 7½'; Prescott NTMS

DEVL: Prospect pits

RAD: 5-10X

ANAL: 0.20% e U_3O_8

GEOL: Uraniferous milky-white to greenish opal with irregular patchy manganese oxide in local replacement layer in thinly laminated, poorly consolidated limestone in tilted blocks of fine grain clastics overlying Precambrian granite. The general area contains several anomalies in limestone and mudstones in Miocene-aged sediments. For details, see Scarborough and Wilt (1979).

REF: PRR-w/o# (#465)

CEDAR WASH

LOC: 36°35'18"N; 114° 00' 40"W

QUAD: Virgin Peak 15'; Las Vegas NTMS

GEOL: Carnotite - type mineralization apparently in Shinarump Member, Chinle Fm.

REF: Peirce, H. and others (1970)

CERBAT MINE

LOC: NE¼ Sec. 7, T22N, R17W

QUAD: Cerbat 7½'; Kingman NTMS

DEVL: 750 ft. shaft and drifts

PROD: Gold and silver

RAD: 40X

ANAL: 0.021% e U_3O_8; 0.021% U_3O_8

GEOL: Radioactivity associated with hematite cemented breecia in 3 to 15 ft. wide quartz and gouge filled fault fissure, striking N48°W, dipping nearly vertical.

REF: PRR-AP-7 (#469)

CHAMPION MINE

LOC: Sec. 18, T22N, R17W

QUAD: Cerbat 7½'; Kingman NTMS

DEVL: 500 ft. shaft with five levels

PROD: Gold, lead, silver, zinc

RAD: 3X

GEOL: Radioactivity is associated with mineralization in NNW striking vein, dipping 75°E, along a fault or fissure. Country rock is amphibole schist and gneiss.

REF: PRR-AR-67 (#524)

CHAPEL

LOC: NE¼ Sec. 25, T33N, R10W
Parashant Wash.

QUAD: Whitmore Point 7½'; Grand Canyon NTMS

DEVL: 50 ft. Tunnel driven southward; some drilling done.

PROD: 1.08 ton @ 0.23% U_3O_8, 4.02% Cu, 1.1% $CaCO_3$ in 1954.

RAD: 100X in 1 inch thick Cu-filled joint.

ANAL: 0.34% e U_3O_8; 0.31% U_3O_8; 0.31% U_3O_8; 1.95% Cu

GEOL: Autunite, uranophane and copper minerals in Supai Sandstone and/or Hermit Shale. Supai is bleached along bedding planes; no Redwall Ls is visible in area. Probable breccia pipe structure. Beds in area dip shallow to SE.

REF: PRR-RA-11 (#545)
D.O.E.
Mike Price, Tempe

CHERYL M #1

LOC: Sec. 28, T11N, R14W, location uncertain

QUAD: Artillery Peak 15'; Prescott NTMS

PROD: 29 tons @ 0.01% U_3O_8; 2.46% Ca CO_3 in 1958.

RAD: 20X

GEOL: Ore was apparently in granite or schist. Radioactive hematized quartz veins reportedly intrude foliated granite-gneiss.

REF: Arizona Bureau of Geology Data
D.O.E.

CHIEF CLAIMS (Democrat Mine)

CINCINNATI CLAIM (Summit Mine)

CISCO

LOC: Approx. SW¼ Sec. 23, T30N, R30W

QUAD: Senator Mtn. 15'; Kingman NTMS

DEVL: , Small trenches

ANAL: 0.36% e U_3O_8; 0.348% U_3O_8

GEOL: Carnotite and radioactive opal in small, scattered pockets in a white, friable, tuffaceous limestone of late Cenozoic Age.

REF: PRR-C-96 (#433)
Blair, W. and Armstrong, A. (1979)

COPPER HOUSE #1 & 2

LOC: Sec. 1, 2, T 32N, R11W
Andrus Canyon

QUAD: Yellow John 7½'; Grand Canyon NTMS

DEVL: 30 ft. adit and pits

RAD: 50X

ANAL: 0.18% e U_3O_8; 0.165% U_3O_8; 3.99% Cu; 0.01% V_2O_5

GEOL: No. 1: Toroweap limestone has collapsed 300 ft. through Coconino Sandstone into Hermit Shale. Coconino is altered to yellow and purple. Underlying Supai is bleached. Circular bleached fracture zone reported.
No. 2: Radioactivity along fractures trending N50°W in bleached Supai Fm. Basalt (?) dikes and fault zone in immediate area of mineralization. Both structures are breccia pipes.

REF: PRR-135 (#567)
D.O.E. data

COPPER HOUSE COLITION #2

LOC: Approx. Sec. 1, 2, T 32N, R11W
near Copper House #1

QUAD: Yellow John 7½'; Grand Canyon NTMS

DEVL: Prospect pits

RAD: 5X

ANAL: 0.048% U_3O_8; 0.02% U_2O_5; 4.57% Cu

GEOL: Uranium and copper minerals associated with curving brecciated zone in bleached and fractured course-grained Supai Fm., probable Breccia pipe.

REF: PRR-RR-136 (#568)
Finch, W. (1967)

COPPER MOUNTAIN MINE

LOC: SW¼ Sec. 14, T32N, R10W

QUAD: Whitmore Point 7½'; Grand Canyon NTMS

DEVL: 210 ft. shaft and stopes

PROD: Copper production

RAD: 120X - highest at water table

ANAL: 0.13 -14.1% e U_3O_8

GEOL: Uranium and base metal mineralization in fractures around periphyry of pipe-like collapse structure. Diameter of pipe is about 700 ft. Workings are in Supai Fm., above an unformable contact with Redwall limestone. Supai is bleached. Redwall is cherty. Hermit Shale contains basic dikes. No Toroweap noted in breccia. Toroweap and most of Hermit are eroded away, probable breccia pipe.

REF: PRR-RR-99 (#561)
Finch, W. (1967)

CORLEY, LIND AND ELLINGTON MINE

LOC: Approx. Sec. 6, T 29N, R17W

QUAD: Garnet Mtn. 15'; Kingman NTMS

DEVL: Two shafts and adit

PROD: About 24 tons @ 0.25% U_3O_8 stockpiled

RAD: 30X

ANAL: 0.70% e U_3O_8; 0.70% U_3O_8

GEOL: Greenish-black resinous radioactive mineral associated with base metal-iron sulfides and oxides. Mineralization in quartz veins cutting metamorphic rocks and gneissis granite.

REF: PRR-AP-122 (#566)

CUNNINGHAM MINE

LOC: Center Sec. 16, T33N, R14W

QUAD: Grand Gulch Bench 7½'; Grand Canyon NTMS

DEVL: Short adit and incline

RAD: 16X

GEOL: Radioactivity associated with copper and iron fracture fillings in well-bedded silty facies of Redwall Ls, 150 ft. below its top. Main tunnel intersects Fe and Cu in a 1"-12" wide vein dipping 30°S.

REF: D.O.E.

CUPAL MINE

LOC: Sec. 9, T22N, R17W
Cerbat Mtns.

QUAD: Stockton Hill 7½'; Kingman NTMS

DEVL: Three shafts

PROD: Gold, silver, zinc, lead

RAD: 7X

GEOL: Mineralization and radioactivity along quartz vein in fault fissure.

REF: PRR-AR-55 (#512)

DAB #1 AND DAGMAR

LOC: Approx. E. Center Sec. 21 and SW¼ Sec. 22, T30N, R20W

QUAD: Senator Mtn. 15'; Kingman NTMS

DEVL: Adit and dozer cuts

RAD: 4X

ANAL: 0.85% e U_3O_8; 0.878% U_3O_8

GEOL: Autunite and other secondary uranium minerals occur as thin smears in Tertiary tuffaceous mudstone interbedded with tuff and clay.

REF: PRR-NSL-275 (#436 e 437)
Blair, W. and Armstrong, A. (1979)

DAGMAR (Dab #1)

DELTA GROUP

LOC: Sec. 28, T40N, R6W

QUAD: Short Creek SW 7½'; Grand Canyon NTMS

RAD: 4X

GEOL: Radioactivity along contact between Moenkopi and Shinarump Conglomerate.

REF: PRR-RR-187 (#440)

DEMO GROUP (Democrat Mine)

DE LA FONTAINE MINE

LOC: SE¼ Sec. 5, T22N, R17W

QUAD: Stockton Hill 7½'; Kingman NTMS

DEVL: Shaft, drift, crosscuts

PROD: Base metals

RAD: 50X

ANAL: 0.80% e U_3O_8; 0.93% U_3O_8; 0.5 oz/+ Ag; 0.7 oz./t Au; 2.9% Pb; 14.3% Zn.

GEOL: Probably finely disseminated uraninite associated with base metal sulfides and quartz filled fractures and shear breccia in granite and schist.

REF: PRR-35 (#495)
Hart, O. (1955, RME-2029)
Hart, O. and Hetland, D. (1953, RME-4026)

DEMOCRAT MINE (Demo Group: Chief, Mickey; Morning Star; Papoose Claims)

LOC: SE¼ Sec. 33, T20N, R15W
Hualapai Mtns.

QUAD: Dean Peak 7½'; Williams NTMS

DEVL: 3 adits and 45° inclined shaft

PROD: Silver and gold in 1860-1870's
88 tons @ 0.17%, U_3O_8, 1955-57

RAD: 75X

ANAL: 0.264% e U_3O_8; 0.11% U_3O_8; 0.21 oz/T. Au; 3.9 oz/T Ag. waste dump material 0.04% U_3O_8; chute muck in adit 0.11% U_3O_8; 1.7 Foot wide channel sample on the vein 0.05% U_3O_8.

GEOL: Uraninite occurs with arsenopyrite in fissure vein cutting Precambrian granite, gneiss, and schist. Vein trends N-S, and dips 45° easterly. Vein is 1-4 feet thick. Originally mined for gold and silver in arsenopyrite, pyrite, and chalcopyrite. There has been shearing along the vein.

REF: PRR-AP-25 (#487)
Hart, O. and Hetland, D. (1953, RME - 4026)
D.O.E.

DETROIT GROUP (Brooklyn; Hudson; New York and Palisades Claims

LOC: W. central Sec. 31, T23N; R17W

QUAD: Cerbat 7½'; Kingman NTMS

DEVL: 335 ft. crosscut, 110 ft. drift; 100 ft. winze; 50 ft. shaft

PROD: Gold and silver in 1960's

RAD: 300X

ANAL: 0.193% e U_3O_8; 0.371% U_3O_8

GEOL: Vein of base metals occurs in a fault or fissure cutting Precambrian Granite, gneiss and schist. Vein strikes N35° W and dips 75° SW. Hydrothermal mineralization occurs along footwall and hanging wall. Finely disseminated uraninite occurs in highest concentration within shattered sphalerite in the hanging-wall portion of the vein structure. Becqueralite was identified.

REF: PRR-RA-12 (#546)
Hart, O. and Hetland, D. (1953, RME-4026)
Hart, O. (1955, RME-2029)

DIPLOMAT

LOC: Sec. 13, T22N, R18W
Cerbat Mtns.

QUAD: Cerbat 7½'; Kingman NTMS

DEVL: 250 ft. inclined shaft; 67 ft. drift

PROD: Lead and silver

RAD: 4X

GEOL: Radioactivity associated with galena vein striking N50°W, dipping 60°S. Mineralized area consists of a group of lens shaped en echelon ore bodies each separated by a horse of altered and bleached gneiss.

REF: PRR-AR-65 (#522)

ESTER BASIN

LOC: SE¼ Sec. 29, T12N, R13W

QUAD: Artillery Peak 15'; Prescott NTMS

DEVL: Drilled

RAD: 4X

GEOL: Dark brown, organic-rich, siliceous mudstone just above basal arkose in Artillery Fm. exposed in hogbacks dipping 70°SW.

REF: Waechter, N. (1979)
Otton, J. (1977 b)

ESTHER (Eva)

EVA, MARION, ESTHER, AND WHITE ELEPHANT CLAIMS

LOC: Sec. 30, T22N, R17W
Cerbat Mtns.

QUAD: Cerbat 7½'; Kingman NTMS

DEVL: 35 ft. drift and 20 ft. crosscut

RAD: 6X

GEOL: Radioactivity in rare earth-bearing pegmatite dikes cutting Precambrian schist and gneiss.

REF: PRR-AR-66 (#523)

FOOLS PEAK (Blue Smoke)

FORT LEE (J. C. Claims)

FREDONIA #1

LOC: Sec. 7, T39N, R3W

QUAD: Fredonia SW 7½'; Grand Canyon NTMS

RAD: 4X

GEOL: Radioactivity associated with stringers and pockets of carbonaceous matter with copper staining in sandstones and shales of lower Moenkopi Fm.

REF: PRR-RR-203 (#442)

FRONTIER AND FRONTIER #2

LOC: Sec. 18, T22N, R17W
Cerbat Canyon

QUAD: Cerbat 7½'; Kingman NTMS

DEVL: Two 250 ft. drifts and crosscuts; several short adits, pits

PROD: Gold and silver

RAD: 15X

ANAL: 0.096% e U_3O_8; 0.063% U_3O_8

GEOL: Highest radioactivity in the schist in the footwall of a fault fissure paralleled by a pegmatite at the Frontier Claim.

REF: PRR-AP-27 (#489)

GOLCONDA GROUP (Primrose Mine)

GOLD NUGGET

LOC: Sec. 7, T22N, R17W
Cerbat Canyon

QUAD: Cerbat 7½'; Kingman NTMS

DEVL: Shaft and surface trenching

PROD: Gold and silver

RAD: 15X on ore dump

ANAL: 0.23% e U_3O_8; 0.45% U_3O_8

GEOL: Uranium in quartz and gouge filled fault fissure striking N10°W, dipping 86°W and cutting Precambrian gneiss and schist.

REF: PRR-AP-8 (#470)

GREY BOY # 1-6 (White Owl Group)

H.E.C. PROSPECT

LOC: Sec. 25, 26, T 26N, R11W. (35° 36' 35"N,
Hualapai Indian Reservation 113° 24' 56"W)

QUAD: Peach Springs 7½'; Williams NTMS

DEVL: Bulldozing

RAD: 60X

ANAL: 0.2% e U_3O_8

GEOL: Radioactivity associated with limonite and hematite in conglomeratic sandstone with silicified wood fragments. Abundant faulting along SW side of area. Hurricane fault is 1 mile to the west.

REF: PRR-AP-306 (#455)

HACK CANYON MINE

LOC: NE¼ Sec. 26, T37N, R5W

QUAD: Heaton Knolls SE 7½'; Grand Canyon NTMS

DEVL: Two shafts, tunnel, adit, and underground workings

PROD: 1,329 tons @ 0.18% U_3O_8, in 1950, 52, 53, 54, 64. 53 tons in 1954 was "no-pay" 0.08% U_3O_8 ore. copper production in 1944-45 Canyon Copper Co.

ANAL: 0.006 - 1.673% e U_3O_8; 0.009 - 1.798% U_3O_8

GEOL: Slump structure possibly involving Toroweap and Coconino Sandstones and Hermit Shale. Rock is bleached and silicified. Uraninite mixed with chalcocite is deposited in the breccia zone and in some of the coarser grained sandstones. Fractures are coated with chalcanthite, brochantite, erythrite, bieberite, zippeite, meta torbernite, torbernite, and malachite, Breccia pipe origin. See general discussion on breccia pipes for new discovery nearby this mine.

REF: PRR without # (#462,466)
Granger, H. and Raup, R. (1962)
Finch, W. (1967)
Gruner, J. & Gardiner, L. (1953, RMO-746)
Gruner, J. & Gardiner, L. (1950, RMO-747)
Dunning, C. (1948)
Rason, C. (1949)
Breed and Roat (1974), p. 177-78
Osterwald (1965) p. 132-135.

HILLSIDE GROUP AND QUARTZ MOUNTAIN GROUP

LOC: Sec. 10, 14, T28N, R16W

QUAD: Quartermaster Canyon SW7½'; Williams NTMS

DEVL: Prospect pits

ANAL: 0.007 -0.533% e U_3O_8

GEOL: Small pods of allanite, polycrase, euxenite, and monazite associated with a pegmatite dike and granitic intrusive cutting gneiss and schist.

REF: PRR-AP-261 (#447)

HOPKINS FELDSPAR CLAIM

LOC: Sec. 27, T22N, R17W
Cerbat Mtns.

QUAD: Stockton Hill 7½'; Kingman NTMS

RAD: 8X

GEOL: Radioactivity associated with pegmatite dike.

REF: PRR RA-16 or 18 (#545)

HUDSON CLAIMS (Detroit Group)

IEIVAL CLAIM (Madrill Claim)

IRIS CLAIM

LOC: North center Sec. 4, T38N, R6W
Yellowstone Mesa

QUAD: Heaton Knolls NW 7½'; Grand Canyon NTMS

DEVL: 10 ft. adit and pits

RAD: 20X

ANAL: 0.01% e U_3O_8

GEOL: Radioactivity associated with carbonaceous matter in pebble conglomerate of Shinarump member Moenkopi contact. Some fine galena disseminated in the red Moenkopi near the contact.

REF: PRR-RR-255 (#446)

J. C. AND FORT LEE CLAIMS

LOC: SE¼ Sec. 12, T22N, R18W
Cerbat Mtns.

QUAD: Cerbat 7½'; Kingman NTMS

DEVL: Two incline shafts, drifts and stoping

PROD: Gold and silver

RAD: 10X

ANAL: 0.06% e U_3O_8; 0.06% U_3O_8

GEOL: Radioactivity along mineralized quartz vein in rhyolite dike cutting Ithica Peak Granite.

REF: PRR-AP-161 (#492,569)
Hart, O. (1955, RME-2029)
Hart, O. and Hetland, D. (1953, RMO-4026)

JACOBS RANCH

LOC: South central N. Mohave Co. Sec. 4, T36N, R16W
Note: Jacobs Ranch House is on Sec. 9-

QUAD: Virgin Peak 15'; Las Vegas NTMS

DEVL: Prospecting; unknown geology

REF: Keith (1970)

JAMISON (MAMMOTH #1)

JESSIE BELLE #2-4

LOC: Sec. 31, T 29N, R21W,
East of Hoover Dam

QUAD: Black Canyon 15'; Kingman NTMS

RAD: 3X

ANAL; 0.03% e U_3O_8; 0.015% U_3O_8

GEOL: Pegmatite and basic dikes cutting gneiss and schist.

REF: PRR-NSL-160 (#534)

JIM KANE MINE (Monitor Group)

LOC: NE¼ Sec. 8, T22N, R17W

QUAD: Stockton Hill 7½'; Kingman NTMS

DEVL: Adit

RAD: 20X

ANAL: 0.08% e U_3O_8; 0.052%, U_3O_8; 6.6% Pb 3.7 oz/T Ag; 0.02 oz./T Au

GEOL: Mineralization along a shear zone in altered and brecciated granite. Fluorescent radioactive coatings on drift walls.

REF: PRR-RA-21 (#551)
Kaiser, E. (1951, TEM-216)
Wright, R. (1950, RMO-679)
Hart, O. (1955, RME-2029
Hart, O. and Hetland, D. (1953, RME-4026)

KAIBAB INDIAN RESERVATION LEASE (Piute Indian Reservation Lease)

LOC: Approx. SE¼ Sec. 6, T41N, R3W

QUAD: Short Creek 7½'; Grand Canyon NTMS

DEVL: Prospect pit

RAD: 50X

ANAL: 0.53% e U_3O_8; 0.518% U_3O_8

GEOL: Yellow radioactive mineral in small nodules and seams in pink and white gypsum and petrified logs in Petrified Forest Member, Chinle Fm. Possibly some uraninite.

REF: PRR-SL-124 (#458)

KATY J. CLAIMS

LOC: Approx. SW¼ Sec. 14, T39N, R4W

QUAD: Fredonia SW 7½'; Grand Canyon NTMS

DEVL: Drilled

RAD: 6X

ANAL: 0.016-0.224% e U_3O_8; 0.014-0.149% U_3O_8
Mineralized wood = 6.71% e U_3O_8; 6.62% U_3O_8

GEOL: Possibly torbernite with copper carbonates, carbonaceous trash and fossil wood in red sandy shale of Moenkopi Fm.

REF: PRR-RR-286 (#451, 452)

KIM CLAIMS

LOC: Sec. 22, T40N, R6W

QUAD: Short Creek SW 7½'; Grand Canyon NTMS

DEVL: Drilled

GEOL: Radioactivity noted in both drill holes at Moenkopi and Shinarump contact. Uranium mineralization exposed in low ridge about 1¼ miles to the east.

REF: PRR-RR-281 (#580, 580A)

KISSEE - MITCHELL LEASE

LOC: Approx. SE¼ Sec. 23, T30N, R18W

QUAD: Garnet Mtn. 15'; Kingman NTMS

DEVL: Prospected

RAD: 14X

ANAL: 0.22% e U_3O_8

GEOL: Carnotite-type minerals and uranium-bearing fluorescent silica in marl zone between more resistant limestone beds. Tertiary sediments overly granitic schist. Minor faulting, pods of psilomelane and manganite occur in schist.

REF: PRR-A-116 (#724)
Blair, W. and Armstrong, A. (1979)

KISTLER PROSPECT

LOC: Sec. 15, T13N, R12W

QUAD: Artillery Peak 15'; Prescott NTMS

RAD: 10X

ANAL: 0.03% U_3O_8

GEOL: Radioactivity localized in biotite-rich dike or zone in granite.

REF: PRR-AP-216 (#578)
Waechter, N. (1979)

LAST CHANCE (Rainbow)

LITTLE THREE #1

LOC: Approx. Sec. 6, T39N, R3W

QUAD: Fredonia SW 7½'; Grand Canyon NTMS

RAD: 100X

GEOL: Radioactivity associated with carbonaceous debris and copper staining in brown sandstone and shale of the lower Moenkopi Fm.

REF: PRR-RR-205 (#444)

LUCKY FOUR

LOC: Approx. NE¼ Sec. 26, T12N, R13W

QUAD: Artillery Peak 15'; Prescott NTMS

DEVL: Dozer cuts

RAD: 15X

ANAL: 0.02% e U_3O_8

GEOL: Thin coatings of tyuyamunite and carnotite on fractures in a 5 ft. thick carbonaceous bed and several thick bedded limestones in a tilted, fluviolacustrine section of Artillery Fm. beneath a thrust sheet of gneiss.

REF: PRR-A-82 (#429)
Scarborough and Wilt (1979)

LUCKY 44

LOC: Approx. NE¼ Sec. 18, T30N, R20W

QUAD: Senator Mtn. 15'; Kingman NTMS

DEVL: Trenches and drilling

RAD: 10X

ANAL: 0.26% e U_3O_8; 0.51% U_3O_8

GEOL: Carnotite or uranophane coating bedding planes and in sandy pockets in Tertiary lacustrine interbedded bentonitic clay and siltstone, opalitic silica, and sandy conglomerate. Abundant gypsum and calcium carbonate.

REF: PRR-C-23 (#432)

LUCKY FRIDAY

LOC: Sec. 18, T22N, R17W

QUAD: Cerbat 7½'; Kingman NTMS

DEVL: Two short drifts and 100 ft. incline

PROD: Gold prospect

RAD: 4X

GEOL: Radioactivity associated with base metal mineralization along a quartz vein in a 15 ft. wide fault fissure. Fault trends NNW and dips vertically.

REF: PRR-AR-68 (#525)

MADRILL AND IEIVAL CLAIMS

LOC: Sec. 29, T14N, R12W

QUAD: Greenwood Peak 7½'; Prescott NTMS

DEVL: 100 ft. adit and prospect pits

PROD: Tungsten

RAD: 40X

ANAL: 0.07-8.0% e U_3O_8

GEOL: Samarskite and allanite in several large pegmatite dikes trending NE-SW through Precambian granite.

REF: PRR-A-34 (#427)

MAMMOTH #1 (Jamison)

LOC: Sec. 31, T22N, R17W

QUAD: Kingman NW 7½; Kingman NTMS

DEVL: Adit, two shafts, several pits

RAD: 20X

ANAL: 0.03% e U_3O_8; 0.001% U_3O_8

GEOL: Base metal mineralization along quartz and gouge filled fault fissure intersecting basic dike near adit.

REF: PRR-AP-28 (#490)

MARION (Eva)

MASTERSON GROUP

LOC: Central Sec. 22, T12N, R13W

QUAD: Artillery Peak 15'; Prescott NTMS

DEVL: Prospected

RAD: 300X

ANAL: 0.08% e U_3O_8; 0.10% U_3O_8

GEOL: Radioactivity associated with carbonaceous matter and palm-like plant fossils in limestone and mudstone in a tilted section of Artillery Fm. Mineralized zone appears bleached and is about 100 ft. above Precambrian Granite and just above basal conglomerate of Artillery Fm.

REF: PRR-A-68 (#431)
Scarborough and Wilt (1979)

MICKEY CLAIMS (Democrat Mine)

MIDDAY CLAIM

LOC: NW¼ Sec. 12, T22N, R18W

QUAD: Cerbat 7½'; Kingman NTMS

DEVL: Three inclined shafts and some surface trenching

PROD: Gold and silver plus lead and zinc.

RAD: 5X

GEOL: Radioactivity along mineralized quartz and gouge filled fault fissure, striking N10° W, dipping 70° NE.

REF: PRR-AR-47 (#504)

MIDIS CLAIM (Virgin Mtns.)

LOC: Sec. 1, T39N, R15W
or Sec. 1 or 2, T38N, R15W

QUAD: Cane Springs NE 7½ (T38N) or Littlefield SE 7½ for T39N; Grand Canyon NTMS

RAD: Atomic bomb fallout registered anomalous readings on geiger counters, early 1950's.

REF: PRR-P-SL-1

MINERAL X CLAIM

LOC: Approx. Sec. 3, T20N, R17W

QUAD: Kingman 7½'; Kingman NTMS

DEVL: Open cut

RAD: 3X

ANAL: 1.054% e U_3O_8; 0.48% U_3O_8; 3.4% thO_2

GEOL: Pegmatite dike in schist and granite, possibly fergusonite, thalenite, allanite, fluorite and epidote.

MOHAVE FLUORSPAR

LOC: Sec. 1, T23N, R14W

QUAD: Valentine 7½'; Williams NTMS

DEVL: 4 small prospect pits

RAD: 2X

GEOL: Purple fluorite along fissure-like structure in highly altered and silicified rhyolite.

REF: PRR-RA-20 (#550)

MOHAWK MINE

LOC: SE¼ Sec. 6, T22N, R17W

QUAD: Cerbat 7½'; Kingman NTMS

RAD: 2X

GEOL: Mineralized quartz and gouge filled fault fissure about 1 to 3 ft. wide, striking N40°W, dipping 75°N and cutting Precambrian Granite.

REF: PRR-AR-40 (#500)

MONITOR GROUP (Jim Kane)

MORNING STAR CLAIMS (Democrat Mine)

MUSTANG

LOC: Approx. SE corner Sec. 6, T37N, R5W

QUAD: Heaton Knolls 15'; Grand Canyon NTMS

ANAL: 0.05% e U_3O_8; 0.01% U_3O_8

GEOL: Radioactivity along 15 foot ridge of coarse sandstone and conglomerate of the Shinarump member.

REF: PRR-RR-254 (#445)

NAVICO GROUP #1

LOC: " going west on Alamo Rd. take right fork marked Black Diamond Rd. toward Stovall; go 1.2 miles then turn right on Mine Road, proceed 2.4 miles to property.

QUAD: Prescott NTMS

RAD: 7X

GEOL: Thin coatings of carnotite on fracture surfaces in irregular lenticular beds of arkose, ash, sand and mud, capped with basalt. Some silicified wood.

REF: PRR-A-83 (#430)

NEW YORK CLAIMS (Detroit Group)

OLD DAD MINE (Blendina Group)

PALISADES CLAIMS (Detroit Group)

PAPOOSE CLAIMS (Democrat Mine)

PIUTE INDIAN RESERVATION LEASE (Kaibab)

PLENDINA (Blendina)

PRIMROSE MINE (Golconda Group)

LOC: Sec. 6, T22N, R17W

QUAD: Cerbat 7½'; Kingman NTMS

DEVL: Adits, lower workings connect with the Prosperity Mine.

PROD: Gold, silver, copper, lead zinc

GEOL: Possibly uraninite associated with vein in fault fissure cutting gneiss. Vein strike N 14°W and dips 69°E.

REF: Hart, O, and Hetland, D. (1953, RME-4026)

PROSPERITY

LOC: North center Sec. 6, T22N, R17W

QUAD: Cerbats 7½'; Kingman NTMS

DEVL: Drifts and crosscuts

RAD: 20X over the dump

GEOL: Base metal vein along shear zone in Precambrian Granite. Radioactivity maximum close to hanging wall, where brecciation and oxidation are greatest. Possibly uraninite.

REF: PRR-RA-7 (#541)
Hart, O. (1955, RME-2029)
Hart, O. & Hetland, D. (1953, RME-4026)

QUARTZ MOUNTAIN GROUP (Hillside)

QUARTZITE

LOC: Approx. Sec. 9, T19N, R13W
"200 yds. E of Highway 93"

QUAD: Bottleneck Wash 7½'; Williams NTMS

DEVL: Prospect pits

RAD: 2X

GEOL: Possibly samarskite in pegmatite dikes cutting granite.

REF: PRR-A-69

RADON #1

LOC: SW¼ Sec. 24, T40N, R6W

QUAD: Short Creek SW 7½'; Short Creek 15'; Grand Canyon NTMS

DEVL: 2 shallow trenches, 25 and 45 ft. long.

PROD: 22.6 tons @ 0.06% U_3O_8; 0.55% V_2O_5; 1954

ANAL: 0.67% e U_3O_8; 0.19% U_3O_8

GEOL: Carnotite-type ore with Logs and carbonaceous matter in Shinarump member sediments.

REF: PRR-RR-204
PRR-RR-168
D.O.E. data

RAINBOW (Last Chance)

LOC: NW¼ Sec. 25, T40N, R6W

QUAD: Short Creek SW 7½'; Grand Canyon NTMS

DEVL: 18 ft. shaft; drill holes; copper prospect.

PROD: 30 tons @ 0.28%, U_3O_8; 1.13%, V_2O_5, 1955

ANAL: 0.02% e U_3O_8; 0.024%, U_3O_8; 0.75% Cu

GEOL: Uranium occurs in 3 ft. thick sandstone lens with carbonaceous debris and copper staining. Mineralization is apparently in the Shinarump mbr. close to Moenkopi contact. Silicified wood is abundant, copper mineral is chrysocolla.

REF: PRR-RRs-106 (#563, #426)
PRR-D-430 (#532)
D.O.E.

RAINY DAY CLAIMS

LOC: Approx. NW¼ Sec. 33, T30N, R22W or 35°57' 02"N; 114° 38' 58" W.

QUAD: Black Canyon 15'; Kingman NTMS

RAD: 200X

GEOL: Radioactive yellow mineral coating and disseminated in white aplitic rock. Very radioactive float on an alluvial fan near Precambrian schist, granite, aplite and basalt.

REF: PRR-NSL-159

RED HILLS

LOC: West central Sec. 7, T11N, R13W

QUAD: Artillery Peak 15'; Prescott NTMS

DEVL: 21 ft. shaft

RAD: Strongest at intersection of crosscutting shear zone and vein.

ANAL: 0.314% U_3O_8

GEOL: Kasolite and other secondary yellow and orange uranium minerals along fractures in chalcedonic quartz vein cutting a breccia. The breccia consists of fragments of silicitied felsitic material, schist, conglomerate, limestone, cemented with silica, carbonates and manganese-iron oxides. It is probably a fault breccia at the base of the Artillery Fm. Vein strikes N85°E, dips 50-60°SE and is 6 to 20 ft. wide.

REF: PRR w/o # (#463, #890, #890a)
Granger, H. and Raup, R. (1962)
Reyner, M. and Ashwill, W. (1955)
Hart, O. (1955, RME -2029)
Kaiser, E. (1951, TEM-217)
Scarborough, R. and Wilt, J. (1979)

RED WING

LOC: N½ Sec. 23, T33N, R10W
Parashont Canyon

QUAD: Cold Spring, 7½'; Grand Canyon NTMS

DEVL: 8 ft. adit and open cut

PROD: Copper
1.4 tons @ 0.16% U_3O_8, 1956

ANAL: 0.16% e U_3O_8; 0.15% U_3O_8

GEOL: Secondary uranium minerals with copper and carbonaceous material in altered sandstone of the Upper Permian Redbeds.

REF: D.O.E.

S. S. 58

LOC: Approx. Sec. 16, T36N, R13W
Hidden Canyon

QUAD: No quad; Grand Canyon NTMS

DEVL: Extensive workings

PROD: Copper

RAD: 8X

GEOL: Copper and iron minerals filling fractures in Supai Fm.

REF: D.O.E.

SAVANNIC MINE (SAVANIC, BRONZE L MINE)

LOC: SW¼ Sec. 9, T33N, R14W

QUAD: Grand Gulch Bench 7½'; Grand Canyon NTMS

DEVL: Extensive stopes and decline on 1-3 ft. main shear.

PROD: Copper

RAD: 4X

GEOL: Copper minerals filling fractures/shears along bedding planes in Redwall limestone. Main shear is 1 to 3 ft. wide and dips 60°E. It is filled with Cu-Fe-Mg minerals, and dolomite, cemented by calcite.

REF: D.O.E.
Breed and Roat (1974), p. 171

SCHOOL SECTION

LOC: Sec. 16, T33N, R11W
Andrus Canyon

QUAD: Grassy Mtn. 7½'; Grand Canyon NTMS

DEVL: Prospect pit

RAD: 3X

GEOL: Radioactivity at the intersection of a fracture zone with a basic dike both apparently cutting Kaibab limestone.

REF: PRR-RR-303 (#453)

SECRET PASS

LOC: Approx. T21N, R18W

QUAD: Kingman NW 7½'; Kingman NTMS

DEVL: Shafts, adits and trenches

PROD: Gold & silver

RAD: 3X

GEOL: Large mineralized quartz-calcite veins cutting N-S and NW-SE through granite, capped by volcanics.

REF: PRR-AP-172

STATE MINE

LOC: SE¼ Sec. 4, T13N, R12W

QUAD: Artillery Peak 1S'; Prescott NTMS

DEVL: 150 ft. crosscut, 65 ft. drift, 35 ft. shaft

PROD: Gold & Silver

RAD: 45X

ANAL: 0.30% e U_3O_8; 0.36% U_3O_8

GEOL: Fault zone with autunite in gouge and wallrock cuts quartz vein carrying gold-silver mineralization. The coarse granite porphyry wallrock is moderately altered.

REF: PRR-AP-6 (#468)
PRR-CEBR-51
Hart, O. and Hetland, D. (1953, RME-4026)

SUMMIT MINE (Cincinnati Claim)

LOC: Central Sec. 32, T23N, R17W.
Cerbat Mtns.

QUAD: Stockton Hill 7½'; Kingman NTMS

DEVL: 850 ft. of crosscut adit; drilling, drifting and stoping

PROD: 31,500 tons @ 0.65% Cu; 5.5% Pb; 6.5% Zn, 0.07 oz/t Au; 5.5 oz/t. Ag., 1936-1947. No uranium production.

RAD: 20X

ANAL: 0.64% U_3O_8

GEOL: Uraninite occurs as thin film coating base metal sulfides along shattered zones. Heavily altered shear zone parallels vein, striking N30°W, dipping 80° NE and cuts Precambrian Granite, gneiss, and schist.

REF: PRR-RA-27 (#556)
Hart, O. (1955, RME-2029)
Hart, O. and Hetland, D. (1953, RME-4026)

SUNSET

LOC: "in steep barren slopes of tertiary sediments cut by Beaver Dam Wash north of the Virgin River."

QUAD: NW corner Grand Canyon NTMS

RAD: 2X

ANAL: 0.018% e U_3O_8

GEOL: Yellow uranium mineral in tertiary sediments

REF: PRR-SL-109 (#457)

TATE (Red Hills)

TRIPLE H CLAIMS

LOC: SW¼ Sec. 17, T11N; R17W
Osborne Wash

QUAD: Monkeys Head 7½'; Needles NTMS

DEVL: 5 ft. deep pit

PROD: Stockpiled ore @ 0.42% e U_3O_8; 0.40% U_3O_8

ANAL: 0.85% e U_3O_8; 0.77%, U_3O_8; 0.6% Cu

GEOL: Uraninite is disseminated in Precambrian Gneiss adjacent to fault contact with red conglomerate.

REF: D.O.E.

U.S. GOVERNMENT PROPERTY

LOC: Sec. 28,29,32,33, T28N, R10W

QUAD: Travertine Rapids 7½; Williams NTMS

DEVL: Prospect pits

RAD: 3X

ANAL: 0.004%, U_3O_8

GEOL: Uranium mineral in fractures in sunken blocks of basal Supai Sandstone at the top of the Redwall Limestone. Alteration noted.

REF: PRR-EDR-1265

UNNAMED A

LOC: North center Sec. 10, T 38N, R15W
Virgin Mtns.

QUAD: Littlefield NW 7½'; Grand Canyon NTMS

GEOL: Carnotite-type mineralization in apparently Shimarump member, Chinle Fm.

REF: Peirce, H. and others (1970)

UNNAMED B

LOC: Sec. 5, T18N, R20W

QUAD: Boundary Cone 7½'; Needles NTMS

DEVL: Prospect shaft and trenches

RAD: 10X

GEOL: Shear zone with many small pegmatites cutting gneiss outcropping through Tertiary lavas and Quaternary sediments.

REF: PRR-AP-163 (#493)

UNNAMED C

LOC: Approx. T28N, R16½ W

QUAD: Quartermaster Canyon SW 7½; Williams NTMS

RAD: 4X

GEOL: Scheelite in granite

REF: PRR-RSL-8

URANIUM BASIN

LOC: Approx. Sec. 26, T20N, R13W

QUAD: Bottleneck Wash 7½'; Williams NTMS

DEVL: Prospect pits

RAD: 45X

ANAL: 0.45% e U_3O_8

GEOL: Uranothorite replacement of granite along shear zone and a pegmatite vein. Ore is contained in the 25 ft. zone between shear and pegmatite.

REF: PRR-A-70
Adams, I & Staatz, M. (1969)

VICTORY MINE

LOC: Sec. 33, T23N, R17W
Cerbats Mtns.

QUAD: Stockton Hill 7½'; Kingman NTMS

DEVL: Underground workings

RAD: 4X

GEOL: Base metal bearing quartz vein in a fault fissure

REF: PRR-AR-61 (#518)

WESTERN UNION

LOC: Sec. 15, T22N, R17W
Cerbat Mtns.

QUAD: Stockton Hill 7½'; Kingman NTMS

DEVL: Shaft, drifts and surface pits

RAD: 2X

GEOL: Base metal bearing quartz and gouge-filled fault

REF: PRR-AR-49 (#506)

WHARTON PROPERTY

LOC: Approx. Sec. 22, T40N, R16W

QUAD: Mesquite 15'; Las Vegas NTMS

DEVL: Prospected

RAD: 10X

ANAL: 0.02% e U_3O_8

GEOL: Carnotite-type mineralization as fracture coatings in clay, silts and sands, possibly of the Muddy Creek Fm.

REF: PRR-SL-200 (#459)

WHITE CAP

LOC: Approx. T28N, R16W
Grand Wash Cliffs

QUAD: Garnet Mtn. 15'; Quartermaster Canyon SW 7½; Kingman and Williams NTMS

DEVL: 2 pits

RAD: 70X

ANAL: 1.35% e U_3O_8; 1.23% U_3O_8

GEOL: Euxenite, hornblende and beryl in a pegmatite dike about 20 ft. wide.

REF: PRR-C-119 (#434)

WHITE ELEPHANT (Eva)

WHITE OWL GROUP (Grey Boy #1-6)

LOC: Sec. 5, T12N, R14W

QUAD: Artillery Peak 15'; Prescott NTMS

DEVL: Prospect pits

RAD: 50X

ANAL: 0.38% e U_3O_8; 0.048% U_3O_8

GEOL: Radioactivity along pegmatites and faults cutting Precambrian Schist. Fault zones contains fluorite, chalcedonic quartz and calcite.

REF: PRR-AP-307 (#456)

NAVAJO COUNTY

AIR ANOMALY #55

LOC: Probably Sec. 32, T26N, R21E
Hopi Buttes

QUAD: White Cone 15'; Flagstaff NTMS

GEOL: Collapsed Bidahochi Fm. sediments in diatreme mineralization in slightly bleached "travertine" beds and massive dark gray agglomerate.

REF: PRR-w/o [illegible]

AIR ANOMALY #56

LOC: Sec. 16-15; T25N, R21E
Hopi Buttes

QUAD: White Cone 15'; Flagstaff NTMS

GEOL: Collapsed Bidahocki Fm. sediments associated with diatreme.

REF: PRR w/o [illegible]

AIR ANOMALY #59

LOC: Probably Sec. 9, T24N, R21E
Hopi Buttes

QUAD: Indian Wells 7½'; Flagstaff NTMS

GEOL: Collapsed Bidahochi Fm. sediments in diatreme with mineralized interbedded "travertine".

AIR ANOMALY #67

LOC: Probably Sec. 25, T25N, R19E
Hopi Buttes

QUAD: Egloffstein Butte 15'; Flagstaff NTMS

GEOL: Collapse sediments of Bidahochi Fm. associated with a diatreme. Thin to medium bedded buff "travertine" is mineralized.

REF: PRR w/o [illegible]

AIR ANOMALY #74

LOC: Probably Sec. 23 (Bobcat Butte) or NW¼ Sec. 14 and SW¼ Sec. 11 (Saddle Butte), T24N, R18E. on NE side of butte.

QUAD: Shonto Butte 7½; Flagstaff NTMS

GEOL: Collapse sediments of Bidahochi Fm. associated with a diatreme. Mineralized travertine beds form the dip slope.

REF: PRR w/o [illegible]

ALFRED MILES #1 (Todechanee, Nakai Mesa Peninsula)

LOC: Lat. 36° 59' 48"N and long 110° 28'6"W, Approx. Sec. 4, T41N, R17E, Arizona-Utah parts of Nakai Mesa - Monument Valley

QUAD: Boot Mesa 15'; Marble Canyon NTMS

DEVL: Drilled; prospect adit

GEOL: Torbernite (carnotite and autunite?) and copper mineralization associated with logs and carbon matter at the bottom of a N50° trending Shinarump paleochannel.

REF: Witkind, I.J. & Thaden, R.E. (1963, p. 145-150); Finch, W. (1967)
PRR-GJEB-130 (#615)

ALMA #4 (Alma-Seggin Mine)

ALMA-SEGGIN MINE (Alma #4)

LOC: Approx. SW¼ Sec. 11, T40N, R19E
Monument Valley

QUAD: Boot Mesa 15'; Marble Canyon NTMS

DEVL: Drilling in 1958-61, in excess of 70 holes.

PROD: 6,769 tons @ 0.19% U_3O_8 in 1965-66.

ANAL: 0.10-0.20% U_3O_8

GEOL: A N40°W trending, paleochannel of Shinarump conglomerate contains uraninite. Mineralized zone is about 5 ft. thick and between 150-200 ft. beneath the surface.

REF: D.O.E.

ANNA BERNICE CLAIMS #1-5

LOC: West central Sec. 20, T19N, R19E

QUAD: Blair Springs 7½'; Flagstaff NTMS

DEVL: Shallow prospect pit

ANAL: 5 samples @ 0.003-0.25% e U_3O_8; 0.001-0.25% U_3O_8

GEOL: Unidentified uranium minerals in thin jasper lenses in flat-lying bentonitic shale of Chinle Fm.

REF: PRR-w/o # (#582), Granger and Raup, 1962

BARTON MINE (Ruth)

BAYSHORE #2 (Little John #1-3)

BAYSHORE #3 (Ruth)

BEN #2 (Koley Black #1)

BIDAHOCHI BUTTE

LOC: Approx. SE corner Sec. 12, T23N, R21E
Hopi Buttes

QUAD: Indian Wells 7½'; Flagstaff NTMS

ANAL: 0.01% to 0.2% U_3O_8

GEOL: Extremely finely disseminated uranium in limestone and laminated siltstone and shale of the Bidahochi Fm. Associated with a diatreme feature also containing bedded tuff, evaporites and chert.

REF: Shoemaker, et al. (TEI-700, 1957)
Miller, W.C. (1957)

BIG CHIEF # 3 & 4 CLAIMS

LOC: Approx. SE¼, Sec. 21, T41N, R19E
Oljeto Creek - Monument Valley

QUAD: Boot Mesa 15'; Marble Canyon NTMS

DEVL: Underground w/ incline entry

PROD: 32,834 @ 0.23% U_3O_8, 1959-1961

ANAL: 0.31% U_3O_8; 0.50% V_2O_5; 6.00% $CaCO_3$ max.

GEOL: Uraninite is in a paleochannel of Shinarump conglomerate.

REF: D.O.E.

BIG FOUR (Sunlight, South Sunlight, East Sunlight)

LOC: Approx. the common corner of Sec. 20, 28, 29, T41N, R19E, Monument Valley

QUAD: Boot Mesa 15'; Marble Canyon NTMS

DEVL: Incline

PROD: 3,930 tons @ 0.26% U_3O_8 in 1958-65.

GEOL: Uraninite is in a paleochannel deposit of Shinarump sandstone.

REF: D.O.E.

BILL GILL (Section 33 Lease)

BLACK ROCK

LOC: Approx. NE¼ Sec. 14; T40N, R19E
Monument Valley

QUAD: Agatha Peak 15'; Marble Canyon NTMS

DEVL: Incline

PROD: 37 tons @ 0.08% U_3O_8; 0.13% V_2O_5 in 1955.

GEOL: Carnotite-type ore in a paleochannel deposit of Shinarump sandstone.

REF: D.O.E.

BOOT JACK MINE

LOC: Approx. Sec. 32, T41N, R19E
Monument Valley - Olijeto Creek

QUAD: Boot Mesa 15'; Marble Canyon NTMS

DEVL: Vertical shaft with underground workings following E-W trending paleochannel. Over 200 drill holes.

PROD: 36,662 tons @ 0.46% U_3O_8; 0.07% V_2O_8, in 1957-60 and 1965-66.

ANAL: 0.51% U_3O_8 max.

GEOL: Uraninite is in an E-W trending paleochannel, buried 350 to 400 ft. Ore zone averages 10 ft. thick and is restricted to within the channel flank, generally on the southern side and only occasionally above.

REF: D.O.E.

BRODIE #4-5

LOC: Approx. central Sec. 21, T40N, R21E
Central Monument Valley

QUAD: Agathla Peak 15'; Marble Canyon NTMS

RAD: 10X

GEOL: Carnotite-type and secondary copper minerals in 150 ft. long by 20 ft. deep paleochannel of Shinarump trending E-W in Moenkopi. Silicified wood.

REF: PRR-GJEB: R-165 and 166
Witkind and Thaden (1963)

BRUCE GARDNER CLAIM

LOC: 14 mi. SE of Woodruff, AZ. (possibly T14 or 15N, R. 23 or 24E)

QUAD: Holbrook and Saint Johns NTMS

ANAL: 0.83% e U_3O_8; 1.01% U_3O_8

GEOL: Yellow radioactive mineral associated with silicified wood.

REF: Nininger, R. D. (1950)

CABIEN

LOC: Sec. 1, T17N, R23E

QUAD: Petrified Forest 15; Saint Johns NTMS

ANAL: 0.03 - 0.06% e U_3O_8; 0.03-0.07% U_3O_8

GEOL: Probably carnotite in Chinle Shale just under a conglomerate layer. Cobalt color and jarosite yellow present.

REF: PRR-ED-R-212

CALVIN CHEE PROSPECT

LOC: Approx. Sec. 35, T25N, R22E
Hopi Buttes

QUAD: Satan Butte 7½'; Gallup, NTMS

ANAL: 0.09% e U_3O_8; 0.12% U_3O_8; 0.04% V_2O_5; 1.9% $CaCO_3$

GEOL: Uranium and copper mineralization in the Bidahochi Fm.

REF: PRR-ED:R -283

CARNOTITE CANYON

LOC: Unknown - Monument Valley?

PROD: 12 tons @ 0.35% U_3O_8, 0.01% V_2O_5 in 1952

CARRIZO CLAIM

LOC: Sec. 28, T19N, R23E

QUAD: Navajo Springs and Beacon Well 7½'; Gallup NTMS

RAD: 10X against log

GEOL: Silicified logs with minor yellow and green stains in Shinarump. Some fluorescent waxy, yellow surface coatings are tyuyamunite. Sklodowskite also present.

REF: Nininger, R.D. (1951), PRR-USBM (#11)

CECIL TODECHENEE CHANNEL (Tract 2A)

CHACO-ROBINSON (Morale)

CURRY JONES PROSPECT (Rock Garden #25, Lucky Boy 1-10, Rarezona)

LOC: Approx. N. central Sec. 22, T18N, R23E

QUAD: Petrified Forest 15'; Saint Johns NTMS

DEVL: Rim stripping

PROD: 53 tons @ 0.28% U_3O_8; 0.73% V_2O_5, 1956-57

RAD: 2 mr/hr

ANAL: 4 samples @ 0.05-0.86% U_3O_8

GEOL: Zippeite associated with carbonized trash in bentonitic sandstone of Petrified Forest member. Carnotite in mineralized logs and interstitial in sandstone.

REF: PRR-ED:R-226 (#597)
Gregg (1953)

DAYLIGHT

LOC: Approx. Sec. 20, T41N, R19E
Monument Valley

QUAD: Boot Mesa 15'; Marble Canyon NTMS

DEVL: Drilled

PROD: Unmined ore body

GEOL: Paleochannel of Shinarump

REF: D.O.E.

DOUGHNUT DIATREME

LOC: Approx. NE¼ Sec. 22, T24N, R21E,
Hopi Buttes

QUAD: Indian Wells 7½'; Flagstaff AMS

RAD: 3 X Bkg.

GEOL: Bedded pyroclastics and calcareous Bidahochi Fm. dipping inward 20 to 50°, suggesting collapse. Large portion of the limestone beds is weakly mineralized.

REF: Fair, C.L. (1956)

FERN #1 MINE

LOC: Approx. NW corner Sec. 4, T41N, R19E
West Monument Valley

QUAD: Boot Mesa 15'; Marble Canyon NTMS

DEVL: 27,000 ft. of drilling to average depth of 120 ft. Room and pillar underground mining. Cave-in in 1961 following flooding.

PROD: 10,484 tons @ 0.66% U_3O_8; 0.29% V_2O_5 in 1956, 57, 61.

GEOL: NNW trending paleochannel of Shinarump with uraninite and copper sulfides. Located on the east flank of Oljeto syncline, which is superimposed on the Monument upwarp.

REF: D.O.E.

FIRELIGHT #6 CLAIM (Naschoy Mine)

FRED ZAHNE #1-5

LOC: Approx. Sec. 22-23, T36N, R17E
Black Mesa

QUAD: Shonto SE and Long House Valley 7½'; Marble Canyon NTMS

DEVL: Ten drill holes

RAD: Weak

ANAL: 0.02 - 0.04% e U_3O_8

GEOL: About 5 ft. thick uraniferious lignitic coal bed in Dakota Fm. at a depth of about 50 ft.

REF: D.O.E.

GEORGE BELINTE #1

LOC: Approx. T33N, R22 or 21E
Near Apache County line

QUAD: Blue gap 7½ or Burnt Corn Spring 7½; Marble Canyon NTMS

GEOL: See nearby George Belinte #2 in Apache County

REF: D.O.E.

GERWITZ PROSPECT (Spurlock-Westter Ranch)

LOC: Approx. W center Sec. 26, T19N, R20E

QUAD: Lee Mtn. and Blair Springs 7½'; Flagstaff NTMS

RAD: 0.2 mr/hr.

ANAL: 4 samples @ 0.04 - 1.29% U_3O_8

GEOL: Becquerelite and fluorescence uranium mineral(s) (probably autunite and/or tyuyamunite) in light-brown, coarse grained bentonitic sandstone, containing abundant carbonized plant remains. Probably Petrified Forest member, Chinle Fm.

REF: PRR-ED:R-228 (#598)
Finch, 1967
Moore, 1953

GOLD CROWN

LOC: Approx. Sec. 24, T41N, R19E. Monument Valley 1300 ft. ESE of Monument #1.

QUAD: Agathla Peak 15'; Marble Canyon NTMS

PROD: 70 tons @ 0.12% U_3O_8 in 1955-56

GEOL: Tyuyamunite and minor autunite, carnotite, pyrite, and copper oxides in Shinarump coarse grained sandstone with clay pebbles. Abundant pockets of plant material.

REF: Witkind, R. and Thaden, R. (1963)

GOOF (Section 33 Lease)

LOC: SW¼ of NW¼ Sec. 33, T18N, R23E

QUAD: Petrified Forest 15'; Saint Johns NTMS

DEVL: Rim strip

PROD: 8.9 tons @ 0.1% U_3O_8; 0.13% V_2O_5 in 1956

GEOL: Goof is an illegal shipment of ore from the Sec. 33 lease property. Shipment came from west side of butte in SW¼ of NW¼ of Sec. 33. Legal shipments from Section 33 came from east side of another butte in SE¼ of SE¼ of Sec. 33.

REF: D.O.E.

GWEN

LOC: Approx. Sec. 29, T24N, R22E
Hopi Buttes

QUAD: Indian Wells 7½'; Flagstaff NTMS

DEVL: Prospect pits

ANAL: 0.10-0.15% e U_3O_8
0.06% e U_3O_8, 0.04% U_3O_8, 1.5% $CaCO_3$

GEOL: Six inch seam of autunite mineralization in beds of Bidahochi Fm. associated with tuffs on north perimeter of diatreme.

REF: D.O.E.

HANSON #1 (J. D. Hanson #1)

LOC: Approx. Sec. 11, T18N, R19E

QUAD: Joseph City 15'; Holbrook NTMS

DEVL: Shallow pits and trenches

PROD: 285 tons @ 0.06% U_3O_8; 0.03% V_2O_5, 1953-55

GEOL: Carnotite-type mineralization in carbonaceous siltstone with carbonized plants and petrified wood of Petrified Forest member.

REF: D.O.E.

HARVEY BLACK

LOC: Approx. SW¼ Sec. 1, T41N, R19E
West Monument Valley

QUAD: Boot Mesa 15'; Marble Canyon NTMS

GEOL: Massive medium fine grained Shinarump sandstone in paleochannel some 200 ft. wide and 50 ft. deep cut in Moenkopi. Secondary copper and uranium minerals with abundant silicified wood and carbonized material.

REF: D.O.E.

HARVEY BLACK #2 (Spencer #1)

HENRY LEE SAMPSON

LOC: Unknown - somewhere around Monument Valley

PROD: 32 tons @ 0.10% U_3O_8 in 1955 by Spencer Uranium Co.

HOPI BUTTES

The following Hopi Buttes occurrences are reported individually:

#1 Airborne #55
#2 Airborne #56
#3 Airborne #59
#4 Airborne #67
#5 Airborne #74
#8 Bidahochi Butte
#22 Doughnut Diatreme
#28 Gwen
#30 Horseshoe Diatreme
#31 Hoskie Tso #1
#42 Morale (Seth-la-Kai Diatreme)
#49 Roanhorse Diatreme
#54 Sjodin
#57 Sun #12 Claims
#59 Terry Claims
#71 Unnamed E

REF: Hack, J. T. (1942)
Shoemaker, E. (1956)

HORSESHOE DIATREME

LOC: Sec. 25, T25N, R21E, and Sec. 30, T25N, R22E, Hopi Buttes (12 mi. north of Indian Wells T.P. and 2 mi. east of Keams Canyon Road.

QUAD: White Cone 15'; Flagstaff NTMS

ANAL: 0.02 - 0.03% e U_3O_8; 18.6 - 40.8% $CaCO_3$

GEOL: Uranium mineralization is in "water-laid pyroclastics" as small channel cuts into underlying Bidahochi Fm. on north rim of bowl shaped depression of explosion breccia and adjacent to vent filling on SE point of rim.

REF: Fair, C. L . (1956)

HOSKIE TSO #1

LOC: South Sec. 24, T23N, R21E
Hopi Buttes

QUAD: Indian Wells 7½'; Flagstaff NTMS

DEVL: Prospect pit

RAD: Weak

GEOL: Autunite occurs in matrix and Wingate Sandstone blocks in breccia overlying siltstone on the east edge of diatreme.

REF: Shoemaker, E. et. al. (1957)
Shoemaker, E. et. al. (1962),
D.O.E.

J. CITY #1

LOC: Sec. 33, T19N, R19E

QUAD: Blair Spring 7½'; Flagstaff NTMS

DEVL: Shallow pit and surface scrapings

PROD: 31 tons @ 0.04% U_3O_8, 1957

GEOL: Low grade ore horizon is about 1 ft. thick and at an average depth of 2 ft. in Petrified Forest member.

REF: D.O.E.

J. D. HANSON (Hanson #1)

JOE ROCK #7-9

LOC: Approx. Sec. 31-32, T41, R19E
Monument Valley - Oljeto Creek

QUAD: Boot Mesa 15'; Marble Canyon NTMS

DEVL: 56,675 ft. of drilling in 138 holes, 1956 and 1958.

GEOL: Mineralization in paleochannels of Shinarump scoured into underlying Moenkopi Fm. Uraniferous pods are 300-400 ft. below surface and are associated mostly with depressions in the paleochannel floor. Situated on the east flank of Oljeto Syncline.

REF: D.O.E.

KOLEY BLACK #1 (Ben #2, Sam Charlie #1)

LOC: Approx. N. central Sec. 11, T39N, R.20E
Hunts Mesa - Monument Valley

QUAD: Agathla Peak 15'; Marble Canyon NTMS

PROD: 5 tons @ 0.24% U_3O_8; 1.32% V_2O_5 from Sam Charlie #1 in 1953.

GEOL: Coarse conglomerates grade upward into coarse-grained sandstone in a maze of paleochannels, 35-250 ft. wide; forms NW striking system. Tyuyamunite and copper minerals, silicified wood and coaly matter occur in paleochannel fill and partially replace clay pebbles. Moenkopi is deeply cracked with Shinarump filling cracks.

REF: PRR-GEB:R-53
Chester, J.W. (1951)
Witkind, I.J. & Thaden, R.E. (1963)
U.S.G.S., TEI-280 (p.13-14)

LEASE #1

LOC: Unknown, somewhere in Monument Valley, noted in AEC 1973 ore reserve computer list

PROD: 590 tons @ 0.17% U_3O_8; 0.49% V_2O_5

LITTLE JOHN #1-3 (Young, Bayshore #2)

LOC: NW¼ Sec. 12, T17N, R23E

QUAD: Petrified Forest 15'; Saint Johns NTMS

DEVL: Rim stripping and 10' caved adit. Merrill Young was original owner who sold to Bayshore Co. of Canada and called the mine the Little John.

PROD: 11 tons @ 0.10% U_3O_8; 0.16% V_2O_5, 1953-54
1956 production was combined with the Ruth Mine.

RAD: 1.5 mr/hr.

ANAL: 0.02-0.21% U_3O_8

GEOL: Uraninite, coffinite, zeunerite, schroeckingerite, and torbernite occurs in gray medium to coarse grained sandstone and bentonitic mudstone in Petrified Forest member. Abundant petrified logs and carbonaceous trash.

REF: PRR-EDR: 224 and 225 (#595)
D.O.E.
Finch (1967)
Gregg (1952)
Gregg and Moore (1955)

LUCKY BOY 1-10 (Curry Jones Prospect)

MAC #3

LOC: SE corner Sec. 5, T17N, R23E

QUAD: Petrified Forest 15'; Saint Johns NTMS

DEVL: Small pits along rim

PROD: 6 tons @ 0.48% U_3O_8; 0.71% V_2O_5; 1.1% $CaCO_3$, 1956

GEOL: Carnotite-type mineralization associated with a small, very radioactive pod of red jasper in the Sonsela sandstone of the Petrified Forest member.

REF: D.O.E.

MARGARITE LEASE

LOC: N½, N½, Sec. 3, T17N, R23E

QUAD: Petrified Forest 15'; Saint Johns NTMS

DEVL: 2000 ft. of rim stripping and two 25 ft. adits, drilled by A.E.C.

RAD: 100X

ANAL: 3 samples @ 0.02% - 0.77% U_3O_8

GEOL: Carnotite and possibly some pitchblende in carbonaceous sandstone lenses with carbonized wood in Petrified Forest member. Mineralized zone is at a depth of about 80 ft. and is about 1.5 ft. thick.

REF: PRR-ED:R-225 (#596)
D.O.E.
RME-51 (1955, p.10)

MITCHELL BUTTE MESA (Mitchell Mesa)

LOC: Approx. Sec. 13, T41N, R20E, or 36° 58'N, 110°06'W

QUAD: Agathla Peak 15'; Marble Canyon NTMS

DEVL: Drilled; one crosscut with tramway off Mesa.

PROD: 1,764 tons @ 0.14% U_3O_8; 1.71% V_2O_5 in 1962,65,66.

GEOL: Tyuyamunite and minor torbernite occurs in thin seams surrounded by vanadium mineralization and carbonaceous debris in Shinarump. The Shinarump grades form a massive coarse-grained sandstone downward into conglomerate sandstone with clay pebbles and lies in WNW trending paleochannel cut into Moenkopi, up to 350 ft. wide and 75 ft. deep.

REF: U.S.G.S. (1953) TEI-280, p.13-14)
Witkind, I.J. (1956, p. 107)
Witkind, I.J. & Thaden, R.E. (1963)
Finch, W.I. (1967)

MITTEN #2 (Monument #1)

MONUMENT No. 1 (Mitten #2)

LOC: Approx. Sec. 24, T41N, R19E, or 36°57' 00"N, 110° 13' 55"W

QUAD: Agatha Peak 15'; Marble Canyon NTMS

DEVL: Underground

PROD: 29,569 tons @ 0.30% U_3O_8; 1.39% V_2O_5, in 1948-1966. V/U ratio ranged from 0.3:1 to 14:1. Mitten 2 produced in 1952-61.

GEOL: Unmineralized calcite - cemented sandstone lenses in Shinarump are surrounded by roughly concentric mineralization with tyuyamunite, metatyuyamunite, metatorbernite, corvusite, hewettite, volborthite, pyrite, azurite, chrysocolla, malachite and limonite. The conglomerate, silica-cemented sandstone and calcite-cemented sandstone with silicified wood, carbonaceous matter and clay pebbles occur in basal remnants of Shinarump paleochannels cut into Moenkopi. Two 2,000 foot long segments trend N to NW. Ore zone varies from ten to 95 feet wide and 1-18 feet thick. Uranium-vanadium and copper minerals impregnate conglomerate and silica-cemented sandstone.

REF: PRR-CEBR-3 (#589)
Witkind, I.J. (1961)
Witkind, I.J. & Thaden, R.E. (1963)

MOONLIGHT

LOC: Approx. NW¼ Sec. 16, T41N, R19E
Monument Valley-Oljeto Creek

QUAD: Boot Mesa 15'; Marble Canyon NTMS

DEVL: 145 ft. deep open pit and some room and pillar underground workings from the bottom of the pit.

PROD: 223,237 tons @ 0.26% U_3O_8; 0.21% V_2O_5, in 1956 and 1959-66.

GEOL: Uraninite in Shinarump paleochannel cut into Moenkopi-ore extends down into Moenkopi.

REF: Malan, R. C. (1968)
U.S.A.E.C. (1959, RME-141)

MORALE CLAIMS (Seth-la-Kai Diatreme, O'Haco-Robinson)

LOC: Approx. NE¼ Sec. 19, T24N, R22E
Hopi Buttes

QUAD: Indian Wells 7½; Flagstaff NTMS

DEVL: Rim stripping and 15 ft. adit with stoping. USGS drilling in 1979 revealed 100,000 tons of 0.015% U_3O_8 remaining in the diatreme.

PROD: 192 tons @ 0.15% U_3O_8; 0.04% V_2O_5, 1954-55, 1957, 1959. 0.75-1.00% P_2O_5 content makes alkaline leach difficult.

ANAL: 4 samples @ 0.05-0.17% e U_3O_8; 0.01 to 0.20% U_3O_8

GEOL: Finely disseminated, non-fluorescent uranium mineral (possibly autunite) in volcanic sandstone beds (Bidahochi Fm.) laminated with more widespread limestone, shale, siltstone and tuffs with chert and evaporites. Beds tilted toward center of diatreme. Some copper mineralization.

REF: Lowell, D. J. (1956)
Shoemaker, E. M. et. al. (1962)
Shoemaker, E. M. et. al. (1957, TEI-700)
PRR-ED-R-252
PRR-ED-R-249
Chenoweth and Malan (1975)

NAKAI MESA (Alfred Miles #1)

NASCHOY MINE (Firelight #6 Claim)

LOC: Approx. central Sec. 2, T40N, R19E
Monument Valley

QUAD: Agathla Peak 15'; Marble Canyon NTMS

DEVL: 360' incline @ 31° w/ 2 haulage drifts and stoping started Dec. 1957, abandoned in 1960-61 due to flooding.

PROD: 2,140 tons @ 0.18% U_3O_8; 0.59% V_2O_5 in 1959-60.

GEOL: About a 5 ft. thick ore zone in a N-S Trending paleochannel of Shinarump conglomerate on east flank of Oljeto syncline.

REF: U.S.A.E.C. (1959)

NAVAJO

LOC: Sec. 26, T20N, R23E
Trespass on Petrified Forest National Park

QUAD: Kachina Point 7½; Gallup NTMS

DEVL: Surface scrapings

PROD: 67 tons @ 0.12% U_3O_8; 0.15% V_2O_5, 1956

GEOL: Carnotite in petrified wood in the Petrified Forest member.

REF: D.O.E.

NAVAJO TRACT #2 (Tract #2)

NEW MEXICO AND ARIZONA LEASE (Section 33 Lease)

O'HACO RANCH

LOC: Approx. N. central Sec. 25, T19N, R16E

QUAD: Winslow 15'; Flagstaff NTMS

ANAL: 0.04% e U_3O_8; 0.03% U_3O_8

GEOL: Mineralization in siltstone - Petrified Forest member.

REF: PRR-ED-R-256

O'HACO--ROBINSON PROSPECT

LOC: Approx. SW¼ Sec. 31, T20N, R16E

QUAD: Winslow 15'; Flagstaff NTMS

ANAL: 3 samples @ 0.02 - 0.08% e U_3O_8; 0.02 - 0.18% U_3O_8

GEOL: Probably autunite and tyuyamunite or metatyuyamunite in Shinarump paleochannel cut into Moenkopi Fm.

REF: PRR-ED-R-257

P. COSTEN

LOC: NE¼ and S. central Sec. 1, T18N, R19E

QUAD: Joseph City 15'; Holbrook NTMS

GEOL: Carnotite-type mineralization, 4-5 ft. thick, in sandy orange and black shale with abundant petrified wood, close to base of Chinle. Associated with carbonized and silicified wood, gypsum, iron oxide and some erythrite (cobalt).

REF: Gregg, C.C. (1952, RMO-987)
PRR-ED-R-203 & 204 (#592 & 591)

PAINT (Charles Givens)

LOC: Monument Valley Region

PROD: 42 tons @ 0.19% U_3O_8 in 1952

PENINSULA (Alfred Miles #1)

RAINBOW SMITH #1 & 2

LOC: Sec. 36, T16N, R22E

QUAD: Hay Hollow 7½; Saint Johns NTMS

DEVL: Shallow surface scrapings for petrified wood

PROD: 14 tons @ 0.08% U_3O_8; 0.18% V_2O_5, 1956

GEOL: Carnotite in petrified wood in Petrified Forest member.

REF: PRR-ED-R-222

RAREZONA (Curry Jones Prospect)

ROANHORSE DIATREME

LOC: Approx. Sec. 10-15, T24N, R21E
Hopi Buttes

QUAD: Indian Wells 7½, Flagstaff NTMS

ANAL: 0.04% U_3O_8

GEOL: Carnotite-type mineralization in Bidahochi Fm. and Tuffs associated with diatreme. Beds dip steeply to the N-NW and contain silicified and carbonized wood.

REF: Shoemaker, E.M. et. al. (1957, TEI-700)
Shoemaker, E.M. et. al. (1962)

ROCK GARDEN #25 (Curry Jones Prospect)

RUTH #1 & 4 (Barton Mine, Bayshore #3)

LOC: Sec. 2, T17N, R23E

QUAD: Petrified Forest 15'; Saint Johns NTMS

DEVL: Adits and rim stripping

PROD: 1,268 tons @ 0.20% U_3O_8; 0.16% V_2O_5, 1953-55, 1960 and less than 500 tons/year in 1976, 1978.

RAD: 5 mr/hr. in workings

ANAL: 2 samples @ 0.12-0.35% e U_3O_8; 0.08-0.18% U_3O_8; 0.82% V_2O_5

GEOL: Carnotite-type mineralization in carbonaceous siltstone below rim of Sonsela sandstone in Petrified Forest member.

REF: PRR-UP-29 (#350)

SAIN

LOC: Approx. SE corner Sec. 23, T19N, R20E

QUAD: Lee Mtn. 7½; Flagstaff NTMS

DEVL: Rim stripping

PROD: 8 tons @ 0.08% U_3O_8; 0.04% V_2O_5, 1955

RAD: 0.2 mr/hr.

GEOL: Carnotite-type mineralization in a highly carbonaceous, muddy sandstone overlain by a zone with abundant plant fossils in the Petrified Forest member.

REF: D.O.E.

SALLY MINE

LOC: Sec. 6-7, T40N, R20E
Monument Valley

QUAD: Agathla 15'; Marble Canyon NTMS

DEVL: 60 drill holes (3000 ft. total)

PROD: 67 tons @ 0.10% U_3O_8, 0.04% V_2O_5 in 1955.

GEOL: Low-grade mineralization occurs at base of sandstone-filled Shinarump paleochannel on west limb of Agathla Anticline, superimposed on Monument upwarp. Deposit is completely oxidized autunite, low vanadium, low lime . Channel trends NNW to WNW. Channel tilted 5° toward NW.

REF: D.O.E.

SAM CHARLIE #1 (Koley Black #1)

SECTION 33 LEASE (Bill Gill, New Mexico-Arizona Lease, Goof)

LOC: SE¼ - SE¼ Sec. 33, T18N, R23E

QUAD: Petrified Forest 15'; Saint Johns NTMS

DEVL: 2000 ft. rim stripping, 15 ft. shaft into mineralized slump block, small open cut 25 X 15 x 10 ft., 6,000 ft. rotary drilling.

PROD: 29 tons @ 0.13% U_3O_8, some stockpiled on property.

GEOL: Chinle Fm., Petrified Forest member

REF: D.O.E.

SETH-LA-KAI (Morale claims)

SHARON LYNN

LOC: SW¼ Sec. 34, T16N, R23E

QUAD: Hay Hollow 7½; Saint Johns NTMS

DEVL: Scattered, shallow surface scrapings

PROD: 5 tons @ 0.08% U_3O_8; 0.03% V_2O_5, 1954

GEOL: Mineralized petrified wood in Petrified Forest member.

REF: D.O.E.

SJODIN

LOC: Approx. Sec. 24, T25N, R23E
Hopi Buttes

QUAD: Greasewood 7½; Gallup NTMS

DEVL: Drilled

ANAL: 0.09% U_3O_8; 14% $CaCO_3$

GEOL: Autunite in volcanic agglomerate and associated sediments and spring deposits in Bidahochi Fm.

REF: D.O.E.

SM TRACT #2 (Tract #2)

SONNY JAMES (James Sonny?)

LOC: Unknown

RAD: 0.87% U_3O_8, 0.08% V_2O_5, 4.68% Cu

GEOL: Channel in Shinarump with Copper, Mananese

REF: GJEB-R-71

SOUTH SUNLIGHT (Big Four Claim)

SPENCER #1 (Harvey Black #2)

LOC: Approx. Sec. 6, T41N, R20E

QUAD: Agathla 15'; Marble Canyon NTMS

DEVL: Underground

PROD: 375 tons @ 0.23% U_3O_8; 0.79% V_2O_5 in 1954,55,62.

GEOL: Carnotite hewettite, tyuyamunite, associated with iron oxides, silicified logs plus pebbles and cobbles, at base of N61°E trending Shinarump paleochannel.

REF: D.O.E.

SPURLOCK - WESTTER RANCH (Gerwitz Prospect)

STARLIGHT (Starlight 1 & 2; Starlight East)

LOC: Approx. W. central Sec. 17, T41N, R19E
Monument Valley - Oljeto Creek

QUAD: Boot Mesa 15'; Marble Canyon NTMS

DEVL: Vertical shaft plus room and pillar

PROD: 86,369 tons @ 0.30% U_3O_8; 0.06 V_2O_5 in 1958-64.

ANAL: 0.40% U_3O_8; 0.50% V_2O_5; 5.41% $CaCO_3$ max.

GEOL: Uraninite in Shinarump paleochannel

REF: U.S.A.E.C. (1959)
Johnson, H.S. Jr. & Thordarson, W. (1956, TEI-640)

SUN #12 CLAIM

LOC: Approx. Sec. 32, T23N, R21E
Hopi Buttes

QUAD: Sunflower Butte 7½; Flagstaff NTMS

GEOL: Finely disseminated uranium mineralization in limestone and concentrated in laminated siltstones and shales of the Bidahochi Fm., associated with a diatreme. Volcanic tuff, chert and evaporites associated with sediments.

REF: Shoemaker, E. M. (1955, TEI-590)
Shoemaker, et.al. (1957, TEI-700)

SUNLIGHT (Big Four Claim)

SUNRISE

LOC: Sec. 4, T17N, R23E

QUAD: Petrified Forest 15'; Saint Johns NTMS

DEVL: Rim stripping

PROD: 14 tons @ 0.10% U_3O_8; 0.21% V_2O_5, 3.4% $CaCO_3$, 1957
This ore may have come from stockpiles on the Bill Gill Lease on adjacent Section 33.

GEOL: Carnotite in upper part of Sonsela sandstone in Petrified Forest member.

REF: D.O.E.

TERRY CLAIMS

LOC: E½ Sec. 34, T25N, R22E
Hopi Buttes

QUAD: Satan Butte 7½'; Gallup NTMS

ANAL: 0.08-0.18% U_3O_8; 0.04 - 0.06% V_2O_5; 8.3- 17.5% $CaCO_3$

GEOL: Autunite in volcanic rock associated with diatreme

REF: PRR-4-14-54

TODECHENEE (Alfred Miles #1)

TRACT #1

LOC: SE¼ Sec. 1, T17N, R23E

QUAD: Petrified Forest 15'; Saint Johns NTMS

ANAL: 2 samples 0.01 - 0.02% e U_3O_8; 0.003 -0.017% U_3O_8

GEOL: Mineralization is associated with carbonized wood and plants plus silicified wood in flat-lying sandstone, bentonitic clay and conglomerate in Chinle Fm.

REF: PRR-w/o # (#585)

TRACT #2

LOC: SW corner Sec. 33, T16N, R23E

QUAD: Hay Hollow 7½; Saint Johns NTMS

ANAL: 2 samples @ 0.014-0.018% e U_3O_8; 0.007 - 0.010% U_3O_8

GEOL: Carnotite associated with silicified logs in shales of the Chinle Fm.

REF: PRR-w/o# (#586)
Granger, H. C. & Raup, R.B. (1962), Finch, W.I. (1967)

TRACT #2 (SM Tract #2, Navajo Tract #2)

LOC: Approx. SW¼, Sec. 10, T41N, R18E
Monument Valley

QUAD: Boot Mesa 15'; Marble Canyon NTMS

DEVL: Incline

PROD: 13,523 tons @ 0.34% U_3O_8, 1958-62

ANAL: 0.55% U_3O_8; 0.17% V_2O_5; 3.86% $CaCO_3$; 2.0% Cu

GEOL: Uraninite in Shinarump paleochannel.

REF: D.O.E.

TRACT 2A (Cecil Todechenee Channel)

LOC: Lat. 36° 53' 24"N and long. 110° 24' 48"W or Approx. Sec. 8, T40N, R18E. Monument Valley - Skeleton Mesa

QUAD: Boot Mesa 15'; Marble Canyon NTMS

DEVL: 20 ft. adit

PROD: Small stockpile

ANAL: Channel sample @ 0.02% U_3O_8; 1.49% V_2O_5
Grab sample @ 0.24% U_3O_8 max.

GEOL: Carnotite-type mineralization with malachite, associated with silicified and carbonize wood, is in Shinarump paleochannel, Trending E-W.

REF: Witkind, I. J. and Thaden, R.E. (1963, p. 150-151)

TRACT #11 MINE

LOC: Approx. W. central Sec. 16, T41N, R18E
Monument Valley - Hoskinnini Mesa

QUAD: Boot Mesa 15'; Marble Canyon NTMS

PROD: 12,384 tons @ 0.35% U_3O_8 in 1958-64

GEOL: Mineralization is in Shinarump paleochannel

REF: Witkind, I. J. & Thaden, R.E. (1963, p. 151-152)
U.S.A.E.C. (1959)

TRACT 17 (Tract 17-TZM)

LOC: Approx. W. Sec. 21, T41N, R17E
Monument Valley - Nokai Creek

QUAD: Cattle Canyon 7½ and Boot Mesa 15'; Marble Canyon NTMS

DEVL: 400' sublevel adit w/raise to ore horizon - Room and pillar, 41 drill holes.

PROD: 4,131 tons @ 0.41% U_3O_8 in 1959.

ANAL: 0.23% U_3O_8; 0.15% V_2O_5; 16% $CaCO_3$

GEOL: Uraninite, chalcopyrite, chalcocite, bornite and covellite in conglomerate lens of Shinarump paleochannel. Beds strike NE, dip 2-3° NW on west flank of Organ Rock anticline. Ore body 40 ft. wide, 200 ft. long, average 4-5 ft. in thickness.

REF: D.O.E.

TWILIGHT #1

LOC: Approx. Sec. 17, T41N, R19E
Monument Valley - Oljeto Creek

QUAD: Boot Mesa 15'; Marble Canyon NTMS

DEVL: Drilled in 1959

GEOL: Uraninite in continuous ore pod 25 ft. X 175 ft. in Shinarump paleochannel.

REF: D.O.E.

TWIN BUTTES (Kay Group)

UNNAMED A

LOC: Sec. 30, T16N, R23E

QUAD: Petrified Forest 15'; Saint Johns NTMS

RAD: 12X

ANAL: 4 samples @ 0.03 - 0.39% U_3O_8

GEOL: Unidentified uranium mineralization associated with carbonaceous matter, probably in lower Chinle Fm.

REF: PRR-ED-R-222 (#594)

UNNAMED B

LOC: Approx. Sec. 23, T20N, R17E

QUAD: Holbrook 15'; Flagstaff NTMS

RAD: 6X

ANAL: 0.03% U_3O_8 around log

GEOL: Mineralization associated with petrified wood and limonite in sand and mudstones in Chinle Fm.

REF: PRR-ED-R-232

UNNAMED C

LOC: Approx. Sec. 2, T16N, R23E
1.1 miles west of south entrance to Petrified Forest National Park.

QUAD: Petrified Forest 15'; Saint Johns NTMS

DEVL: Cut

ANAL: 2 channel samples @ 0.012 -0.015% e U_3O_8; 0.008-0.014% U_3O_8

GEOL: Mineralization associated with carbonized plants in Chinle Fm.

REF: PRR-w/o # (#584)

UNNAMED D

LOC: Sec. 15, T16N, R23E

QUAD: Petrified Forest 15'; Saint Johns NTMS

GEOL: Uranium mineralization and some pyrite associated with petrified logs in lower Chinle Fm.

REF: PRR-F10102 (A.E.C.)

UNNAMED E

LOC: Approx. SE¼ Sec. F, T24N, R21E
Hogback - 1 mile NE of Na Ah Tee Trading Post

QUAD: Na Ah Tee 7½; White Cone 15'; Flagstaff NTMS

RAD: 0.15 mr/hr.

ANAL: 0.04% U_3O_8

GEOL: Mineralization occurs in Kaolin, conglomerate and marl along ridges dipping steeply N-NW. Silicified and carbonized wood plus volcanic rocks (tuffs and lava) present.

REF: PRR-ED-R-205 (#593)

UNNAMED F

LOC: Lat. 34° 03' 50"N, long. 110° 29' 55"W
Cibecue Approx. Sec. 26, T8N, R17E

QUAD: Cibecue 15'; Holbrook NTMS

GEOL: Anomalous radioactivity in conglomerate-sandstone lenses in Paleozoic Naco-Supai formations.

REF: PRR-AP-17S (#587)
Peirce, H.W. et. al. (1977, p. A-11)

UNNAMED G

LOC: Approx. NW¼ Sec. 11, T8N, R17E

QUAD: Cibecue and Chediski Peak 15'; Holbrook NTMS

GEOL: Uranium and copper mineralization in gray, limy Supi mudstone overlain by six feet of resistant thin-bedded calcerous silty sandstone.

REF: PRR-AP-175

UNNAMED H

LOC: Lat. 34° 00' 35" N and long. 110°28'10"W, near BM4840

QUAD: Cibecue 15'; Holbrook NTMS

DEVL: Highway roadcut

ANAL: 10-80 ppm uranium by weight, 0.03% Cu, trace Ag, Pb, Zn.

GEOL: Naco-Supai channel complex of sandstone and limestone pebble conglomerate inter-fingered laterally with siltstone. Anomalous radioactivity in sandstones and a 6 inch thick zone of gray, carbonaceous, micaceous shale.

REF: Peirce, H.W. et. al. (1977)

UNNAMED I

LOC: 36° 14' 50" to 15' 10"N, 110° 13' 40"W on east side of two Red Peaks Valley, 10.4 miles north of Pinon Trading Post.

QUAD: Pinon NW and To NeZhonnie Spring 7.5, Marble Canyon NTMS

DEVL: Airborne anomaly discovered in about 1955 by AEC.

RAD: Some anomalous airborne-detected radioactivity.

ANAL: None

GEOL: Very thin lens of black placer sand in walls of canyon, incorporated into Toreva Fm. of the Black Mesa Basin. Radioactivity due to uranium in zircon and Th in monazite. TiO_2 contents of placer concentrates of this age typically 10-30% by weight. This is southwesternmost known placer concentrate of this age in the regressive phase of the Bisbee-Mancos seaway.

REF: Murphy J.F. (1956)
Houston and Murphy (1977)

WINSLOW # 6 & 7 (Winslow Group)

LOC: N. central Sec. 32, T20N, R17E
Edge of Ives Mesa

QUAD: Winslow 15'; Flagstaff NTMS

DEVL: One 100 ft. adit from rim towards ore body; 64 holes drilled in 1955 for 8200 feet.

PROD: 49 tons @ 0.03% U_3O_8; 0.17% V_2O_5, 1954 reported from Winslow #7.

GEOL: Mineralization occurs in 2 sandstone lenses or paleochannels in Petrified Forest member. Ore body is at a depth of 50 ft. and averages 4-5 ft. thick. Lenses are separated by 20' stratigraphically, both trend ENE, and are superimposed.

REF: D.O.E.

YOUNG (Little John #1-3)

Index for Pima County Uranium Occurrences

		Name
N	27	Abe Lincoln
N	24	Blake Dike
N	32	Black Hawk
T	9	Blue Rock
T	7	Center Chance
A	14	Copper Squaw
A	12	Copper U.O.
N	28	Diamond Head
T	17	Dollar Bill
T	5	Dumar
T	16	Dutchess
T	10	East Chance
N	21	El Conquistadors
T	20	England -Will-Bixby
N	26	Escondida
N	33	Esperanza Copper Mine
N	41A	Gismo
N	25	Glen
T	2	Half Moon
N	22	Holy Mother
N	29	Hopeful
N	43	Iris and Natalia
N	23	Juanita
N	36	King Mine
N	31	Leadville
N	30	Lena, Jenny and Blue Moon
A	15	Linda Lee
N	40	Lobos
T	6	North Chance
N	34	New Years Eve
N	38	Old Baldy Copper Mine
T	1	Old Hat
N	41	Papago Chief
T	18	Red Hills
A	4	San Antonio Mine
N	42	Shamrock Mine
A	13	Silver Bullion
T	11	South Chance
N	35	Twin Buttes Copper Mine
N	37	Unnamed B
T	19	Unnamed C
N	39	Unnamed D
T	8	Van Hill
T	3	X-mas

A = Ajo
N = Nogales
T = Tucson

PIMA COUNTY

ABE LINCOLN

LOC: Sec. 34, 35, T17S. R11E

QUAD: Twin Buttes 15'; Nogales NTMS

DEVL: 15 ft. drift

RAD: 10X

ANAL: 0.08% U_3O_8

GEOL: Metatorbernite occurs with copper oxide and molybdenite in a quartz vein along fault zone in granite.

REF: PRR-A-90 (#651)

BABSON CLAIM GROUP (Black Dike Shaft)

BIXBY (England)

BLACK DYKE SHAFT (Babson Claim Group)

LOC: SE¼, SE¼, Sec. 23, T17S, R10E
Sierrita Mtns.

QUAD: Palo Alto Ranch 15'; Nogales NTMS

DEVL: Inclined shaft with adits

PROD: 61 tons @ 0.08% U_3O_8; 0.04% V_2O_5, 1956-57. Only one 1957 shipment of 10.7 tons assaying 0.18% U_3O_8 was "pay" ore.
Initially developed for copper production.

RAD: 10X

ANAL: 0.01-0.16%; U_3O_8

GEOL: Uraninite, pitchblende, fluorite, copper and manganese minerals occur as veinlets and disseminated in quartz monzonite. 100 ft. to the east, the rock changes to a metamorphosed sequence of sedimentary beds, striking northward and dipping 70°. Mineralization associated with contact zone between Paleozoic sediments and granitic stocks and dikes of probable Laramide age. Also iron oxide-coated shear zones nearby in Precambrian metamorphics and chloritic Continental granodiorite.

REF: PRR-UP-646
PRR-F-9051
Granger, H. and Raup, R. (1962)
Bissett, D. (1958)
Wells, R. and Puttuck, H. (1954, RME-2019)
Drewes (USGS Map MF-538)
D.O.E.

BLACK HAWK CLAIMS (San Juan #1-2)

LOC: Sec. 16, T18S, R11E
Southern Sierrita Mtns.

QUAD: Twin Buttes 15'; Nogales NTMS

DEVL: 180 ft. and 80 ft. shaft; 300 ft. drift

PROD: Lead and silver

RAD: 80X

ANAL: 0.07% e U_3O_8

GEOL: Radioactivity is associated with base metal mineralization along a vein, striking N30°E, dip 80°SE, in rhyolite porphyry.

REF: PRR-AP-383 (#670)
PRR-RA-25 (#674)

BLUE MOON (Refer to Lena #1)

BLUE ROCK #1 & 2 (Vanover; Blueslate; Sure Fire #1 Vanhill #5, East Chance Claims)

LOC: SW¼, Sec. 15, T13S, R18E

QUAD: Redington 15'; Tucson NTMS

DEVL: 3 short adits, 160 ft. incline, open face stoping, drilling

PROD: 58 tons @ 0.09%; U_3O_8, 1956 plus some shipments in late 1970's

RAD: 200X

ANAL: 0.014- 0.50% e U_3O_8; 0.06 -0.33% U_3O_8

GEOL: Uranophane and autunite occurs with copper and iron minerals and fluorite in a 10 ft. thick shear zone that separates Precambrian Granite on the west from Cretaceous clastic sediments on the east. Shear zone trends NW and dips 25°NE.

REF: PRR-AP-177 (#658)
Granger, H. and Raup, R. (1962)
D.O.E.
Arizona Bureau of Geology Data
Thorman, C. and others (1978)
Bissett, D. (1958)

BLUESLATE (Bluerock #1 & 2)

CENTER CHANCE CLAIMS

LOC: Southern edge SE¼, Sec. 10, T13S, R18E

QUAD: Redington 15'; Tucson NTMS

DEVL: Dozer cuts in hillside

RAD: 6X

GEOL: Several areas spread over 0.5 square miles, contain radioactive shale lenses intercalated into basal conglomerate of Oligocene Mineta Fm. Kaolinization and bedding plane faults in shale indicate some hydrothermal-structural control.

REF: Bissett, D. (1958)
Scarborough, R. and Wilt, J. (1979)

CHANCE GROUP (East Chance Claims)

Claim Group includes: North Chance
Center Chance
East Chance
South Chance (Pima & Cochise Co.)
Robles Spring (Cochise Co.)

CHRISTENSEN-LANE MINE

LOC: Probably Sec. 23, T18S, R15E
Helvetia area - NW Santa Rita Mtns.

QUAD: Sahuarita 15'; Nogales NTMS

DEVL: 30 ft. incline shaft, shallow open pit

ANAL: 0.01% e U_3O_8

GEOL: Granite cut by basic dikes and quartz veins

REF: PRR-A-20 (#640)

CONTROL (Old Hat)

COPPER SQUAW

LOC: Sec. 30, 14S, R3E - 32° 09' 55"N., 112° 06' 15"W

QUAD: Quijotoa Mtns. 15'; Ajo NTMS

DEVL: 120 ft. 30° incline shaft; shallow trenches

PROD: 6 tons @ 0.12%, U_3O_8; 5.8% Cu, 0.01 oz/t Au; 2.3 oz/t Ag. stockpiled; also produced about 90 tons of ore 1948-1953.

ANAL: 0.76 - 1.4% e U_3O_8

GEOL: Uranophane and uraninite occurs with base metals in vein along shear zone in altered andesite. Zone trends N40° W, dips 30°.

REF: PRR-AP-102 (#655)
D.O.E.

COPPER U.O. CLAIMS

LOC: 32°13' 40"N; 112° 07' 04" W
Adjacent to Copper Squaw Claim

QUAD: Quijotoa Mtns., 15'; Ajo NTMS

DEVL: 50 ft. shaft; several trenches and pit

PROD: 460 tons of 2% copper and 7-10 oz. silver in 1952.

RAD: 100X

GEOL: Mineralized shear zone in altered andesite with azurite and malachite.

REF: PRR-AP-103 (#656)

DIAMOND HEAD GROUP

LOC: Near center SE¼; NW¼; Sec. 34, T17S, R11E
Fresnal Canyon - Sierrita Mtns.

QUAD: Twin Buttes 15'; Nogales NTMS

DEVL: 180 ft. adit; 20 ft. incline; 15 ft. shaft, 170 ft. drift

RAD: 300X

ANAL: 0.22-0.74%, U_3O_8

GEOL: Lenses of pitchblende (¼ inch to 1 ft. thick by 15 ft. long) occur along ENE trending fault, intersecting small cross faults in alaskite granite. Fault gouge contains much kaolinite and hematite some calcite, pyrite and sparce chalcopyrite and fluorite. Possibly some uraninite.

REF: PRR-A-94 (#652)
Bissett, D. (1958)

DOLLAR BILL CLAIMS

LOC: Sec. 23, T15S, R18E
Rincon Mtns.

QUAD: Galleta Flat West 7½, Happy Valley 15'; Tucson NTMS

RAD: 375X

GEOL: Samarskite occurs with garnet in troughs along stream bed for 2 to 3 miles. Country rock is a aplitic, fine-grained porphyroblastic granite and schist with many pegmatite bands.

REF: PRR-A-64 (#647)

DUMAR CLAIM (Lamar)

LOC: Sec. 33, T12S, R14E

QUAD: Tucson North 7½'; Tucson NTMS

RAD: 4X

ANAL: 0.02% e U_3O_8

GEOL: Hematized structured zone in Pinal Schist beneath epidotized schist with higher count.

REF: Waechter, N. (1979)
PRR-A-13

DUTCHESS CLAIM (Cardinal Ave. Limestone)

LOC: Sec. 17, T. 15S, R13E
S. Tucson Mtns.

QUAD: San Xavier Mission 7½'; Tucson NTMS

DEVL: Small pit and drill holes

RAD: 30X

ANAL: 0.06% e U_3O_8

GEOL: Radioactivity disseminated in fetid limestone with some carnotite fracture coatings. 20 ft. section of light gray limestone 2-3 ft. thick interbedded with gypsiferous mudstone and gypsum seams. Beds are folded into a shallow E-W trending syncline. The units are most probably Oligocene in age.

REF: PRR-A-65
Grimm, J. (1978)
Scarborough, R. and Wilt, J. (1979)

EAST CHANCE CLAIMS (Van Hill #7 & 8, Vanover, Chance Group)

LOC: Near mutal corner of Sec. 13, 14, 23, 24, T 13S, R18E

QUAD: Redington 15'; Tucson NTMS

DEVL: 60 ft. adit

ANAL: 0.40%, U_3O_8

GEOL: Mineralization in shales and fetid limestones in Oligocene Mineta Fm. Section strikes N30°E, dips 30° and contains shales intercalated with thin-bedded limestones and overlie a conglomerate. Shales are sheared, hydrothermally altered, contain abundant bedding-parallel slickensides and pinch out along strike.

REF: PRR w/o# (#624)
Bissett, D. (1958)

EL CONQUISTADORS

LOC: Sec. 2, T17S, R8E
Coyote Mtns.

QUAD: Baboquivari Peak and Palo Alto Ranch 15'; Nogales NTMS

DEVL: Prospect pit

RAD: 3X

ANAL: 0.01% e U_3O_8

GEOL: Pegmatite zones in biotite gneiss

REF: PRR-A-52 (#646)

ENGLAND-WILL-BIXBY GROUP

LOC: Sec. 7-10, 14-15, 17-20, 22-23, 26-27, T16S, R12E

QUAD: San Xavier Mission and San Xavier Mission SW 7½; Tucson NTMS

DEVL: Small open pit

RAD: 10X

ANAL: Heavy mineral separate =11.8% e U_3O_8; .4.95% U_3O_8; 26% ThO_2

GEOL: Zircons and urano-thorite concentration with other heavy minerals in decomposed granite.

REF: PRR-AP-334 (#668)

ESCONDIDA

LOC: Sec. 34, T17S, R11E
Fresnal Canyon - Sierrita Mtns.

QUAD: Twin Buttes 15'; Nogales

DEVL: Two 8 ft. deep pits

RAD: 4X

ANAL: 0.06% e U_3O_8

GEOL: Uraninite with copper-iron sulfides along contact zone between basic dike and monzonite. Structures strike N70E, dip 65°N.

REF: PRR-A-35 (#642)

ESPERANZA COPPER MINE

LOC: SE¼ Sec. 8, NW¼ Sec. 16, NE¼ Sec. 17, T18S, RIZE

QUAD: Twin Buttes 15'; Nogales NTMS

DEVL: Open pit copper-molybdenum mine

PROD: Major Cu-Mo producer

ANAL: 0.11-18% E U_3O_8; on stockpiled ore

GEOL: Traces of torbernite reported associated with Cu-Mo-Ag disseminated mineralization in brecciated fissured, and jointed strongly altered Laramide intrusive complex (quartz latites-andesites) which invade Triassic-Jurassic volcanics.

REF: PRR-AP-255
Keith, S (1974) and Lynch, D. (1968)

GISMO GROUP

LOC: Sec. 5, T21S, R10E
NE Los Guijas Mtns.

QUAD: Arivaca 15'; Nogales NTMS

DEVL: Shafts and drifts, parts flooded or caved

PROD: Gold and silver

RAD: 50X

ANAL: 0.33% e U_3O_8

GEOL: Uraninite, kasolite and schroeckingerite occurs with copper-iron mineralization in vein along fault cutting granite. Veins strike NE and dip 80°N.

REF: PRR-A-114 (#722)

GLEN CLAIMS

LOC: NW¼ Sec. 30, T17S, R11E

QUAD: Palo Alto Ranch 15'; Nogales, NTMS

DEVL: Open cut about 15 ft. into hill

RAD: 2X

ANAL: 0.015-0.027%, U_3O_8

GEOL: Uraninite associated with metal sulfides disseminated in silicified breccia zone cutting granite. Feldspars altered to sericite along zone, trending N20°W.

REF: PRR-w/o# (#632, 634, 623)
Granger, H. and Raup, R. (1962)
Ransome, F. (1922)

HALF MOON #3

LOC: NE¼ Sec. 21, T11S, R18E

QUAD: Bellota Ranch 15'; Tucson NTMS

DEVL: Dozer cut

RAD: 27X

ANAL: 0.074% e U_3O_8

GEOL: Uraniferous opal in 8 ft. reddish brown opalite covered by horizontal, loosely consolidated lake beds of Pliocene age.

REF: PRR-AP-315 (#664)
Arizona Bureau of Geology data

HOLY MOTHER CLAIMS

LOC: Sec. 8, T17S, R11E

QUAD: Twin Buttes 15'; Nogales, NTMS

DEVL: Prospect pit

RAD: 3X

ANAL: 0.114%, e U_3O_8

GEOL: Specks of polycrase in granite

REF: PRR-AP-281 (#661)

HOPEFUL #1

LOC: Sec. 36, T17S, R11E
Sierrita Mtns.

QUAD: Twin Buttes 15'; Nogales, NTMS

DEVL: Location pit

RAD: 300X

ANAL: 1.35% e U_3O_8; 1.17% U_3O_8

GEOL: Secondary uranium minerals in zone cutting fractured and silicified quartzite near contact with granite.

REF: PRR-A-84 (#649)

IRIS AND NATALIA CLAIMS

LOC: SW¼ Sec. 26 T21S, R11E

QUAD: Tubac 15'; Nogales NTMS

DEVL: Old workings

ANAL: 0.76%, U_3O_8

GEOL: Shear zones in rhyolite cut by iron-stained quartz veins. Possibly kasolite associated with chalcocite.

REF: Webb, B. and Coryell, K. (1954, RME-2009)
Granger, H. and Raup, R. (1962)
Waechter, N. (1979)

JENNY #1 (Refer to Lena #1)

JUANITA

LOC: Approx. 31°54'30" N; 111°39'40" W

QUAD: Sells and Baboquivari Peak 15'; Nogales NTMS

DEVL: Prospect pit, dozer cut

RAD: 10X

ANAL: 0.003% e U_3O_8

GEOL: Radioactivity associated with limonite along small fault in rhyolite

REF: PRR-AP-316 (#665)

KING MINE

LOC: East central Sec. 24, T18S, R15E
Helvetia - North Santa Rita Mtns.

QUAD: Sahuarita 15'; Nogales, NTMS

DEVL: Underground

PROD: Silver and copper

RAD: 20X

ANAL: 0.93% e U_3O_8; 0.87% U_3O_8

GEOL: Pitchblende with base metal sulfides in pockets along contact (generally N60°E, dip 30°S) between limestone and quartz monzonite

REF: PRR-A-37 (#644)
Schrader, F. (1915)

LAMAR CLAIMS (Dumar Claims)

LEADVILLE GROUP

LOC: Sec. 10, T18S, R11E

QUAD: Twin Buttes 15'; Nogales NTMS

DEVL: Drift

RAD: 75X

ANAL: 0.01-0.05% e U_3O_8

GEOL: Radioactivity associated with pods of oxides of copper and iron along shear zone, striking N70E, through volcanics.

REF: PRR-AP-358 (#669)

LENA #1, JENNY #1, BLUE MOON

LOC: Sec. 5, 8, T18S, R11E

QUAD: Twin Buttes 15'; Nogales NTMS

DEVL: Shallow shaft and pits

ANAL: 0.19% e U_3O_8; 0.19% U_3O_8

GEOL: Probably metatorbernite pitchblende, and kasolite occurs with base metal sulfides along fractures in shear zones cutting granite.

REF: PRR-w/o # (#628); Granger, H. and Raup, R. (1962)
PRR-ASL-2 (#672); Ransome, F. (1922)

LINDA LEE CLAIMS (Quijotoa Mine)

LOC: Approx. Sec. 11, 14, T15S, R2E or 32°07'30"N; 112° 07' 30"

QUAD: Quijotoa Mtn. 15'; Ajo Mtns.

DEVL: Open cut in stream bed at rock outcrop at Linda Lee #2 (producer). Open cut and 15 ft. shaft on vein in adjacent claim to the south.

PROD: 7.8 tons @ 0.15% U_3O_8, 1955

RAD: 75X

ANAL: 0.05-0.15% e U_3O_8; and 0.08% U_3O_8

GEOL: Torbernite and gummite associated with iron oxide in a steeply deeping vein cutting an arkose near contact with a granite.

REF: PRR-A-331 (#667)
D.O.E.

LOBOS GROUP

LOC: Approx. Sec 6, T21S, R7E
S.W. Baboquivari Mtns.

QUAD: Presumido Peak 15'; Nogales NTMS

DEVL: Location pits

RAD: 35X

ANAL: 0.13% e U_3O_8

GEOL: Secondary uranium minerals associated with quartz veins and aplite-andesite dikes cutting gray quartzite with epidote alteration, and mica schist. Possibly euxenite in mica schist.

REF: PRR-A-89 (#650)
Waechter, N. (1979)

MICA MINE (San Antonio Mine)

NATALIA CLAIMS (Iris)

NEW YEARS EVE PIT

LOC: South central, Sec. 9, T18S, R12E

QUAD: Twin Buttes 15'; Nogales NTMS

DEVL: 200 ft. shaft, adits

PROD: Copper and molybdenum

RAD: 10X

ANAL: 0.18% e U_3O_8

GEOL: Uraninite, molybdenite and secondary uranium minerals along NW-SE vein in granite.

REF: PRR-AP-255 (#660)

NORTH CHANCE CLAIMS (Chance Group)

LOC: North, SW¼, SE¼, Sec. 10, T13S, R18E

QUAD: Redington 15'; Tucson NTMS

DEVL: 2 short inclined shafts or pits

RAD: 100X in shale
10X in granite

GEOL: Radioactivity in a shale sequence lens in a lower conglomerate member in the Oligocene Mineta Fm., dipping 20-40° NE. Shales are poorly exposed and appear to pinch out short distance to the south. Sediments are depositional on a Precambrian Granite which also counts to 6X in the same wash.

REF: Bissett, D. (1958)
Scarborough, R. and Wilt, J. (1979)

OLD BALDY COPPER MINE

LOC: Approx. NW¼ Sec. 19, T19S. R15E
North Santa Rita Mtns.

QUAD: Sahuarita 15'; Nogales NTMS

DEVL: 2 shafts and 65 ft. drift

RAD: 4X

GEOL: Radioactivity associated with copper, molybdenum and iron minerals in narrow quartz stringers cutting quartz monzonite.

REF: PRR-A-118 (#653)

OLD HAT (Control)

LOC: Sec. 20, T11S, R16E
North Santa Catalina Mtns.

QUAD: Bellota Ranch 15'; Tucson NTMS

DEVL: Short adits and several pits

PROD: Base metals

RAD: 3X

GEOL: Radioactivity associated with base metal sulfides in a contact metamorphic deposit in marblized Paleozoic Limestone.

REF: PRR-M-986 (#673)

PAPAGO CHIEF

LOC: Sec. 21, T20S, R7E
Baboquivari Mtns.

QUAD: Presumido Peak, Nogales NTMS

DEV: Old workings

PROD: Copper, gold, silver

GEOL: Metatorbernite occurs with base metal sulfides along fissure vein in foliated flow rock.

REF: PRR-w/o#

QUIJOTOA MINE (Linda Lee)

RED HILLS CLAIM

LOC: NW¼ Sec. 5, NE¼ Sec. 6, T16S, R17E

QUAD: Rincon Valley 15'; Tucson NTMS

DEVL: Several shallow pits

RAD: 5X

ANAL: 0.08-0.38% e U_3O_8

GEOL: Uranophane in fine-grained clastics and in weathered granite near high angle faults. Red clastic material contains brecciated quartz, pebble conglomerates and red shales, and may represent basal Apache Group (Precambrian) or basal Tertiary sediments.

REF: PRR-AP-314 (#663)
Drewes, H. (1978)
Scarborough, R. and Wilt, F. (1979)

RED HILLS #5 (Van Hill #5)

ROBLES SPRING (refer to Cochise Co. listing)

SAN ANTONIO MINE (Mica Mine)

LOC: 32°18' 30"N; 112° 57' 05" W

QUAD: Ajo 15'; Ajo NTMS

DEVL: Small pit

PROD: Silica

RAD: 10X

ANAL: 0.01% e U_3O_8

GEOL: Uranium minerals coat mineral grains and fractures in quartz-pegmatite and in granite cut by pegmatite. Mineralized zone along contact strikes N-S and dips 40-50°E.

REF: PRR-A-38 (#645)

SAN JUAN #1-2 (Black Hawk)

SHAMROCK MINE

LOC: Sec. 32, T21S, R10E

QUAD: Arivaca 15'; Nogales NTMS

DEVL: One shaft with 2 levels

PROD: lead and silver

RAD: 6X

ANAL: 0.05% e U_3O_8

GEOL: Radioactivity associated with sulfides and carbonates of lead, zinc, iron plus some quartz and barite along a shear zone in rhyolite.

REF: PRR-A-36 (#643)

SILVER BULLION MINE

LOC: Approx. 32° 11'45" N, 112° 07'08" W

QUAD: Quijotoa Mtns. 15'; Ajo NTMS

DEVL: 100 ft. shaft and workings

PROD: Silver

RAD: 100X

ANAL: 0.04 -0.19% e U_3O_8
out of equilibrium in favor of radioactivity.

GEOL: Radioactivity along fault zone in granite

SOUTH CHANCE (Chance Group)

LOC: SW¼ Sec. 31, T13S, R19E
on Pima and Cochise County line

QUAD: Redington 15'; Tucson NTMS

DEVL: One adit, now flooded

GEOL: Disseminated mineralization and radioactivity along shear zone which separates deformed Precambrian granite against phyllites of the Oligocene Mineta Fm. Alternative interpretation is Pinal Schist phyllites in thrust fault contact with Cretaceous Bisbee Group sediments to the west.

REF: Bissett, D. (1958)
Thorman, C. and others (1978)
D.O.E.

SUREFIRE #1 (Bluerock #1 & 2)

TWIN BUTTES COPPER MINE

LOC: W½ Sec. 5 and NE¼ Sec. 6, T18S, R13E

QUAD: Twin Buttes 15'; Nogales NTMS

DEVL: Major Open pit copper mine

PROD: Shipments of yellow-cake initiated in late April 1980. Anamax Co. anticipates shipping 120,000 lbs. of yellow-cake in the first year.

GEOL: Uranium extracted as by product from copper leach solutions. Copper sulfides and oxides with sphalerite, molybdenite and native copper are associated with a plug of quartz monzonite porphyry intruded along S-SE flank of the Ruby Star grandiorite batholith.

REF: Kelly, J. (1977)
Cross, C. (1980)
Copper, J. (1973)
Arizona Bureau of Geology data

UNNAMED A

LOC: From Continental 6.9 mi. on Madera Canyon-Sonoita Rd. to Madera Canyon Rd., go 3.8 mi. on Canyon Rd. to Proctor Ranch Rd., go 2.8 mi. to Laos Ranch, then hike ½ mi. S to foothills below Elephant Head."

QUAD: Mount Wrightson 15'; Nogales NTMS

DEVL: Prospects

RAD: 3X

GEOL: Pyrite and some opalized zones along jointing and shearing (N45°E, dip 35°N) in quartz monzonite.

REF: PRR-A-12 (#638)

UNNAMED B

LOC: Approx. Sec. 15, T19S, R14E
NW Santa Rita Mtns.

QUAD: Sahuarita 15'; Nogales NTMS

DEVL: Water well which services titan missile silo near Madera Canyon Rd.

RAD: Gross alpha= 41pc/l; U^{238}=23.6 pc/l U^{234}=27.1 pc/l
Tucson area average is below 5 pc/l.

GEOL: High Fe, Mn, Mg and U in water samples from sand-gravel aquafer in subsurface draining downslope from Madera Canyon. Aquifer depth below surface probably about 50 ft.

REF: Arizona Bureau of Geology data

UNNAMED C

LOC: NE¼ Sec. 26, T16S, R8E
Northern Coyote Mtns.

QUAD: Cocoraque Butte and Sam Vicente 15'; Tucson Mtns.

RAD: 10X

GEOL: Radioactivity along unaltered fracture zones forming natural benches in long N-S trending ridges made of granitic gneiss with muscovite.

REF: Arizona Bureau of Geology data.

UNNAMED D

LOC: N½ NW¼ Sec. 15, T19S, R18E or 31°47'18"N; 110° 29' 51" W SW. Whetstone Mtns. near Ramsey Well

QUAD: Apache Peak 7½'; Nogales NTMS

DEVL: 50 ft. inclined shaft, crosscut

PROD: Possibly copper

RAD: 2X

GEOL: Radioactivity associated with copper oxide minerals impregnating a three foot thick zone in a fluvial sandstone, probably Shellenburger Canyon FM, Bisbee Group. Chrysocolla replaces some plant imprints in sandstone.

REF: Arizona Bureau of Geology data
Creasey, S. (1967)

VAN HILL #5 (Vanover; Red Hill #5, also Bluerock and East Chance Claims

LOC: SE¼ Sec. 10 and NE¼ Sec. 15, T13S, R18E

QUAD: Redington 15'; Tucson NTMS

DEVL: Small pit in arroyo bottom

ANAL: 0.17% e U_3O_8; 0.008% U_3O_8

GEOL: Possibly autunite with purple fluorite and heavy iron and manganese staining along 4 ft. wide fracture zone cutting quartzite capped by limestone. Strong leaching of sediments in vicinity.

REF: Granger, H. and Raup, R. (1962)

VAN HILL #7-8 (East Chance Claims)

VANOVER (Bluerock #1 & 2)

Early name applied to now several claims:

Blue Rock #1 & 2
Chance Claims
Van Hill #5

WILL (Refer to England)

XMAS CLAIMS

LOC: SE¼ Sec. 21, T11S, R18E, and N½NE¼ Sec. 28, T11S, R18E

QUAD: Bellota Ranch 15'; Tucson NTMS

DEVL: Prospect pit

RAD: 20X

ANAL: 0.015% U_3O_8

GEOL: Radioactivity associated with chalcedony and calcite coatings in vugs in volcanic glass. Deposit in marginal lacustrine facies of Pliocene Quiburis Fm., with unconsolidated sandy-silty-gravelly beds containing some reworked and primary tuffaceous beds.

REF: PRR-AP-282 (#662)
Waechter, N. (1979)
U.S.A.E.C. (1970, RME-159, p. 30)

Index for Pinal County Uranium Occurrences

Name		
M	3	American Mine
M	12	Betty
M	10	Hillside
M	8	Honey Bee and Shortie
T	15	Hot Spot
M	7	Katie
T	17	M & M
M	5	Mineral Butte
M	4	Morning Star
T	16	Old Jonah
T	20	Old Reliable, Bunker Hill, Magma, Battleaxe
T	14	Pohle
T	19	Purchell
M	2	Red Dog
M	1	Red Rock
A	18	Reward Mine
M	9	Unnamed A
M	6	Valentine
T	13	Waterfall
M	11	Wooley #1

T = Tucson
M = Mesa
A = Ajo

PINAL COUNTY

AMERICAN MINE

LOC: Sec. 19, T1S, R14E
Miami-Summit District

QUAD: Pinal Ranch 7½'; Mesa NTMS

DEVL: 2 shafts 60 ft. deep, 150 ft. adit

PROD: Probably copper, gold, silver

RAD: 10X

ANAL: 0.05% e U_3O_8; 0.05% U_3O_8

GEOL: Radioactivity associated with base metal mineralization along vein and shear zone in granite. Zone strikes N48° E, dips 65°NW.

REF: PRR-AP-185 (#691)

BATTLEAXE (Refer to Old Reliable)

BETTY #1

LOC: Probably SE¼ Sec. 20, T4S, R13E

QUAD: Grayback 7½'; Mesa NTMS

DEVL: Blocked shaft and drifts

PROD: Silver

RAD: 5X

ANAL: 0.07% e U_3O_8; 0.08% U_3O_8

GEOL: Radioactivity associated with mineralization along basaltic dike in Precambrian biotite granite. Dike strikes N80° W, dips 80° NE.

REF: PRR-AP-212

BUNKER HILL (Refer to Old Reliable)

CARDINAL #1-4

LOC: Hewitt Canyon area NW¼ of Picket Post Mtn. Quad.

QUAD: Picket Post Mtn. 7½'; Mesa NTMS

DEVL: 2 shallow pits

RAD: 10X

GEOL: Brecciated, sheared and weathered rhyolite flow rock.

REF: PRR-AP-162 (#737)

HILLSIDE GROUP

LOC: Sec. 35, T4S, R12E

QUAD: Grayback 7½'; Mesa NTMS

DEVL: Shaft, drift, prospect pits

RAD: Box

ANAL: 0.01-0.11% e U_3O_8

GEOL: Possibly torbernite and copper carbonates in shear zone cutting dike in granite.

REF: PRR-AP-345

HOMESTEAD CLAIMS

LOC: Approx. T1N, R12E, West of Miami on U.S. 60-70, take the Castle Dome Road; at 2.7 mi. turn left on Kennedy Ranch Rd., claims are about ½ mi. down creek from Miles Ranch (once called Kennedy Ranch)

QUAD: Haunted Canyon 7½; Mesa NTMS

RAD: 5X

ANAL: 0.01% e U_3O_8

GEOL: Radioactivity in Dripping Spring Quartzite overlain by Mescal Limestone and underlain by diabase.

REF: PRR-AP-333 (#698)

HONEY BEE AND SHORTIE GROUP

LOC: Sec. 14, 15, 16, T4S, R13E

QUAD: Kearny and Grayback 7½'; Mesa NTMS

DEVL: Surface pits and adit

RAD: 5X

ANAL: 0.05% e U_3O_8; 0.05% U_3O_8

GEOL: Mineralized shear zones with associated mafic, porphyritic dike cutting coarse grained granite.

REF: PRR-AP-4 (#678)
Granger, H. and Raup, R. (1962)

HOT SPOT CLAIM

LOC: Sec. 2, T7S, R17E
Aravaipa

QUAD: Holy Joe Peak 7½'; Tucson NTMS

DEVL: Short drift

RAD: 20X

GEOL: Few inch mineralized seam in granite. Malachite and azurite noted.

REF: PRR-AP-385 (#702)

JEEP CLAIMS

LOC: "From Florence take Ray-Kelvin Hwy. for 25.3 mi., turn up wash for 0.2 mi. Property is 100 yds. to left of wash.

QUAD: Mesa NTMS

DEVL: Small trench

RAD: 15X

ANAL: 0.103% e U_3O_8

GEOL: Radioactivity along fault zone in granite

REF: PRR-AP-318 (#318)

KATIE #3

LOC: Sec. 10, T4S, R13E

QUAD: Grayback and Kearny 7½'; Mesa NTMS

DEVL: Prospect pits and cuts

ANAL: Less than 0.01% U_3O_8; 0.2503 oz./ton Au, Ag.

GEOL: Mineralized, radioactive shear zone, striking E, dipping 80°N, in granite. Vuggy quartz stringers.

REF: PRR w/o # (#675A)

M AND M GROUP

LOC: Sec. 10, T9S, R5E

QUAD: Silver Reef Mtn.; Tucson NTMS

DEVL: Prospect pits, cuts
originally prospected for perlite

RAD: 10X

ANAL: 0.065% e U_3O_8

GEOL: Carnotite coating fractures along 30 ft. wide shear zone in altered perlite.

REF: PRR-AP-346 (#700)

MAGNA (Refer to Old Reliable)

MINERAL BUTTE GROUP (Montana, Apache, Yellow Peak, Squaw Peak)

LOC: SE¼, Sec. 36, T3S, R7E and SW¼ 31, T3S, R8E
East Santan Mtns.

QUAD: Blackwater 7½'; Mesa NTMS

DEVL: 70 ft. shaft, incline, extensive workings

PROD: Copper

RAD: 12X

ANAL: 0.15% e U_3O_8

GEOL: Torbernite occurs with copper minerals in fault gouge and along dacite dike intruding red granite. Fault zone strikes N45° W, dips 55°N.

REF: PRR-A-71

MORNING STAR CLAIMS

LOC: Sec. 16, T3S, R7E

QUAD: Chandler Heights 7½; Mesa NTMS

DEVL: 40 ft. shaft and several 10-20 ft. shafts

PROD: Gold and silver

RAD: 10X

GEOL: Spotty mineralization along narrow quartz vein, striking N70° E, dip 85°N, in Precambrian granite. Kasolite noted in dump specimens.

REF: PRR-AP-384 (#701)

OLD JONAH MINE

LOC: Sec. 23, T8S, R5E

QUAD: Silver Reef Mtns. 15'; Tucson NTMS

DEVL: Adit and open cut

PROD: Gold

RAD: 2X

GEOL: Radioactivity associated with base metal mineralization in quartz veins along shear zone between coarse grained granite and andesite. Zone strikes N87° E, dips 75°S.

REF: PRR-A-65 (#729)

OLD RELIABLE, BUNKER HILL, MAGNA, AND BATTLEAXE

LOC: Sec. 10, 11, 14, 15, T8S, R18E

QUAD: Oak Canyon and Rhodes Peak 7½'; Tucson NTMS

DEVL: Extensive underground workings

PROD: Base metals

RAD: 3X

GEOL: Radioactivity associated with base metals mineralization, in nearly vertical breccia pipe and veins intruding granodiorite and andesite tuff.

REF: PRR-M-987 (#707)

POHLE

LOC: Sec. 25, T5S, R13E

QUAD: Crozier Peak 7½'; Tucson NTMS

DEVL: Detected by A.E.C. airborne

RAD: 10X

ANAL: 0.04% e U_3O_8

GEOL: Radioactivity along contact fractured Dripping Spring Quartzite and diabase.

REF: PRR-A-66 (#679)

PURCHELL GROUP

LOC: Probably Sec. 10, 11, 15, T9S, R16E

QUAD: Mammoth 7½'; Tucson NTMS

DEVL: Pits and trenches

RAD: 2X

GEOL: Parallel veins in quartz monzonite covered by Cenozoic gravels Veins strike N80°E, dip 80°NW.

REF: PRR-AP-184 (#690)

RED DOG #1-3

LOC: Sec. 22, 23, T1S, R11E
Superstition Mtns.

QUAD: Picket Post Mtn. 7½'; Mesa NTMS

RAD: 3X

ANAL: 0.08% U_3O_8

GEOL: Highest radioactivity in brecciated limonitic rock along extensive thrust fault. Possible Dripping Springs Quartzite or silicified Pioneer Shale beneath thrust.

REF: PRR-AP-332 (#697)

RED ROCK #1-3

LOC: Sec. 12, T1S, R11E
Queen Creek, North Superstition Mtns.

QUAD: Picket Post Mtn. 7½'; Mesa NTMS

RAD: 3X

ANAL: 0.08% U_3O_8

GEOL: Radioactivity along thrust fault with extensive brecciation and re-cementation. Over thrust block may be Troy or Dripping Spring Quartzite.

REF: PRR-AP-328 (#696)

REWARD MINE

LOC: Sec. 34, T9S, R3E

QUAD: Vekol Mtns. 15'; Ajo NTMS

DEVL: Numerous pits and shafts over wide area

PROD: Base metals

RAD: 3X

GEOL: Radioactivity associated with mineralization and contact metamorphism in Paleozoic limestone.

REF: PRR-AP-67 (682 and #731)
PRR-AP-166 (#689)

SHORTIE GROUP (Refer to Honey Bee)

UNNAMED A

LOC: Sec. 26, 35, T4S, R11E

QUAD: North Butte 7½'; Mesa NTMS

DEVL: Adits and shaft

PROD: Gold

RAD: 10X

ANAL: 0.012-0.115% e U_3O_8; 0.075% U_3O_8

GEOL: Radioactivity in east-west mineralized zones in granite. Granite is intruded by aplite, diabase and porphyritic andesite.

REF: PRR-AP-291 (#693)

VALENTINE PROPERTY

LOC: Probably NE¼ Sec. 6, T3S, R13E

QUAD: Teapot Mtn. 7½'; Mesa NTMS

DEVL: Underground workings

PROD: Possible lead and silver

RAD: 6X

GEOL: Mineralization at contact between diabase and steeply dipping limestone and quartzite of the Apache Group.

REF: PRR-A-72

WATERFALL

LOC: Sec. 30, T5S, R15E

QUAD: Winkelman 7½'; Tucson NTMS

DEVL: 35 ft. adit, prospect pits

RAD: 12X

ANAL: 0.17% e U_3O_8 on dump

GEOL: 3 ft. wide vein in granite

REF: PRR-AP-298 (#694)

WOOLEY #1

LOC: NW¼ Sec. 33, T4S, R13E

QUAD: Grayback 7½; Mesa NTMS

DEVL: Shaft, adit

RAD: 6X

ANAL: 0.017% U_3O_8

GEOL: Radioactivity associated with iron and copper oxide veins cutting granite.

REF: PRR-w/o# (#677)

Index for Santa Cruz County Uranium Occurrences

	Name
N 5	Alto
N 18	Annie Laurie
N 6	Atika
N 4	Baca-Tubac
N 10	Blue Jay
N 7	Bowling Green and Lucky Spur
N 19	Carnary Yellow
N 1	Carol
N 9	Cracker Jack
N 2	Duranium
N 3	Four Queens
N 11	Grandview
N 23	Happy Day
N 8	Happy Jack
N 17	J.B. Claims
N 24	Joe Parker
N 12	Little Doe
N 20	Little Jim
N 13	Lone Star
N 21	Penaso
N 15	Purple Cow
N 22	Reactor and Opaline
N 16	Santa Clara
N 14	Skyline
N 25	Sunset
N 26	White Oak

N = Nogales

SANTA CRUZ COUNTY

ALTO GROUP (Gold tree; El Plomo, Mineral Vein #1)

LOC: SE¼ Sec. 12, N½ Sec. 13, T21S, R14E
Patagonia

QUAD: Mt. Wrightson 15'; Nogales NTMS

DEVL: Extensive underground workings

PROD: Base metals

RAD: 12X

ANAL: 0.07% e U_3O_8

GEOL: Very fine uraninite crystals on cross fractures in quartz latite agglomerate. Vein deposit along east-west trending structure.

REF: PRR-AP-360 (#750)
PRR-M-848 (#759)

ANNIE LAURIE (Ruby Claim)

LOC: SE¼ Sec. 1, T23S, R11E

QUAD: Ruby 15'; Nogales NTMS

DEVL: Prospect pits, drill hole

ANAL: 0.01% U_3O_8

GEOL: Pitchblende, uraninite, uranophane and torbernite occurs with base metal sulfides along shear zone in highly silicified rhyolite porphyry with carbonate veins and faulted against shale and diorite dikes. Brecciated flow rock in shear zone. Uraninite is disseminated and along hairline fractures in wall rock.

REF: PRR-AR-4 (#753, 754, 710)
Granger, H. and Raup, R. (1962)
Webb, B. and Coryell, K. (1954, RME-2009)
Anderson, R. and Kurtz, E. (1955)

ATIKA PROPERTY

LOC: Approx. Sec. 7, T21S, R15E or 31° 62'N, 110° 85' W
One km. northeast of Alto Mine

QUAD: Mt. Wrightson 15'; Nogales NTMS

RAD: 5X

ANAL: 100 ppm, U_3O_8

GEOL: Base metal anomaly along a zone of stockworks in altered Laramide monzonite and granite.

REF: Arizona Bureau of Geology data

BACA-TUBAC CLAIMS

LOC: Probably Northern part Sec. 12, T21S, R14E
Just North of Alto Mine

QUAD: Mt. Wrightson 15'; Nogales NTMS

DEVL: Located by aerial radiometric survey

GEOL: Salero Volcanics consist of volcanic flows, arkoses containing large granite boulders, and some pockets of secondary uranium.

REF: Arizona Bureau of Geology data

BALD EAGLE (Duranium)

BEAR CLAW (Duranium)

BELL CLAIMS (Santa Clara Claim)

BLUE JAY

LOC: Sec. 27, 28, 33, 34, T21S, R15E
Squaw Gulch-Santa Rita Mtns.

QUAD: Mt. Wrightson 15'; Nogales NTMS

DEVL: 18 ft. and 25 ft. shafts in SE¼ Sec. 33.

RAD: 10X

ANAL: 0.04% e U_3O_8; 0.02% U_3O_8

GEOL: Possible autunite associated with strong hematite mineralization along quartz veins in granite. Strongest radioactivity along a series of N85° W trending thin quartz-hematite-limonite being over a considerable area show anomalous radioactivity. Squaw Gulch granite (Jurassic) is host rock and contains kaolinization of feldspar over about a square mile. See Drewes (1971) USGS map I-614, Mt. Wrightson quadrangle. Nearby Ivanhoe mine produced 363 tons of ore @ 1.78% Cu, 0.182% Ag (no Au) between 1908-1924.

REF: PRR-A-101
N.U.R.E.

BOWLING GREEN AND LUCKY SPUR GROUPS

LOC: Secs. 17, 20, T21S, R15E
Patagonia

QUAD: Mt. Wrightson 15'; Nogales, NTMS

DEVL: Two 50 ft. stopes, 250 ft. drift

PROD: Lead and silver

RAD: 85X

ANAL: 0.16% e U_3O_8

GEOL: Uraninite occurs with galena along vein, striking N70°E, dipping 80°S, in granite. Metatorbernite forms on fractures in highly altered shear zone.

REF: PRR-AP-359 (#749)

BRICK CLAIMS (Santa Clara Claim)

CARNARY YELLOW CLAIMS

LOC: Sec. 23, T22S, R17E
Patagonia

QUAD: O'Donnell Canyon 7½'; Nogales NTMS

DEVL: Pits

RAD: 20X

ANAL: 0.007% e U_3O_8

GEOL: Mineralized shear zone in acidic volcanic porphyry of Jurassic age.

REF: PRR-AP-320 (#748)

CAROL #9

LOC: Probably Sec. 19, T20S, R14E
Near Duranium Claims

QUAD: Mt. Wrightson 15'; Nogales NTMS

DEVL: Trenches, 3 shallow shafts, numerous pits

ANAL: 8.9% e U_3O_8

GEOL: Kasolite with minor uranophane along veins in silicified limestone conglomerate.

REF: D.O.E.

CLARK MINE (White Oak)

CRACKER JACK GROUP (Loraine #7, Remuda, Cracker Jack #1)

LOC: Sec. 29, T21S, R15E

QUAD: Mt. Wrightson 15'; Nogales NTMS

DEVL: Prospect pits

RAD: 2X

ANAL: 0.07% e U_3O_8

GEOL: Probably pitchblende with base metal sulfides in a fissure vein cutting quartz latite.

REF: PRR-A-39 (#715)

DURANIUM CLAIMS (Santa Cruz Claims, Bear Claw, Bald Eagle)

LOC: Northern SE¼, SW¼ Sec. 19, T20S, R14E

QUAD: Mt. Wrightson 15'; Nogales NTMS

DEVL: Trench 100 X 12 X 12 ft. deep, several pits
Discovered by airborne scintillometer in 1954

PROD: 677 Tons @ 0.20% U_3O_8, 1956-57
Some ore stockpiled

RAD: 75X

ANAL: 0.05-2.4% e U_3O_8

GEOL: Kasolite, uranophane, autunite and some malachite staining along cross fractures in arkosic sandstone of the Cretaceous Ft. Crittendon Fm. which strikes N30° W and dips 35° SW. Mineralized rock is faulted against Paleozoic rocks to the south and east. East-west cross fractures exert some ore control and are parallel to numerous Laramide quartz latite dikes to the east. Mineralization also along 60° NNE, NNW, and ENE shear zone in vicinity of main trench. Conglomeratic beds are radioactivity north by about 0.5 miles. Hydrothermal alteration noted, as kasolite and hematite-limonite replace calcite matrix fillings in the arkose.

REF: PRR-AP-285 (#740)
Bissett, D. (1958)
Drewes, H. (1971)
D.O.E.

EL PLOMO (Alto Group)

FOUR QUEENS

LOC: Sec. 33, T20S, R15E

QUAD: Mt. Wrightson 15'; Nogales NTMS

DEVL: Discovery pit and 2 shallow drill holes

RAD: 30X

ANAL: 0.12% U_3O_8
1% vanadium in select sample

GEOL: Autunite and torbernite along fracture zones in rhyolitic tuff-agglomerate. Hematitic alteration and radioactivity is greatest along E-W zones.

REF: PRR-A-112 (#721)

GOLD TREE (Alto Group)

GRANDVIEW GROUP

LOC: North central Sec. 20, T22S, R10E

QUAD: Arivaca 15'; Nogales NTMS

DEVL: 115 ft. shaft and open cut

RAD: 30X

ANAL: 0.08% U_3O_8

GEOL: Strong zone of cross fractures with kasolite and iron oxides in silicified volcanics. Main vein trends SE.

REF: PRR-AP-319 (#747)

HAPPY DAY CLAIMS (Silver Mine Claims; Horny Claims) (See Reactor and Opaline Group)

LOC: NW¼ SE¼ Sec. 5, T24S, R12E, adits just above stream level 0.25 miles downstream of Alamo Spring marked on Ruby quad.

QUAD: Ruby 15'; Nogales NTMS

DEVL: Several pits; 2 drifts 20 and 40 ft., developed for copper

RAD: 50-100X in veins

ANAL: 1.21% e U_3O_8; 1.05% U_3O_8

GEOL: Kasolite, autunite, uranophane, uraninite with chrysocolla and malachite in highly fractured Jurassic rhyolite porphyry. Mineralized fractures trend N10° W to N55°E. Several parallel weakly mineralized fractures are seen 50-200 ft. upstream. The veins were mined in late 1800's for their argentiferous galena content.

REF: PRR-AP-284 (#739)
PRR-AP-292 (#743, 744)

HAPPY JACK MINE

LOC: SW¼ SE¼ Sec. 16, T21S, R15E

QUAD: Mt. Wrightson 15'; Nogales NTMS

DEVL: Underground workings

PROD: Base metals

GEOL: Pitchblende with base metals in vein

REF: Schrader, F. (1915)
Schrader, F. and others (1917)
Bulter, G. and Allen, M. (1921)

HORNY CLAIMS (Happy Day)

J. B. CLAIMS

LOC: Sec. 20, 29, T22S, R11E

QUAD: Ruby 15'; Nogales NTMS

DEVL: 100 ft. incline and prospect pits

RAD: 25X

ANAL: 0.14-0.24% e U_3O_8; 0.006-0.03% U_3O_8

GEOL: Radioactivity associated with hematite.manganese nodules and strong silicification in highly altered and fractured rhyolite porphyry and volcanic tuff.

REF: PRR-A-111 (#720)

JOE PARKER No. 5 (Happy Day claim is 0.3 miles upstream)

LOC: Extreme east central edge of Sec. 5, T24S, R12E, 30 ft. south of main east-flowing stream bed, along banks of tributary stream.

QUAD: Ruby 15", Nogales NTMS

DEVL: 2 small cuts into hillside, one nearby 15-20 ft. shaft.

RAD: 2X

ANAL: 0.09% e U_3O_8

GEOL: Copper-uranium mineralization in vertical N55°E trending fractures in altered Jurassic volcanics. 0.5 tons of stockpiled ore is radioactive, and has chrysocolla-malachite colors. Shaft dug through stream terrace gravels into bedrock.

REF: PRR-AP-386 (#751)
ABG Field work

LITTLE DOC

LOC: NE¼ NW¼ Sec. 20, T22S, R10E

QUAD: Arivaca 15'; Nogales NTMS

DEVL: 2 inaccessible shafts, pits and trenches

RAD: 5-15X

ANAL: 0.04-0.13% U_3O_8

GEOL: Kasolite and possibly gummite with copper and silver mineralization along silicified, E-W trending fracture zones in Jurassic volcanics. Fractures dip 75°N. N-S fractures are not mineralized.

REF: PRR-A-SL-3 (#755, 756)
Webb, B. and Coryell, K. (1954, RME-2009)
PRR-AP-319

LITTLE JIM

LOC: Sec. 32, 33, T23S, R11E

QUAD: Ruby 15'; Nogales NTMS

DEVL: Discovery pit

RAD: 3X

GEOL: Sheared and opalized volcanic tuff

REF: PRR-A-40 (#716)

LOLITA MINE (Iris and Natalia)

LONE STAR #1

LOC: Sec. 23, T22S, R10E

QUAD: Oro Blanco and Arivaca 15'; Nogales NTMS

DEVL: Prospect pit

RAD: 40X

ANAL: 0.012% e U_3O_8

GEOL: Sooty uraninite on fracture planes in rhyolite dike

REF: PRR-AP-294 (#746)

LORAINE (Cracker Jack Group)

LUCKY SPUR (Bowling Green)

MINERAL VEIN #1 (Alto Group)

MONTANA CLAIM GROUP (Santa Clara)

Includes: Santa Clara
Bell
Brick

OPALINE (Refer to Reactor)

PENASO

LOC: Sec. 31, T23S, R12E

QUAD: Ruby 15'; Nogales NTMS

DEVL: 100 ft. adit and workings

PROD: Base metals

RAD: 3X

ANAL: 0.07% e U_3O_8

GEOL: Possibly kasolite associated with base metal sulfides (galena) on a shear in vein cutting rhyolite.
Shear zone strikes N45°E, dips 85°SE

REF: PRR-A-115 (#723)

PURPLE COW CLAIMS

LOC: Sec. 36, T22S, R10E

QUAD: Oro Blanco 15'; Nogales NTMS

DEVL: Prospect pit

RAD: 5X

ANAL: 0.03% e U_3O_8

GEOL: Torbernite crystals on fracture surfaces in steeply dipping, highly fractured dacite.

REF: PRR-AP-286 (#741)

REACTOR AND OPALINE GROUPS

LOC: Sec. 5, 8, T24S, R12E, staked later than, in vicinity of Happy Day Claims

QUAD: Oro Blanco 15'; Nogales NTMS

DEVL: Pits and cuts

RAD: 3X

GEOL: Autunite, uranophane and uraninite in shear zone cutting rhyolite porphyry.

REF: PRR-A-108 (#719)

REMUDA (Cracker Jack Group)

RUBY CLAIM (Annie Laurie)

SANTA CLARA CLAIM (Montana Group, Brick Claims; Bell Claims)

LOC: NE corner Sec. 6, T23S, R11E, 0.9 miles west of Ruby gate along main road, 30 ft. south of road in creek bottom-pits now filled in.

QUAD: Oro Blanco 15'; Nogales NTMS

DEVL: 18 ft. shaft, shallow drill holes, trench and pit Workings now covered.

PROD: 9.15 tons @ 0.28% U_3O_8; 0.40% Cu; 3.4% $CaCO_3$, 1955

RAD: Of volcanics at surface - 200-400 cps, or near the average values in area.

ANAL: 0.026-0.15% e U_3O_8

GEOL: Uraninite with sulfides in veinlets in dark colored 3 to 4 ft. wide base metal vein cutting Jurassic volcanic series.

REF: PRR-AP-293 (#745)
Fowler, G. (1938)
D.O.E.

SANTA CRUZ CLAIMS (Duranium)

Santa Cruz group includes:
Duranium
Bear Claw
Bald Eagle #1-2

SILVER MINE CLAIMS (Happy Day)
Name used in early 1900's

SKYLINE

LOC: Sec. 35, T22S, R10E

QUAD: Oro Blanco 15'; Nogales NTMS

DEVL: Dozer pit on hilltop

RAD: 3X

GEOL: Torbernite and possible uraninite along fractures and joints in felsite intrusive. Joints trend S10°W, dip 65°E. Numerous quartz and iron stained veins noted.

REF: PRR-A-107 (#718)

SUNSET MINE

LOC: Sec. 3, T24S, R12E

QUAD: Ruby 15'; Nogales NTMS

DEVL: Two flooded shafts and several adits

PROD: At lease 15,500 lbs Pb, 4,640 oz. Ag, 400 lbs Cu, 19 oz. Au, between 1924-1969.

RAD 4X

GEOL: Uranium mineral associated with wulfenite and cerussite in brecciated rhyolite porphyry. Pyromorphite is moderately radioactive.

REF: PRR-AP-287 (#742)

WHITE OAK (Clark Mine) (Nearby Big Steve Mine)

LOC: NE¼ Sec. 2, T24S, R12E

QUAD: Ruby 15'; Nogales NTMS

DEVL: 6 adits, 2 shafts, 400 ft. of drifts, stopes. Both adits to main stopes caved in in Jan., 1981.

PROD: 17.6 tons @ 0.34% U_3O_8; 0.04% V_2O_5; 1951-52. At least 12,300 lbs. Pb, 70 oz. Ag between 1928-1958.

ANAL: 0.82 - 12.49% U_3O_8

Geol: Kasolite, uranophane, dumontite, autunite, pyromorphite associated with copper and lead minerals along shear zone, striking N55°E, dip 70° SE to vertical, cutting rhyolite volcanics of Jurassaic-Cretaceous age. Shear zone is up to 30 ft. wide and consists of intensively fractured, brecciated and shattered rocks. Veins contain carbonates and sulfates with rhyolite country rock altered to clay and sericite. Several local surficial radioactive shows in the area. Dump material along main stream reported to have very radioactive mineral pods. Best uranium ore came from intsection of NW and main NE trending shear zones. The nearby Big Steve mine is a parallel shear cutting the volcanics, and is truncated to the NE by a NW trending fault. It has black vein material containing psilomelane (Mn, Ba oxides) with Pb, Cu, Zn, and Mo, and radioactive yellow pyromorphite. Local anomalies of 2-3X at Big Steve mine dumps.

REF: PRR-AR-2 (#711, 752, 757)
Granger, H. and Raup, R. (1962)
Webb, B. and Coryell, K. (1954, RME-2009)
Nelson, F. (1968)
D.O.E.

Index for Yavapai County Uranium Occurrences

		Name
P	42	Abe Lincoln Mine
P	22	Anderson Mine
P	39	Antimony-Silver
P	36	Arizona Black Donkey
P	11	Bagdad Copper Mine
P	4	Bechetti Lease
P	37	Black Buck
P	33	Blue Boy
P	23	Buckhorn Mine
P	1	Camp Wood
P	14A	Cardinal
H	43	Chalk Mountain
P	28	Congress Mine
P	38	Copper Chief
P	25	Cuba Mine
P	14	Curling
P	34	Denver
P	40	Dishman Brothers
P	19	Dorothy Fraction
P	5	Erickson
P	7	Ethiopia
P	32	Excalibur
P	31	Ford
P	8	Gamma
P	15	Good Luck Mine
Ph	44	Great Southern Mine
P	9	Grubstack
P	6	Hillside Mine
P	10	Kitten
Ph	46	Lake Pleasant
P	26	Little Surprise
P	24	Lucky Day
P	20	Lucky Probe
P	12	Mammoth Mine
P	35	Miller Mine
P	27	Miss Tracey
P	13	Mountain Spring
P	18	P.R. Equity
P	2	Pretty Folly
P	21	Riverside
P	3	Section 2
Ph	45	Shamrock
P	17	Silver Knight Mine
P	30	Springfield Mine
P	34a	Three Bucks
P	16	Unnamed A
P	29	Uranus

Ph = Phoenix
P = Prescott
H = Holbrook

YAVAPAI COUNTY

ABE LINCOLN MINE

LOC: Center S½ Sec. 11, T8N, R3W

QUAD: Morgan Butte 7½'; Prescott NTMS

DEVL: 2 caved and flooded shafts; 2 adits, 2500 ft. of inaccessible workings.

RAD: 100X

ANAL: 0.038-0.12% e U_3O_8; 0.01-0.11% U_3O_8
Select @ 0.46% U_3O_8 from dump

GEOL: Veins, narrow basaltic dike and trachyte porphyry dike occupy a fault zone that strikes N50°E, dipping 78-89°NW. Schoepite, probably uraninite and possibly pitchblende and uranophane are associated with copper and iron minerals, quartz, calcite and fluorite with traces of gold and silver in veins. Schoepite formed a coating on pyrite grains. Best assays from dump were on last material mined.

REF: PRR-M-990 (#887)
Granger, H. and Raup, R. (1962)

ANDERSON MINE (Uranium Aire Group; Date Creek basin: East End Claims; Main; Flat Top; and West)

LOC: Sec. 9-16, T11N, R10W, Mine in SW¼ Sec. 11

QUAD: Arrastra Mtn. SE 7½'; Prescott NTMS

DEVL: Open cut, stripping and benching, extensive drilling

PROD: 10,758 tons @ 0.154% U_3O_8 and 0.047% V_2O_5 in 1955-59.

ANAL: 0.60% e U_3O_8; 0.913% U_3O_8
V to U ratios vary from 1:1 to 1:2.4

GEOL: Tyuyamunite and carnotite in carbonaceous sandstone interbedded with conglomerate and ash beds in early to mid-Miocene lake sediments. Considerable faulting and minor folding. Wood fragments are opalized, carbonized and replaced by chalcedony. Green fluorescent mineral is uraniferous opal and chalcedony. Abundant limonite and hematite. Yellow encrustations on bentonite is nontronite (iron montmorillionite). Some secondary enrichment of uranium.

REF: PRR-AP-394 (#837)
Reyner, M. and others (1956, RME-2057)
Otton, J. (1977a)
Otton, J. (1977b)
A.G.S. (1978)
Sherborne, J. and others (1979)

ANTIMONY -SILVER #1 & 2

LOC: Sec. 3, T8N, R1E

QUAD: Squaw Creek Mesa 7½'; Prescott NTMS

DEVL: Caved adit and two filled shafts, worked in late 19th century. One shaft reopened to 35 ft.

RAD: 5X

ANAL: 0.03% U_3O_8

GEOL: Antimony, gold, silver and possibly meta zeunerite in two foot quartz vein in mica schist and granitic gneiss. Vein strikes N65°E, dips 70°NW.

REF: PRR-AP-91 (#804)

ARIZONA BLACK DONKEY (Black Donkey; Willbank Group)

LOC: Sec. 4, T8N, R1W
Bradshaw Mtns.

QUAD: Columbia 7½; Prescott NTMS

DEVL: Open cut, test pits, drilling

RAD: 5X

ANAL: 0.02-0.80% e U_3O_8; 0.26-0.55% U_3O_8

GEOL: Autunite and other uranium minerals in quartz veins along shear zone in complex of schist and gneiss. Vein strike N10°E, dip 80°W. Most radioactivity associated with limonite. Some barite.

REF: PRR-A-91 (#780)
PRR-A-78 (#777)

ARROWHEAD GROUP (Granite Ridge Group)

ATHENA

LOC: "Follow Black Canyon Hwy. south from Rock Spring, 3.2 mi. turn R. on Bard Ranch Rd. and proceed 8.2 mi. to property.

QUAD: Phoenix and Prescott NTMS

DEVL: 3 small prospect pits

RAD: 4X

ANAL: 0.32% e U_3O_8

GEOL: Basic volcanic flow overlying schist

REF: PRR-AP-334 (#830)

BAGDAD COPPER MINE (Black Mesa Tunnel)

LOC: Sec. 4, T14N, R9W

QUAD: Bagdad 15'; Prescott NTMS

DEVL: Open pit copper mine

PROD: Base metals

RAD: 2X

GEOL: Radioactivity associated with copper mineralization in monzonite intruding schist and gneiss.

REF: PRR-AP-75 (#793)

BAGIO #1-10 and ESPERANCE #1-10

LOC: "Take road 6 mi. past Cornville, turn L. on the Middle Verde Road and proceed about 4 mi. "
Verde Valley

QUAD: Prescott NTMS

DEVL: Prospect pits

RAD: 0.2 mr/hr.

GEOL: Radioactive along contact of clay, marl and lime beds in Verde Fm. of Miocene-Pliocene age.

REF: PRR-AP-247 (#826)

BECHETTI LEASE (Silver Platte Mine)

LOC: NE¼ Sec. 35, T16N, R2E
East Mingus Mtn.

QUAD: Cottonwood 7½'; Prescott NTMS

DEVL: Crosscuts and incline, prospect pits

PROD: Copper, gold, silver

RAD: 150X

ANAL: 0.02-0.14% e U_3O_8; 0.003-0.01% U_3O_8; 0.02-1.35% ThO_2

GEOL: Mineralization associated with 25 ft. thick quartz vein (strikes S30°W, dips 45°S) in metamorphosed volcanics and sediments overlain by Paleozoic sediments and Tertiary lake sediments. Vein exposed on hillside for nearly 1,000 feet.

REF: PRR-AP-363 (#834)
D.O.E.

BLACK BUCK

LOC: Sec. 28, T8N, R1W
Castle Creek

QUAD: Columbia 7½; Prescott NTMS

RAD: 4X

GEOL: Vein type in granite, schist and metasediments

REF: PRR-AP-178 (#817)

BLACK DONKEY (Arizona Black Donkey)

BLACK MESA TUNNEL (Bagdad)

BLUE BOY

LOC: Sec.11, T9N, R3W

QUAD: Wagoner 7½'; Prescott NTMS

DEVL: Test pits and open cut

RAD: 12X

ANAL: 0.11% e U_3O_8; 0.07% U_3O_8

GEOL: Radioactivity located at intersection of shears in greenstone complex and follows N10°E, dip 75°E shear zone.

REF: PRR-A-85 (#778)

BUCKHORN MINE (Buckskin, Cuba; Lucky Day; Independence Mines)

LOC: Approx. SE¼ Sec. 8, T11N, R5W

QUAD: Weaver Peak 7½; Prescott NTMS

DEVL: Old underground workings

PROD: Copper, tungsten, gold

GEOL: Granite contains torbernite and uranophane in fractures and quartz veins. Tungsten and beryllium minerals present.

REF: Granger, H. and Raup, R. (1962)

BUCKSKIN (Buckhorn)

CAMP (Hillside Mine)

CAMP WOOD

LOC: Sec. 24, T17N, R6W

QUAD: Camp Wood 15'; Prescott NTMS

DEVL: 2 small pits

PROD: Worked for mica

RAD: 2X

GEOL: Pegmatite cutting granite

REF: PRR-A-14 (#767)

CARDINAL CLAIM

LOC: Sec. 27, T14N, R8W

QUAD: Bagdad 15'; Prescott NTMS

DEVL: Prospect pit

RAD: 50X

ANAL: 0.05-0.13% e U_3O_8

GEOL: Two foot vein striking NW-SE through Precambrian Granite. Radioactivity associated with limonite.

REF: PRR-A-41 (#771)

CHALK MOUNTAIN PROSPECT

LOC: Approx. SE¼ Sec. 14, T8N, R6E or 34°02'N, 11°42.5'W
Lower Verde River

QUAD: West Bottom Mesa 7½; Holbrook NTMS

RAD: 4X

ANAL: 0.006% U_3O_8

GEOL: Fracture coatings of carnotite in tuffaceous lacustrine marl exposed in dry wash bed. Flat lying section of tuffs, limestones and fine-grained sediments.

REF: Scarborough, R. and Wilt, J. (1979)

CONGRESS MINE

LOC: NW¼ Sec. 23, T 10N, R6W

QUAD: Congress 7½'; Prescott NTMS

DEVL: Extensive underground workings

PROD: Gold and silver

RAD: 20X

ANAL: 0.04-0.121% e U_3O_8

GEOL: Radioactivity is associated with limonite in pegmatitic and basic dikes intruding gneissic granite. Radioactive zone is also in a fault on hanging- wall of the 6 ft. white quartz Congress vein, striking N75° W, dips 25°N.

REF: PRR-AP-309 (#829)

CONTRACT #1-2 (Hillside Mine)

COPPER CHIEF

LOC: Sec. 2, T8N, R1W

QUAD: Columbia 7½'; Prescott NTMS

DEVL: Small pit

ANAL: 0.01-0.12% e U_3O_8; 0.113% U_3O_8

GEOL: Uranium, copper and iron mineralization in one foot wide quartz vein in Yavapai Schist.

REF: PRR-AP-108 (#816)

COPPER QUEEN

LOC: "South from Bagdad "Heights" approximately 1 mi. on Congress Junction Rd. to cattleguard. Immediately across cattleguard, turn right (west) for 3.8 mi. take left fork for approx. 1 mi. to mine.

QUAD: Bagdad 15'; Prescott NTMS

DEVL: Extensive underground workings

RAD: 2X

GEOL: Quartz veins with base metal sulfides in Precambrian schist.

REF: PRR-AP-61 (#791)

CUBA MINE (Buck horn, Lucky Day and Independence)

LOC: NW¼ Sec. 16, T 11N, R5W

QUAD: Weaver Peak 7½'; Prescott NTMS

DEVL: Underground

PROD: Probably gold

RAD: 15X

ANAL: 0.014% e U_3O_8; 0.009% U_3O_8

GEOL: Torbernite in quartz vein (strikes N 52° W, dips 25° NE) in weathered granite.

REF: PRR-M-981 (#882)

CURLING CLAIMS

LOC: Sec. 14, T14N, R8W

QUAD: Bagdad 15'; Prescott NTMS

RAD: 20X

GEOL: Basalt flow capped by coarse conglomerate

REF: PRR-A-86 (#779)

DATE CREEK BASIN (Anderson Mine)

DENVER GROUP

LOC: Approx. E½ Sec. 16, T8N, R3W

QUAD: Morgan Butte 7½'; Prescott NTMS

DEVL: Old underground mine

PROD: Copper

RAD: 30X

ANAL: 0.46% e U_3O_8 and 0.61% U_3O_8

GEOL: Radioactivity associated with copper mineralization in veins along fault zone, striking N54°E, dip 73° N. A basic dike trends N38W, dips 80° N. Fault is post dike and both cut Precambrian gneiss-schist complex.

REF: PRR-A-54 (#775)

DISHMAN BROTHERS CLAIMS

LOC: Sec. 1-6, T8N, R1E

QUAD: Black Canyon City and Columbia 7½'; Prescott NTMS

DEVL: Old cuts and shaft; drilled

PROD: Silver

RAD: 12X

ANAL: 0.06% e U_3O_8

GEOL: Torbernite associated with iron oxides in numerous small quartz veins, trending N-S, dipping steeply west in granite.

REF: PRR-A-73

DOROTHY FRACTION CLAIM

LOC: Sec. 25, 26, T 12½N, R2W

QUAD: Mt. Union 15'; Prescott NTMS

DEVL: Drifts, raises, and stopes

RAD: 30X

ANAL: 0.07% e U_3O_8

GEOL: Radioactivity associated with iron oxide in a narrow zone in hanging wall with several parallel veins in Precambrian Granite.

EAST END CLAIMS (Anderson Mine)

ERICKSON PROPERTY

LOC: Sec. 12, 13 T 15N, R2W

QUAD: Chino Valley South 7½'; Prescott

DEVL: Blasted face

RAD: 2X

GEOL: High background radioactivity in moderately fractured granite.

REF: PRR-AP-387 (#835)

ESPERANCE #1-10 (Refer to Bagio #1-10)

ETHIOPIA CLAIMS

LOC: Sec. 22, T15N, R9W

QUAD: Bagdad 15'; Prescott NTMS

DEVL: Two 20 ft. shafts; One 45 ft. (70°) incline and workings

RAD: 8X

ANAL: Select @ 0.13% e U_3O_8; 0.124% U_3O_8; 0.01% ThO_2

GEOL: Radioactivity associated with quartz, galena, and iron oxides in small veins along joints in Precambrian Granite.

REF: PRR-AP-99 (#810)

EXCALIBUR GROUP

LOC: SW¼ Sec. 13, T 10N, R1E
Black Canyon

QUAD: Mayor 15'; Prescott NTMS

DEVL: 15 ft. incline, shallow pits, drill holes

RAD: 25X

ANAL: 0.08% U_3O_8

GEOL: Black radioactive mineral with pyrite, iron oxide and quartz in weakly mineralized silicified shear zone (strikes N5°W, dips 75° W) in strongly foliated Yavapai Schist.

REF: PRR-A-103 (#783)

FARVIEW

LOC: Approx. NE¼, T15N, R2E, or 34°42'28"N, 112°5' 17"W west side of Verde Valley just above Verde Fault

QUAD: Cottonwood 7½'; Prescott NTMS

DEVL: Prospect pits

RAD: 150X

ANAL: 0.01-0.24% e U_3O_8; 0.02-0.91% ThO_2

GEOL: Numerous faults and associated iron oxide - quartz veins cut metamorphosed basic volcanic flow rock. Schistosity and most fractures trend E-W. One vein and fault strikes N17° E, dips 65°SE. Yellow limonite is most radioactive. Chalcopyrite, smoky quartz, and thorite noted.

REF: PRR-AP-299
Staaz, M. (1974)

FLAT TOP (Anderson Mine)

FORD CLAIM (Gazelle Mine)

LOC: 34°10'6"N; 112° 21' 28"W

QUAD: Crown King 7½'; Prescott NTMS

DEVL: 2 drifts, prospect pits

PROD: Old gold mine

RAD: 50X

ANAL: 0.18% e U_3O_8

GEOL: Torbernite and uranophane in small quartz stringers in fault, mineralized with base metals and cutting granite.

REF: PRR-A-16 (#769)

GAMMA GROUP

LOC: Sec. 27, T15N, R9W

QUAD: Bagdad 15'; Prescott NTMS

DEVL: Several dozer cuts and prospect pits

RAD: 35X

GEOL: Radioactivity associated with iron oxide in quartz vein striking E-W through granite porphyry.

REF: PRR-A-42 (#772)

GAZELLE MINE (Ford Claims)

GOLDEN DUCK (refer to Maricopa Co. listing)

GOOD LUCK MINE

LOC: Approx. NE¼ Sec. 22, T13N, R10W

QUAD: Arrastra Mtn. NE 7½'; Prescott NTMS

DEVL: Surface cuts and 2 shallow shafts

RAD: 50X

ANAL: 0.02% e U_3O_8; 0.023% U_3O_8; 0.01% ThO_2

GEOL: Radioactivity associated with pegmatite dike cutting metamorphic complex. Quartz, tourmaline, beryl, scheelite, epidote and garnets present.

REF: PRR-AP-100 (#811)

GRANITE RIDGE GROUP (Arrowhead Group)

LOC: T10 N, R6 W

QUAD: Congress and O'Neil Pass 7½'; Prescott NTMS

DEVL: Incline shaft, adits, pits

PROD: Old gold prospect

RAD: 15X

ANAL: 0.14% e U_3O_8

GEOL: Crystalline, black radioactive mineral in quartz veins and pegmatite dikes cutting pink granite.

REF: PRR-AP-256 (#827)

GREAT SOUTHERN MINE

LOC: Sec. 32, T8N, R3W
Wickenburg Mtns.

QUAD: Red Picacho 7½'; Phoenix NTMS

RAD: 5X

ANAL: 300 ppm U_3O_8

GEOL: Sheared fault zones in Precambrian schist related to emplacement of NW trending Tertiary Lamprophyry dikes.

REF: Arizona Bureau of Geology data.

GRUBSTAKE #1-6

LOC: Sec. 27, T15N, R9W

QUAD: Bagdad 15'; Prescott NTMS

DEVL: 3 small prospect pits

RAD: 5X

ANAL: 0.01% e U_3O_8

GEOL: Narrow quartz vein in granite porphyry

REF: PRR-AP-388 (#836)

HILLSIDE MINE (Happy Jack; Camp, Contract 1-2; Seven Stars)

LOC: Sec. 16, 21, T15N, R9W

QUAD: Bagdad 15'; Prescott NTMS

DEVL: Extensive underground workings from shaft.

PROD: Base metals mine, 1930-1951
21 tons @ 0.30% U_3O_8, 0.03% V_2O_5 in 1950 was mined from Seven Stars claim along Hillside vein and hauled up through Hillside mine shaft. Two tailings ponds a short distance down Boulder Creek contain ore processed from Hillside mine have been estimated by AEC to contain 175,000 tons @ 0.06% U_3O_8 available ore.

ANAL: 0.11-2.02% U_3O_8

GEOL: Pitchblende and secondary uranium minerals (bayleyite, swartzite, andersonite, schroekingerite) associated with gold-silver-base metal-fluorite vein in Precambrian Yavapai Schist.

REF: PRR-w/o # (#765-A-C)
Wright, R. (1950, RMO-679)
Anderson, C. and others (1955)
Axelrod, J. and others (1951)
Arizona Bureau of Mines (1950)

HORSESHOE PROSPECTS (Refer to Maricopa County listing)

HUDSON (Pretty Folly)

INDEPENDENCE MINE (Lucky Day)

JEEP CLAIMS

LOC: Approx. T13N, R10W, (North on Hwy. 93 8.2 mi. from Hwy. 93 Junction turn right - 0.5 mi. to trailer house and ask directions.

QUAD: Prescott NTMS

PROD: 300 lbs. beryl

RAD: 4X

GEOL: Samarskite with beryl, tourmaline and quartz in a pegmatite vein in schist.

REF: PRR-AP-80 (#798)

KITTEN #1 CLAIM

LOC: SW¼ Sec. 27, T15N, R9W

QUAD: Bagdad 15'; Prescott NTMS

DEVL: Prospect pits

ANAL: 0.014-0.20% e U_3O_8, 0.013-0.094% U_3O_8

GEOL: Metatorbernite, pyrite and fluorite disseminated along fracture zone in porphyritic granite.

REF: PRR w/o # (#766)
Granger, H. and Raup, R. (1962)

LAKE PLEASANT PROSPECT

LOC: SW¼, NW¼ Sec. 22, T7N, R1E

QUAD: Governors Peak 7½'; Phoenix NTMS

DEVL: Drilled

ANAL: 0.02% e U_3O_8

GEOL: Carnotite occurs as fracture coatings and disseminated in clastic and tuff beds. Tuff beds contain coven-hoofed vertebrate tracks. The gently warped and folded tuffaceous and lacustrine sequence is overlain by Pliocene sediments.

REF: Scarborough, R. and Wilt, J. (1979)
Waechter, N. (1979)

LITTLE SURPRISE

LOC: Approx. 34°18' 20" N; 112° 15' 18" W

QUAD: Bottle flat 7½'; Prescott NTMS

DEVL: Prospect for silver

ANAL: 0.7% e U_3O_8

GEOL: Small quartz-barite vein cutting Precambrian rocks contains copper staining and possibly Torbernite.

REF: PRR-AP-245 (#824)

LUCKY DAY (Independence, also refer to Buckhorn; Cuba)

LOC: Sec. 9, T11 N, R5 W

QUAD: Weaver Peak 7½'; Prescott NTMS

RAD: 10X

ANAL: 0.004 -0.017% e U_3O_8; 0.016% U_3O_8

GEOL: Uranophane on exfoliation planes in coarse granite

REF: PRR-M-982 (#883)

LUCKY PROBE

LOC: Sec. 23, T 12N, R6W

QUAD: Weaver Peak and Bismarck Mesa 7½'; Prescott NTMS

DEVL: Old discovery work

RAD: 10X

ANAL: 0.04-0.27% e U_3O_8; 0.15-0.24% U_3O_8

GEOL: Radioactivity is associated with platy hematite-magnetite in pink granite with local volcanic cap rock. Spotty yellow uranium mineral and polycrase noted.

REF: PRR-A-17 (#770)

MAIN (Anderson Mine)

MAMMOTH MINE

LOC: Sec. F, T14N, R9W

QUAD: Bagdad 15'; Prescott NTMS

DEVL: 50 ft. adit, 15 ft. vertical shaft

RAD: 2X

GEOL: Radioactivity associated with copper minerals along joints and fractures in a highly altered granite.

REF: PRR-AP-86 (#803)

MILLER MINE

LOC: Probably Sec. 23, T8N, R3W

QUAD: Morgan Butte 7½'; Prescott NTMS

DEVL: Flooded incline shaft (65 ft.)

RAD: 10X

ANAL: 0.015% e U_3O_8; 0.012% U_3O_8

GEOL: Radioactivity associated with copper mineralization in a vein striking N40° W, dips steeply NE in granite.

REF: PRR-M-983 (#884)

MISS TRACEY CLAIMS

LOC: Sec. 30, T11N, R2E

QUAD: Mayer 15'; Prescott NTMS

RAD: 5X

ANAL: 0.01% e U_3O_8

GEOL: Ten foot bed of quartz latite porphyry in volcanic series.

REF: PRR-A-51 (#774)

MIXPAH (Uranus Group)

MOUNTAIN SPRING

LOC: Sec. 17, T 14N, R9W

QUAD: Bagdad 15'; Prescott NTMS

DEVL: Shaft

PROD: Lead, silver, copper

RAD: 2X

GEOL: Radioactivity, associated with mineralization with quartz veins in schist near contact with granite.

REF: PRR-AP-77 (#795)

NEST EGG (Uranus Group)

P. R. EQUITY

LOC: Sec. 26, 27 T12½N, R3W
Hassayampa

QUAD: Wilhoit 7½'; Prescott NTMS

RAD: 13X

ANAL: 0.08% e U_3O_8

GEOL: Radioactive iron oxides in a 2-4 ft. wide fault breccia in rhyolite dikes intruding granite.

REF: PRR-AP-139 (#821)

PEOPLES VALLEY MINE

LOC: "Turn left on dirt road 5.9 mi. NE of Yarnell on U.S. 89. Follow dirt road 5.5 mi. NW to property."

QUAD: Weaver Peak 7½'; Prescott NTMS

DEVL: Open cuts and 20 ft. shaft

ANAL: 0.15% e U_3O_8; 0.13% U_3O_8; 0.078% ThO_2

GEOL: Radioactivity associated with beryl bearing pegmatite, striking N40°E, dip 70° NW, in a granite.

REF: PRR-M-847 (#881)

PLANET SATURN (Uranus Group)

PRETTY FOLLY (Hudson, Smokie #1-9)

LOC: Possibly Sec. 35, T17N, R3E. (very poorly located)
Verde

QUAD: Clarkdale 15'; Prescott NTMS

DEVL: Prospected and drilled

RAD: 7X

ANAL: 0.03% e U_3O_8

GEOL: Thin coatings of carnotite on bedding planes and fractures in calcareous Pliocene lake beds of the Verde Fm.

REF: PRR-AP-247
PRR-AP-361 (#832)
PRR-AP-362 (#833)
PRR-A-56 (#776)

RIVERSIDE #1

LOC: Sec. 9, T11N, R10W

QUAD: Arrastra Mtn. SE 7½; Prescott NTMS

DEVL: Trench, 25-30 drill holes

ANAL: 0.08% e U_3O_8

GEOL: Carnotite in flat lying Tertiary sediments containing some silicified wood.

REF: PRR-A-117 (#784)

SECTION 2 CLAIMS

LOC: Sec. 2, T16N, R1W
Chino Valley

QUAD: Paulden 15'; Prescott NTMS

RAD: 2X

ANAL: 0.01% e U_3O_8

GEOL: Basalt flow capping late Paleozoic limestone

SEVEN STARS (Hillside Mine)

SHAMROCK MINING AND DEVELOPMENT CO.

LOC: Sec. 16, 17, 20, 21, TFN, R2W

QUAD: Gartias Mtn. 7½'; Phoenix NTMS

RAD: 100X

GEOL: Yellow uranium mineral coatings along fractures in large pegmatite dike, trending N75° W, in metamorphic rocks. Tungsten, beryl and lithium minerals noted.

REF: PRR-AP-347 (#831)

SILVER KNIGHT MINE

LOC: Approx. Sec. 25, 26, 36, T13N, R3W

QUAD: Wilhoit 7½; Prescott NTMS

DEVL: Adits and numerous pits

PROD: Silver

RAD: 5X

GEOL: Anomalous radioactivity confined to flat fault (N 38°W, dip 23°N) in Precambrian granite.

REF: PRR-A-98 (#782)

SILVER PLATTE MINE (Bechetti Lease)

SMOKIE #1-9 (Pretty Folly)

SPRINGFIELD MINE

LOC: Approx. 34° 12' 28" N; 112° 30' 6" W

QUAD: Crown King 7½'; Prescott NTMS

DEVL: Flooded shaft, adit

ANAL: 0.18% e U_3O_8; 0.15% U_3O_8

GEOL: Base metal mineralization associated with vein in granodiorite. Secondary uranium minerals in acidic volcanic rocks piled along mine access road.

REF: PRR-M-985 (#886)

TERMINAL (Uranus Group)

THREE BUCKS claims

LOC: Secs 10-15, and 23, T8N, R3W.

QUAD: Morgan Butte 7.5', Prescott NTMS

DEVL: Some dozer cuts

RAD: 2-5X.

ANAL: to 50 ft. of 0.02-0.04% U_3O_8 in shear zone.

GEOL: Mineralized shear zones trend NNW and NNE to NE are parallel to basic tertiary (?) dikes, and cut Precambrian granitic and amphibolitic gneisses folded along N 40-50° W trends. Shears are less than 2 feet wide.

REF: AZ Bur of Geol file data

TOTAL WRECK (Uranus Group)

UNNAMED A

LOC: NW¼ Sec. 21, T13N, R3W
Copper Basin

QUAD: Wilhoit 7½'; Prescott NTMS

DEVL: Shallow underground workings

RAD: 2X

GEOL: Copper mineralization disseminated in fluvial poorly sorted conglomerate and along fractures in underlying rhyolite porphyry.

REF: PRR-AP-137 (#819)

UNNAMED B

LOC: "From Wickenburg take Constellation Road to fork at 3.3 mi. turn left and drive 9.6 mi. to property.

QUAD: Sam Powell 7½'; Prescott NTMS

DEVL: Small shafts and prospect pits

RAD: 10X

ANAL: 0.015% e U_3O_8

GEOL: Metamorphic and pegmatite complex are cut by basic dikes.

REF: PRR-M-984 (#885)

URANIUM AIRE GROUP (Anderson Mine)

URANUS GROUP (Mixpah, Terminal, Nest Egg, Planet Saturn, Total Wreck)

LOC: SE corner T10N, R5W and SW corner T10N, R4W

QUAD: Congress and Yarnell 7½'; Prescott NTMS

DEVL: Extensive underground workings

PROD: Gold

RAD: 30X

ANAL: 0.06-0.14% e U_3O_8, 0.14% U_3O_8

GEOL: Radioactivity associated with limonite and fluorite with mineralized veins in fault zones, striking N 15° W, dipping 35-45°E, in granite. Granite intrudes metasediments. NW trending basic dike cuts granite. Thin fluorescent coatings in places.

REF: PRR-AP-15 (#768)

WEST (Anderson Mine)

WILLBANK GROUP (Arizona Black Donkey)

YUMA COUNTY

ATOM CLAIMS

LOC: Approx. 5½, T4S, R22W

QUAD: Picacho and Red Hills 15'; Salton Sea NTMS

ANAL: 0.01-0.04% U_3O_8

GEOL: Weak radioactivity associated with hematite veins along footwall contact of schist inclusions in foliated granite. Quartz veins.

REF: Granger, H. & Raup, R. (1962)
Waechter, N. (1979)

B#1-3 (WILHITE AND HARRELL GROUP)

BIG CHIMNEY GROUP (Busy Bee; Lucky; Lucy Alice; Lucky Four; Katy Did #1-2; Spear-Larsen #1-5)

LOC: Secs. 9, 10, 16, 17, 21, T9S, R20W
W. Gila Mtns.

QUAD: Ligurta 7½'; El Centro NTMS

DEVL: 20 ft. shaft; 20 ft. drift; open cuts and prospect pits

PROD: 5 tons @ 0.03% U_3O_8, 1957 shipped to Cutter then removed & returned to property. 225 tons of ore now stockpiled.

ANAL: 0.10% e U_3O_8; 0.08% U_3O_8

GEOL: Davidite, allanite, samarskite and monazite occur in veins and pegmatites in granite gneiss.

REF: D.O.E.
PRR-A-49
PRR-A-45 (#892)

BLACK BEAUTY

LOC: Approx. Sec. 10, 11, T2S, R20W
Chocolate Mtns.

QUAD: Trigo Peak 15'; Salton Sea NTMS

DEVL: Discovery pit

RAD: 2X

GEOL: Sandstone interbedded with rhyolite, andesite, and obsidian flows.

REF: PRR-A-67 (#895)

BONANZA MINE

LOC: NW¼ Sec. 26, T7N, R13W

QUAD: Salome 15'; Phoenix NTMS

DEVL: Incline shaft and drifts

RAD: 3X

ANAL: 0.06%, e U_3O_8; 0.07% U_3O_8

GEOL: Uranium associated with iron oxide and secondary copper minerals along dike and fault zone in granite and gneiss. Four foot dike trends 550°E, dips 45°NE, and fault trends N50° W, dips 50°NE.

REF: PRR-AP-301 (#903)

BONNIE (Wilhite and Harrell Group)

BUSY BEE (Big Chimney Group)

CACTUS GROUP

LOC: N from Agua Caliente to S-P Railroad; cross tracks and continue N along fence; take L. fork beyond corral at end of fence, and continue northerly on bladed road, for a total of 14-16 mi.

QUAD: Hyder NE 7½'; Phoenix NTMS

DEVL: Pit

RAD: 25X

ANAL: 0.25- 2.57% e U_3O_8; 0.19- 2.53% U_3O_8

GEOL: Radioactive mineral is disseminated through pegmatite dikes and quartz veins intruding granite. Dikes trend S80E with intersecting vertical shears striking N20°E.

REF: PRR-AP-393 (#912)

DARLING MINE AREA

LOC: Approx. Sec. 28, T5N, R20W
North Dome Rock Mtns.

QUAD: Dome Rock Mtns 15'; Salton Sea NTMS

DEVL: Several mines in area

RAD: 3X

GEOL: Sheared and reworked tectonic contact between Paleozoic marbles and a porphyritic granite of probable Precambrian Age.

REF: Arizona Bureau of Geology data.

DIZZY LIZY

LOC: Approx. SE¼, T7S, R18W, Muggins Mtns.-"From Old Tacna go 4.4 mil W. on U.S. 80; Turn R opposite Bake Tanks turnoff and go 3.9 mi. on gravel road; turn L and go 2.2 mi. along N. side of canal; turn R across Gila River bottom and follow dirt road up wash for 1.3 mi.; turn R. on faint trail and proceed 3.2 mi. to property."

QUAD: Red Bluff Mtn. 15'; El Centro NTMS

DEVL: Prospected

RAD: 25X

ANAL: 0.08% e U_3O_8

GEOL: Radioactivity in tuffaceous beds in tertiary Sedimentary and volcanic sequence. Mineralized tuff strikes NE-SW, dips 30°S and is about 4 ft. thick.

REF: PRR-A-46 (#873)

FAITH AND HOPE

LOC: Sec. 35, T5N, R13W

QUAD: Hope 15'; Phoenix NTMS

ANAL: 0.22% e U_3O_8, 0.11% U_3O_8

GEOL: Disseminated radioactive heavy minerals in loosely unconsolidated granitic material.

REF: PRR-A-68 (#896)

GOODMAN MINE GROUP

LOC: SE¼ Sec. 23; NW¼ Sec. 25, T4N, R21W

QUAD: Lapaz Mtn. 7½; Salton Sea

DEVL: Numerous shafts and tunnels

PROD: Gold and silver

ANAL: 0.03-0.27% ThO_2

GEOL: Thorium along a narrow part of a 2 mile long WNW trending shear zone, dipping 30-90° and ranging 5-40 ft. in width. The shear cuts Mesozoic quartz-epidote schist and metasediments.

REF: Staaz, M. (1974)
Keith, S. (1978)

HWWR (Wilhite and Harrell Group)

HOPE (Faith)

HOT ROCK CLAIM

LOC: T8N, R12W---"From Wenden turn N. on Alamo Rd. for 13 mi. at junction turn R up gas line right-of-way for 150 yeds. then turn left on old dirt road; cross wash and proceed 0.3 mi. take Rt. fork 0.7 mi. to end of road.

QUAD: Ives Peak and Salome 15'; Phoenix and Prescott NTMS

DEVL: 5 adits, 1 shaft, open cuts

ANAL: 0.02-0.05% e U_3O_8; 0.057% U_3O_8

GEOL: Fault vein of granite intruded into schist. copper and iron sulfides and oxides noted.

REF: PRR-AP-289

ISLEY-LILLARD CLAIMS

LOC: Approx. common corner Sec. 6, 7, T8S, R18W and Sec. 1, 2, T8S, R19W
Muggins Mtns.

QUAD: Red Bluff Mtn. 15'; El Centro NTMS

DEVL: Prospect pits

RAD: 6X

GEOL: Radioactive opalitic and chalcedonic white ash layers in shaly beds interbedded with Tertiary lake bed and volcanic sequence. Sediments are gently folded and cut by numerous N35°W faults and overlain to the west by obsidian and rhyolite flows.

REF: PRR-AP-389 (#908)
Reyner, M. and Ashwill, W. (1955)

JAP (Wilhite and Harrell Group)

KATY DID #1-2 (Big Chimney Group)

LA FORTUNA MINE

LOC: Approx. T10S, R20W, or 32° 33' 05"N, 114°19' 45"W
SW. flank of Gila Mtns.

QUAD: Fortuna Mine 7½'; El Centro NTMS

DEVL: One major shaft; several prospect pits

PROD: Gold, silver, copper

GEOL: Samarskite, muscovite, and possible thorium minerals associated with mineralization in pegmatites cutting small Laramide granite pluton.

REF: Keith, S. (1978, p. 150)
Raup, R. and Haines, D. (1953, TEM-679)

LAGUNA MOUNTAINS

LOC: SW¼, T7S, R21W
Adair Park Beds

QUAD: Aztec SE 7½'; Ajo NTMS

RAD: 3X

GEOL: Radioactivity in yellow-brown mottled shale-sandstone near fault. Southwest dipping redbed section of sandstone, conglomerate, mudflows and breccia in high-angle fault contact with gneiss and overlain by Kinter Fm. fanglomerates.

REF: Scarborough, R. and Wilt, J. (1979)

LAKE BED CLAIM

LOC: Approx. Sec. 2, T8S, R19W
Muggin Mtns.

QUAD: Red Bluff Mtn. 15'; El Centro NTMS

DEVL: Small pit and trench

RAD: 30X

GEOL: Uranophane, pyromorphite and chalcedony in volcanic tuffs interbedded in highly silicified Miocene lake beds. Fault separates lake beds from rhyolite on SW side of wash.

REF: PRR-AR-34

LILLIAN #1-3 (Starlight Group)

LOC: Approx. SW¼, T6N, R17W --"8 miles SW of Bouse on Hwy. 95, take unimproved dirt road and proceed west for 1 mile."

QUAD: Bouse 15'; Salton Sea NTMS

DEVL: Open pit

PROD: 125 railroad cars of hematite ore.

RAD: 2X

ANAL: 60% Fe

GEOL: Replacement deposit of hematite in limestone associated with country rocks of older granites and schists. Gypsum, gold, silver, manganese, barite, copper oxides and pyrrhotite noted.

REF: PRR-AP-230 (#901)

LINCOLN RANCH (Reid Valley)

LUCKY ALICE (Big Chimney Group)

LUCKY FOUR (Big Chimney Group)

MARVIN (Wilhite and Harrell Group)

MC MILLIAN PROSPECT

LOC: Approx. NE corner Sec. 16, T12S, R16W

QUAD: Cabeza Prieta Peak 15'; Ajo NTMS

DEVL: Pit, 2 short adits; 50 ft. shaft

RAD: 4X

ANAL: 0.032% e U_3O_8; 0.34% U_3O_8; 7.69% Cu
stockpiled ore = 0.034%; U_3O_8

GEOL: Radioactive mineral associated with secondary iron and copper minerals along fracture zone in granite. Fractures strike N34°W and dip 65°SW.

REF: PRR-D-562 (#918, 919)
Granger, H. and Raup, R. (1962)
Raup, R. and Haines, D. (1953, TEM-679)

MICKEY DOLAN MINE

LOC: SE¼ Sec. 5, T6N, R13W
Harcuvar Mtns.

QUAD: Salome 15'; Phoenix NTMS

DEVL: 85 ft. incline shaft; 110 ft. drift, pits

RAD: 125X

ANAL: 0.14% e U_3O_8; 0.18% U_3O_8

GEOL: Radioactivity associated with secondary copper and iron minerals along E-W fault cutting granite and schist. Quartz is brecciated.

REF: PRR-ASL-4 (#913)

OSBORNE WASH

LOC: Approx. W½ Sec. 4 T9N, R17W
Parker Area

QUAD: Black Peak 15'; Needles NTMS

RAD: 3X

GEOL: Radioactivity in limonite altered gneiss beneath low-angle fault with overlying Tertiary limestone. Associated Cu-Fe-Mn minerals. Limestones are recrystallized and in low angle fault contact with gneiss.

REF: Scarborough, R. and Wilt, J. (1979)

PAULINE GROUP

LOC: Between Wooley and San Francisco Groups
Muggins Mtns.

QUAD: Red Bluff Mtns. 15'; El Centro NTMS

ANAL: 0.20% U_3O_8

GEOL: Quartz stringer zone and uranophane noted in float.

REF: Reyner, M. and Ashwill, W. (1955)

RADIUM HOT SPRINGS

LOC: Sec. 12, T8S, R18W

QUAD: Welton Mesa 7½; Red Bluff Mtn. 15'; El Centro NTMS

RAD: 0.2 mr/hr.

GEOL: Faulted andesite

REF: Waechter, N. (1979)

RAYVERN #2-19

LOC: NW¼ Sec. 13, T6N, R18W and W½ Sec. 7, T6N, R17W Plomosa Mtns.

QUAD: Bouse 15'; Salton Sea NTMS

DEVL: Small pits, shallow shaft, drilled

PROD: Copper and gold prospect

RAD: 15X

ANAL: 0.03-0.08% e U_3O_8

GEOL: Carnotite, uranophane, and meta-autunite associated with copper staining as fracture coatings in white, limey shales interbedded with limestones. Thick SW dipping tertiary section is complexly faulted and contains rhyolite and andesite flows.

REF: PRR-AP-348 (#907)

RED KNOB CLAIMS

LOC: Approx. Sec. 10, T8S, R19W

QUAD: Welton 7½'; El Centro NTMS

DEVL: Small drift

PROD: Ore stockpiled

RAD: 100X

ANAL: 0.28-1.55% e U_3O_8; 0.03-1.79% U_3O_8

GEOL: Uranophane, some carnotite and tyuyaminite, weeksite, vanadinite, gypsum and chalcedony in opalized Tertiary mudstone in lake bed sequence interbedded with volcanics. Mineralization occurs in high grade pockets about 1-3 ft. thick, 100 ft. long and 10 ft. wide.

REF: PRR-AP-302 (#904)
Reyner, M. and Ashwill, W. (1955)

REID VALLEY (Lincoln Ranch)

LOC: Sec. 14-16, 21-23, T10N, R13W

QUAD: Ives Peak 15'; Needles NTMS

ANAL: Less than 0.03% U_3O_8

GEOL: Tertiary lake beds, marls, mudstone and sandstone. Mineralization along sandstone-mudstone facies transition.

REF: Otton, J. (1977b)
Scarborough, R. and Wilt, J. (1979)
Waechter, N. (1979)

SAGUARO GROUP (St. Louis Group)

SAN FRANCISCO AND ST. PATRICK GROUP

LOC: Approx. Sec. 25, T7S, R19W Muggins Mtns.

QUAD: Red Bluff Mtn. 15'; El Centro NTMS

ANAL: 0.10% e U_3O_8

GEOL: Radioactive chrysocolla, and copper carbonates occurs in thin band of mudstone, containing palm tree fragments.

REF: Reyner, M. and Ashwill, W. (1955)

SAWTOOTH MOUNTAIN

LOC: S. Sec. 31, T4N, R20W

QUAD: Dome Rock Mtns. 15'; Salton Sea NTMS

RAD: 10X

GEOL: Radioactivity along mylonitized deformed contact between 160 my. old quartz monzonite porphyry stock intruding metasedimentary sequence.

REF: Arizona Bureau of Geology data.

SILVER KING

LOC: Approx. Center Sec. 1, T4S, R23W

QUAD: Picacho 7½'; Salton Sea NTMS

DEVL: Shallow shaft and short adits

RAD: 2X

GEOL: Quartz veins in andesite flows. Some lead and possibly silver noted.

REF: PRR-RA-32 (#942)

SPEARS-LARSEN #1-5 (Big Chimney Group)

ST. LOUIS GROUP

LOC: Approx. Sec. 2, T8S, R19W

QUAD: Red Bluff Mtn. 15'; El Centro NTMS

DEVL: Dozer cuts

RAD: 100X

ANAL: 0.07-1.55% e U_3O_8; 0.03-1.79% U_3O_8 w/ThO_2

GEOL: Uranophane disseminated in shale interbedded with Tertiary lake beds, which are gently folded and broken by numerous faults, trending N35W.

REF: PRR-AP-390 (#909)
Waechter, N. (1979)
Reyner, M. and Ashwill, W. (1955)

ST. PATRICK CLAIMS (San Francisco Group)

STARLIGHT GROUP (Lillian #1-3)

STATE LEASE

LOC: Sec. 36, T4N, R20W
Dome Rock Mtns.

QUAD: Middle Camp Mtn. 7½'; Salton Sea NTMS

DEVL: Prospect pits

RAD: 50X

ANAL: 0.41-2.77% e U_3O_8; 0.22-1.25% U_3O_8 w/ThO_2

GEOL: Radioactivity associated with iron oxide in quartz veins cutting intrusive diorite and schist.

REF: PRR-AP-303 (#308)

TEN DEE'S

LOC: Sec. 7, T6N, R17W
NE Plomosa Mtns.

QUAD: Bouse 15; Salton Sea NTMS

DEVL: Prospect pit and one drill hole

RAD: 40X

ANAL: 0.10% e U_3O_8; 0.03% U_3O_8 w/ThO_2

GEOL: Radioactivity associated with pink gneiss, capped by Paleozoic sediments, intruded and then capped by Tertiary volcanics.

REF: PRR-A-18 (#891)

TOPAZ CLAIMS

LOC: Sec. 22, T4N, R20W
Dome Rock Mtns.

QUAD: Middle Camp Mtn. 7½'; Salton Sea NTMS

DEVL: Prospect pits

RAD: 2X

ANAL: 0.20% e U_3O_8; 0.14% U_3O_8

GEOL: Radioactivity in iron-quartz veinlets showing some molybdenite and scheelite.

REF: PRR-AP-308 (#906)

TWO FOOLS AND STRONGHOLD

LOC: "Go E. from Blythe on U.S. 60-70 to a point 0.7 beyond Arizona Check Station; turn R. onto Cibola Rd. and proceed from there for 2.1 mi., turn L. and continue for 6.5 mi.; turn onto dim road and continue up canyon to end of road (1.2 mi.), follow burro trail for about 2.5 mi. up (NE) wash to pit."

QUAD: Dome Rock 15'; Salton Sea NTMS

DEVL: 15 ft. and 115 ft. adit

RAD: 100X

ANAL: 2.30% e U_3O_8; 2.39% U_3O_8

GEOL: Uranophane and secondary copper in vertical quartz vein, trending 585°E in shear zone cutting slightly metamorphosed sediments.

REF: PRR-AP-392 (#911)

UNNAMED A

LOC: Approx. SW¼ Sec. 32, T3N, R20W
Tule Springs - Dome Rock Mtns.

QUAD: Cunningham Mtn. 7½'; Salton Sea NTMS

DEVL: Adit and trench

ANAL: 0.4% U_3O_8

GEOL: Yellow uranium mineral(s) along E-W trending vertical shear zone, 2-3 ft. wide, in crystalline rocks.

REF: Arizona Bureau of Geology data

UNNAMED B

LOC: Sec. 25, T4N, R20W

QUAD: Middle Camp Mtn. 7½'; Salton Sea NTMS

DEVL: 250 ft. adit, 30 ft. inclined shaft

PROD: Gold

RAD: 10X

ANAL: 0.09% e U_3O_8; 0.034% U_3O_8 w/ThO_2

GEOL: Radioactivity associated with biotite in schist, intruded by diorite and quartz veins.

REF: PRR-AP-304

VENEGAS prospect

LOC: NE¼ Sec 26, T14S, R15W

Quad: Tule Mtns 15'. Ajo NTMS

DEVL: 4 open cuts along a shear zone trending E-W

RAD: 2X in schist host rock - no radioactivity in shear.

GEOL: Radioactivity in schistose host rock very near a several foot wide shear zone mineralized with pyrite, gypsum, calcite, and brochantite. Shear is exposed along upper NE slope of NW-SE-trending ridge.

REF: Raup and Haines, USAEC TEM-679, p.13.

WILHITE AND HARRELL GROUP (Bonnie, Marvin, Jap, William, HWWR; B#1-3)

LOC: Approx. Sec. 2, 12, T8S, R19W
Muggins Mtns.

QUAD: Red Bluff Mtn. 15'; Welton 7½; El Centro NTMS

DEVL: Prospect pits

RAD: 7X

ANAL: 0.05-0.24% e U_3O_8

GEOL: Uranophane in shaly mudstone interbedded with sandstones and white ash of Miocene lake beds. Opalitic and chalcodonic material noted in sediments folded and broken by numerous faults trending N35° W.

REF: PRR-AP-390
PRR-AP-391 (#910)

WILLIAM (Wilhite and Harrell Group)

WOOLEY GROUP

LOC: Approx. Sec. 31, T7S, R18W and Sec. 6, T8S, R18W Mugging Mtns.

QUAD: Red Bluff Mtn. 15'; El Centro NTMS

DEVL: 50 ft. drift and shallow scrapings

RAD: 100X

ANAL: 0.46% U_3O_8

GEOL: Uranophane and autunite along quartz stringers with basalt sill and disseminated in adjacent Miocene lake bad sediments.

REF: PRR-AP-300 (#902)
Reyner, N. & Ashwill, W. (1955)

APPENDIX A

Production Tables and Histograms

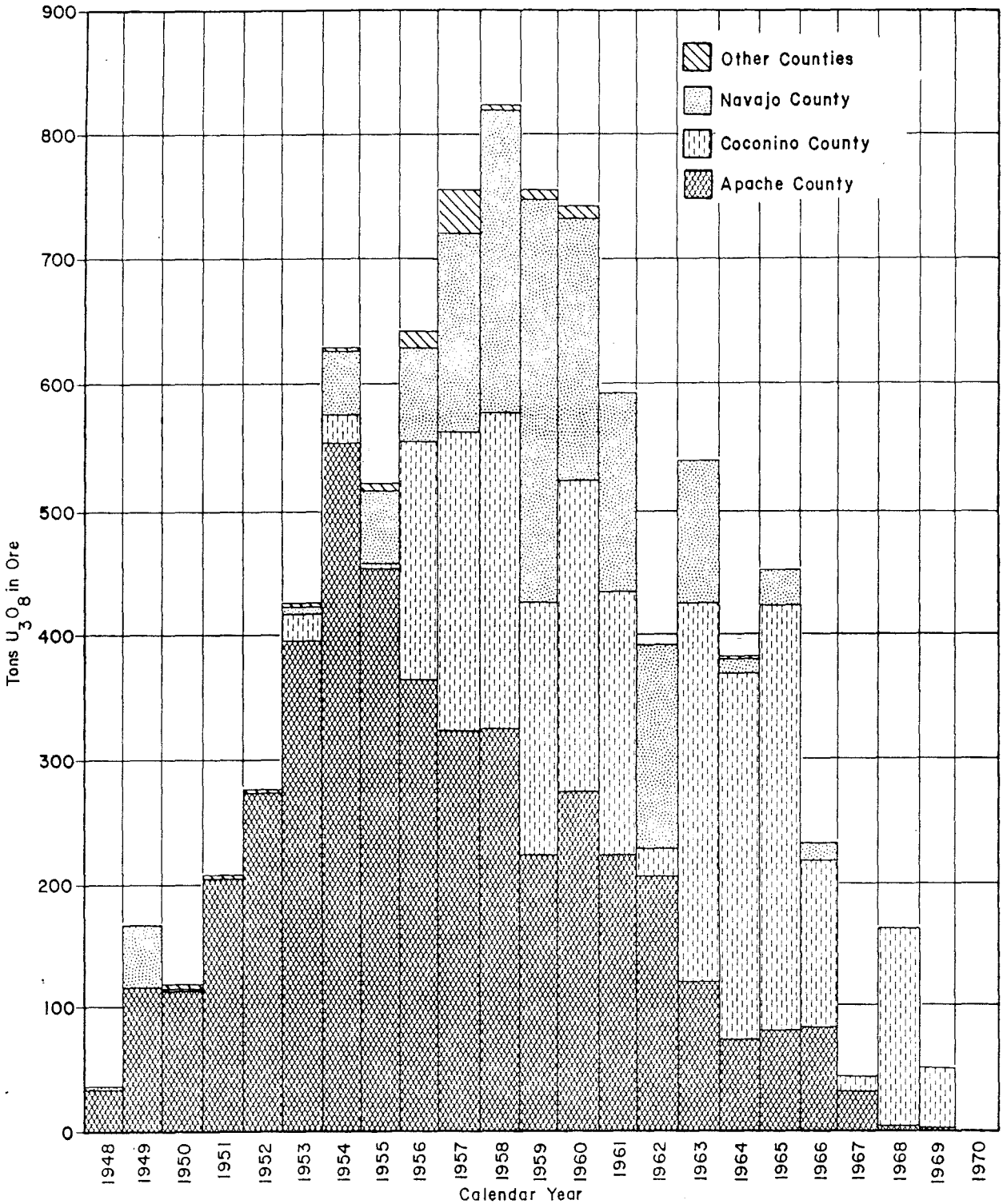
Table 2 - District total production table
Table 3 - Arizona uranium production histogram
Table 4 - County production table, year-by-year
Table 5 - County listing of number of occurences and producers
Table 6 - Monument Valley production histogram
Table 7 - Orphan Lode production histogram
Table 8 - Carrizo Mountains production histogram
Table 9 - Lukachukai Mountain production histogram
Table 10 - Cameron district production histogram
Table 11 - Recent exploration trends in Arizona

ARIZONA URANIUM PRODUCTION, 1948–1970

	Tons of Ore	Pounds of U_3O_8	Average U_3O_8 Grade	Pounds of V_2O_5	Average V_2O_5 Grade	Years of Production
Black Mountain District	16,900	57,600	0.17%	26,000	0.08%	1951–1967
Plateau breccia pipes	511,000	4,374,600	0.43%	—	—	1950–1972
Cameron area[1]	295,100	1,240,000	0.21%	211,900	0.036%	1954–1963 1977–present[2]
Carrizo Mountains	90,300	364,900	0.20%	3,166,200	1.75%	1948–1966
Lukachukai Mountains	724,800	3,483,300	0.24%	14,730,000	1.02%	1950–1968
Monument Valley	1,322,000	8,670,000	0.33%	24,361,400	0.92%	1948–1969
Sierra Ancha District	25,500	115,200	0.23%	—	—	1953–1960 1977–present[3]
Southern Arizona; all sources in Cochise, Graham, Pima, Santa Cruz, Yavapai and Yuma Counties (11 producers)	11,600	36,700	—	10,300	—	1954–1959 1977–present[4]
TOTALS	2,997,200	18,342,300	0.31%	42,505,800	—	

[1] Includes Marble Canyon-Vermillion Cliffs area and one producer in the Kaibab Ls.
[2] One known producer in Holbrook area
[3] Two known producers; one in Pinal Mts., one in Sierra Ancha
[4] One known producer in Rincon Mts. area

Table 2



ARIZONA URANIUM PRODUCTION, 1948-1970

Table 3

TABLE 4
ARIZONA URANIUM PRODUCTION
1948 - 1970

Tons U_3O_8

	Apache	Coconino	Navajo	Gila	Other Counties*
1948	34.33	-	0.55	--	--
1949	116.45	0.08	0.74	--	--
1950	115.43	0.01	0.52	--	1.00 (Mo, Y)
1951	206.15	0.17	0.01	--	0.17 (S)
1952	277.02	0.03	0.12	--	0.65 (Mo, S)
1953	397.11	20.86	3.12	1.80	0.2 (Mo)
1954	552.85	26.05	47.63	3.20	0.3 (Mo)
1955	456.54	3.53	58.27	6.15	0.2 (Ma, Mo, P,S,Y)
1956	367.97	191.00	74.60	12.82	0.4 (C, Mo, P,S,Y)
1957	321.30	240.25	158.77	24.68	9.6 (Ma, P,S,Y)
1958	323.12	255.12	242.20	--	1.95 (C, Y)
1959	223.49	203.11	323.04	0.02	7.60 (C, Y)
1960	271.10	261.30	202.76	7.48	0.0X (C)
1961	224.04	211.46	159.66	--	--
1962	203.77	23.57	163.33	--	--
1963	119.93	307.42	111.64	--	--
1964	71.86	296.02	11.58	--	0.26 (Mo)
1965	82.29	340.37	27.71	--	--
1966	83.30	134.34	14.08	--	--
1967	30.68	12.78	--	--	--
1968	1.95	160.58	--	--	--
1969	0.24	49.51	--	--	--
1970	--	--	--	--	--

* C - Cochise, G - Gila, Ma - Maricopa, Mo - Mohave, P - Pima, S - Santa Cruz, Y - Yavapai
Small "no pay" shipments from Graham and Yuma counties not included.

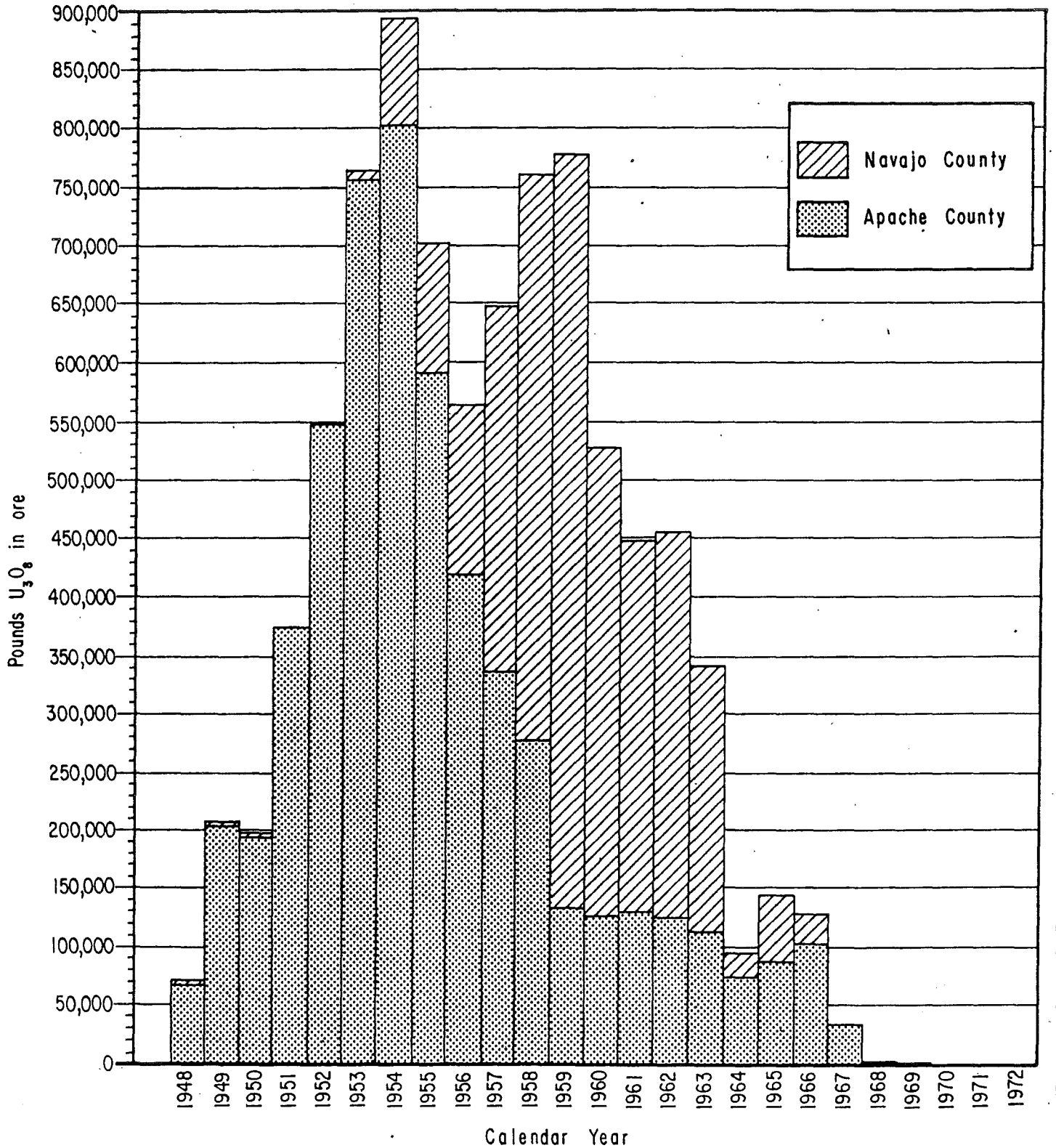
Compiled by Elizabeth A. Learned, February, 1980
U.S. Department of Energy
Grand Junction Office

TABLE 5 Summary Information of Number of Occurrences, Number of Producers, and Uranium-Vanadium Production Listed by County.

County	Total Number of Occurrences and Mines	Total Number of Producers *	Total Pounds of U_3O_8 *	Associated Pounds of V_2O_5 **
Apache	201	147	9,522,637	40,688,132
Cochise	32	2	220	93
Coconino	163	105	5,638,208	211,893
Gila	153	18	122,213	6,493
Graham	27	1	30	11
Greenlee	1	0	0	0
Maricopa	33	3	162	6
Mohave	87	8	15,204	12,091
Navajo	82	34	2,764,080	2,074,161
Pima	46	4	239	49
Pinal	23	0	0	0
Santa Cruz	26	3	2,964	2
Yavapai	55	2	33,253	10,112
Yuma	36	1	3	0
TOTAL	965	328	18,099,213	43,003,043

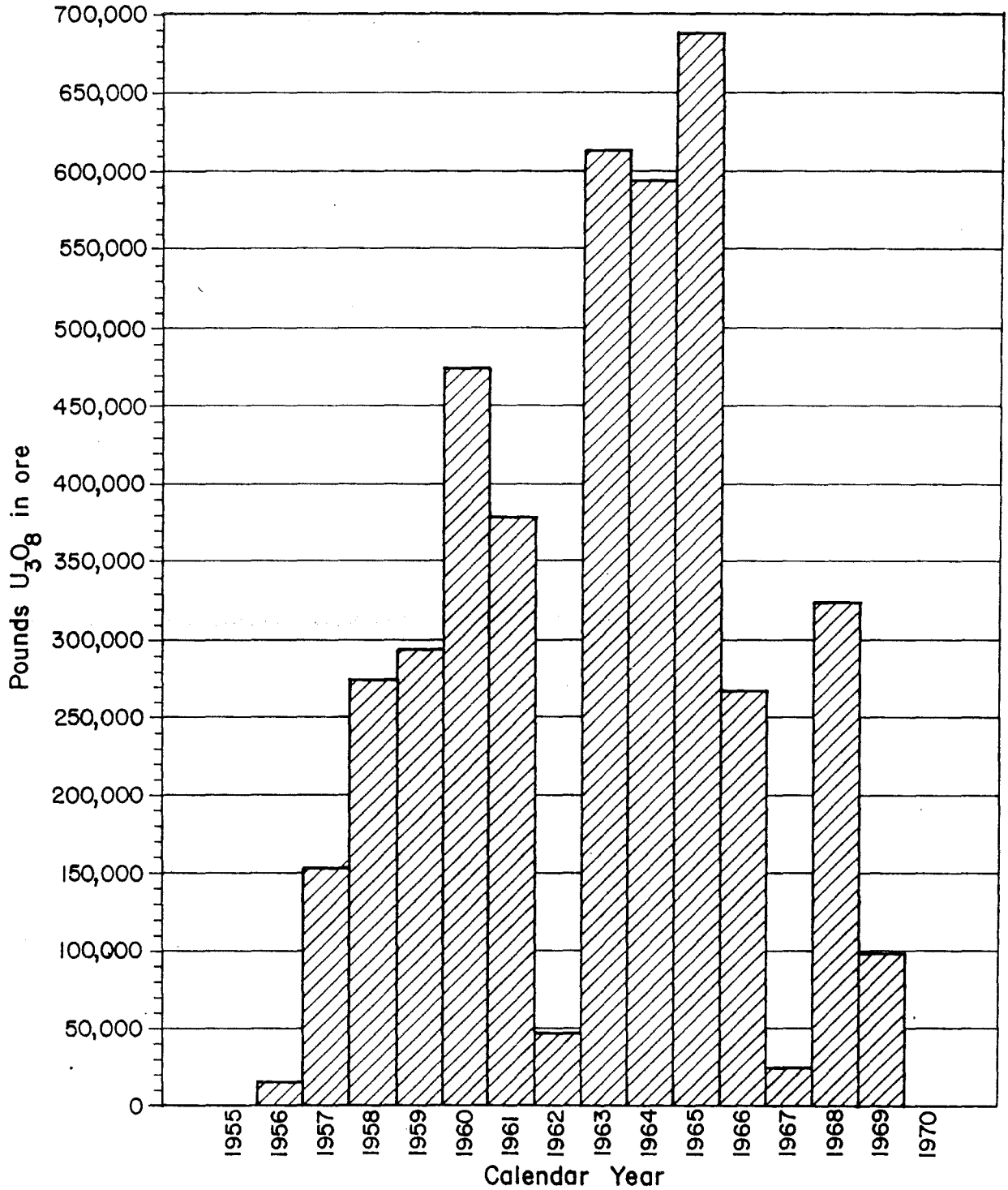
Arizona Total
(to January 1, 1970)

* Includes small amounts of no-pay (low grade) ores from certin localities.
** Only Apache County is probably complete. Not all Cameron, Anderson Mine, etc., ores were assayed for V_2O_5



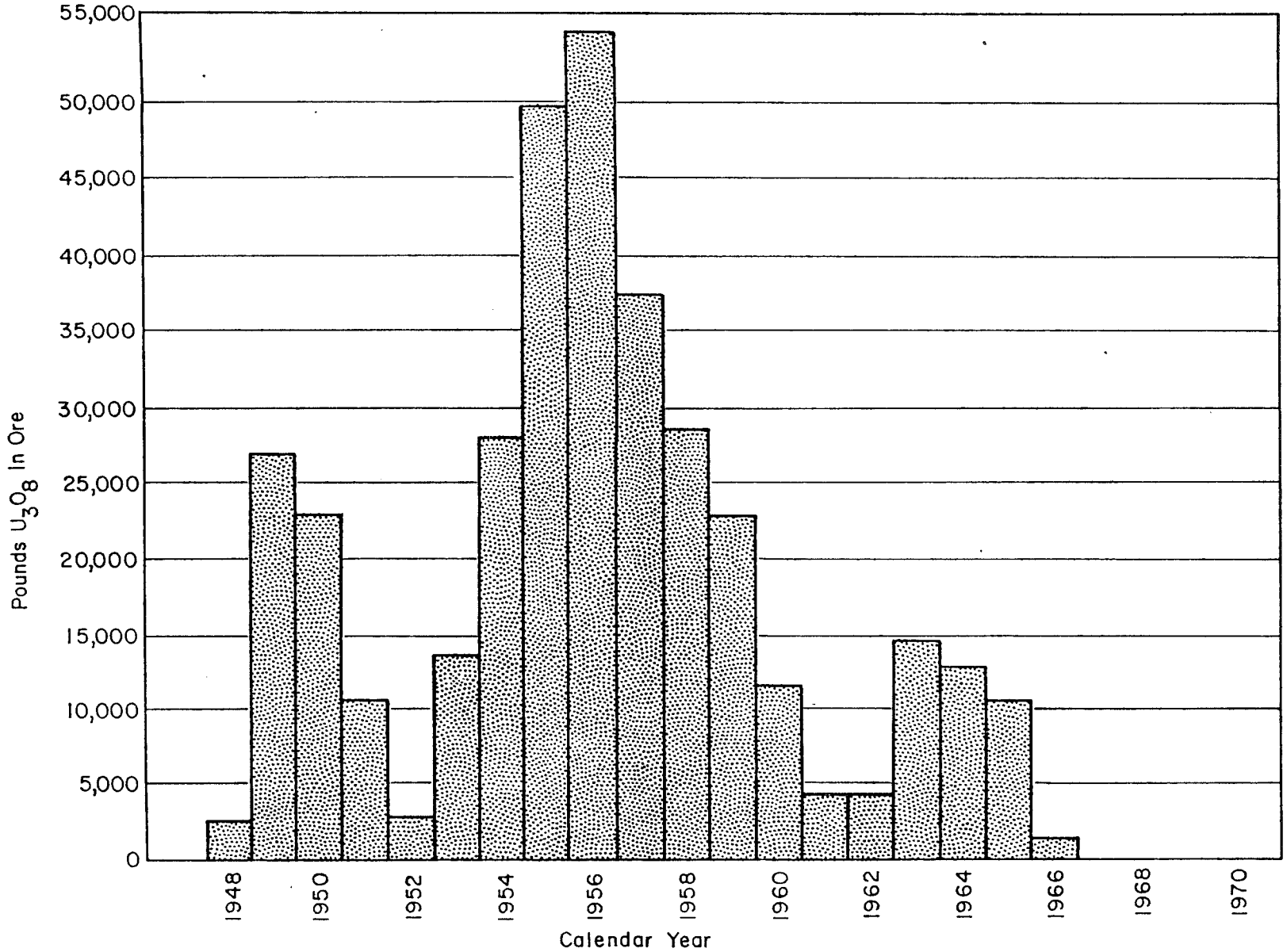
Uranium production Monument Valley, Apache and Navajo Counties, Arizona.

Table 6



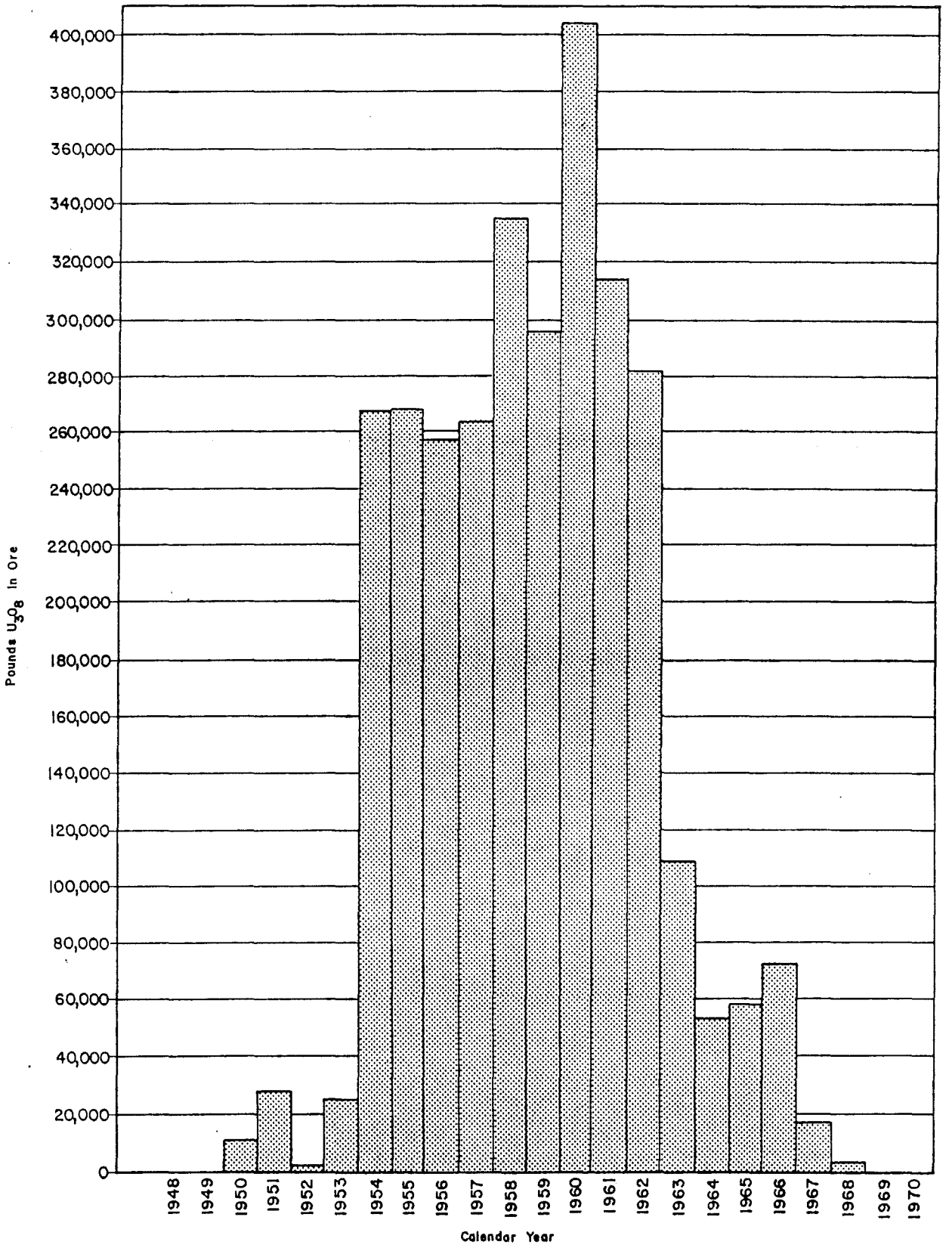
Uranium Production Orphan Lode Mine, Coconino County, Arizona

Table 7



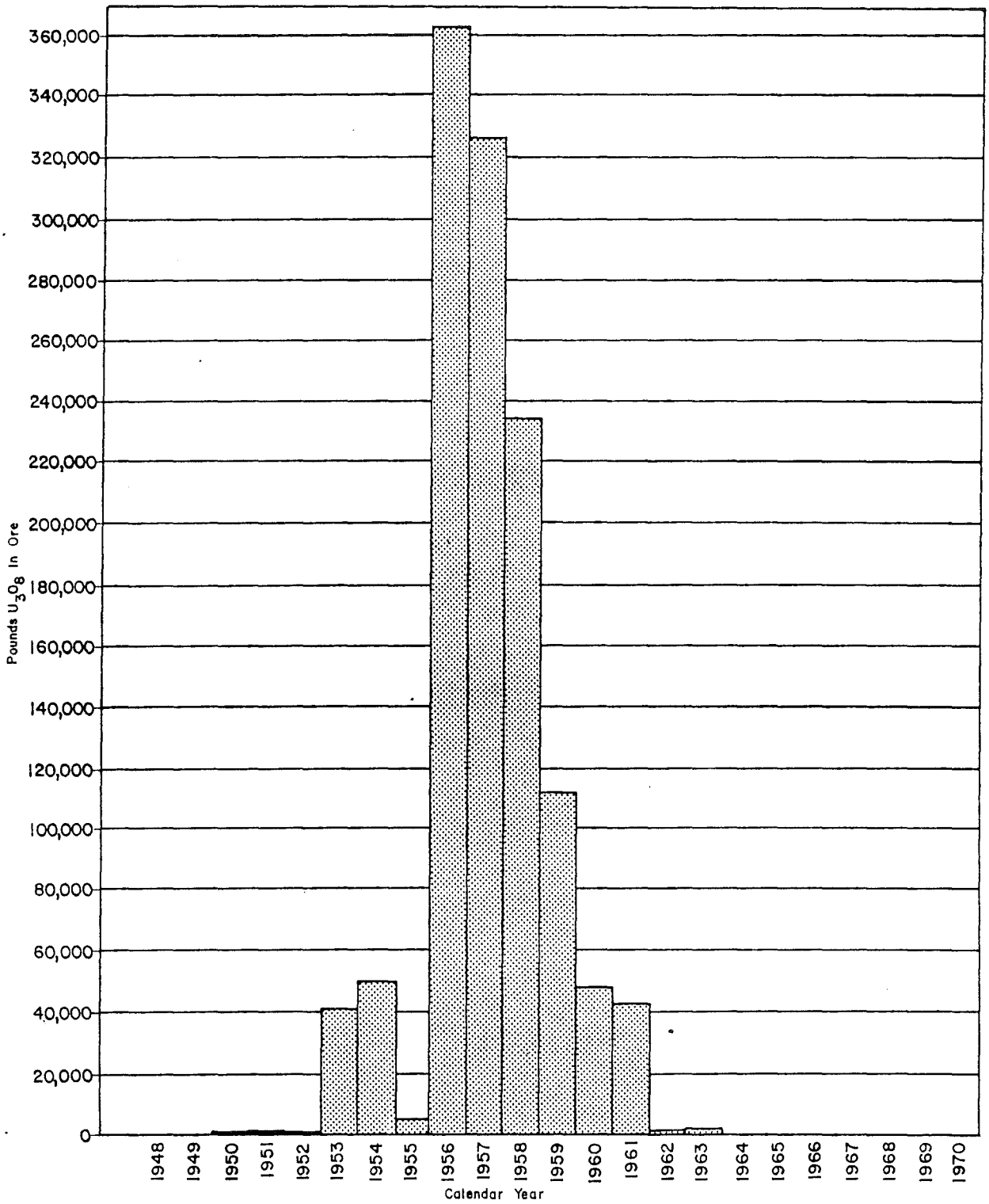
Uranium production Carrizo Mountains, Apache County, Arizona.

Table 8



Uranium production Lukachukai Mountains, Apache County, Arizona.

Table 9



Uranium production Cameron area, Coconino County, Arizona.

Table 10

ARIZONA URANIUM EXPLORATION TRENDS

Year	Year End Acres Held for Exploration and Development x 1,000	Surface Drilling	
		Number of Holes	Footage
1980*	---	601	260,508
1979	1,662	663	378,380
1978	1,282	1,372	688,291
1977	1,212	1,035	500,382
1976	1,021	1,465	544,740
1975	942	1,165	176,162
1974	819	127	52,013
1973	754	50	8,750
1972	486	37	6,000
1971	231	24	2,200
1970	221	14	3,510
1969	272	415	43,203
1968	---	881	114,705
1967	---	331	69,495
1966	---	24	5,330
1965	2	73	9,508
1964	---	102	16,913

*Statewide total of 23 drilling projects, with 5 projects in each of Gila, Mohave, and Yavapai counties, the remaining projects in Cochise, Coconino, and Navajo counties. One project in undisclosed county.

Compiled from DOE statistics by W. Chenoweth

Table II

APPENDIX B
SYNOPSIS OF HISTORY AND MINING DEVELOPMENT

Arizona Early History and AEC Involvement

1. In 1900, first recorded efforts in Colorado to extract uranium and vanadium from carnotite ores by Cashin Copper Company. Early success made the French owners form the American Rare Metals Mining and Manufacturing Company, which, in 1901, built the first mill for uranium-vanadium extraction from Colorado Plateau ores located at Stevens Camp, Summit Creek, Slick Rock mining district. Use of vanadium in hard steel alloys was becoming important, and its use in WWI war effort spurred the industry on.

2. During 1900-124 a booming industry in Colorado extracted radium from carnotite and pitchblende ores for medical use, based on pioneering work of the Curies in Paris. Between 1913 and 1919 about 39 grams of radium, valued at between 60,000 and 100,000 dollars per gram, were produced from Colorado Plateau ores. Best ores went to the Coke Ovens mill at the head of Paradox Valley, owned by Standard Chemical Company of Pittsburgh, Pennsylvania. This mill operated between 1910 and 1924. This industry sparked early exploration interest in NE Arizona. America's radium extraction industry died in 1924 upon discovery of rich Belgian Congo pitchblende ores. See Carrizo Mountains, note 2.

3. Organization in 1919 of Vanadium Corporation of America, which succeeded General Vanadium Company. They took over roscoelite properties in Placerville district, owned by Primos Chemical Company. VCA became important in the vanadium industry which was rapidly growing.

4. Earliest reports on uranium occurrences in Arizona are by Gregory (1917) and Butler and Allen (1921) for Monument Valley, and by Butler and Allen (1921) for the Tombstone area and the Santa Rita Mountains. An unpublished report by Staver (1921) discussed vanadium-uranium ores in the Salt Wash sediments of the eastern Carrizo Mountains of Arizona and New Mexico. F. L. Hess discussed Carrizo Mountains vanadium occurrences in 1933 AIME Lindgren volume.

5. Early mining for vanadium during 1942-1944 in Monument Valley and Carrizo Mountains by VCA, spurred by promotional activity in the federal government's Metal Reserves Company regarding vanadium procurement.

6. AEC (Atomic Energy Commission) was created in 1947. That year, first contracts signed with VCA for mining. Begin mining for uranium in Monument Valley and Carrizo Mountains in 1948.

7. In 1948-1949 AEC announced ore-buying schedules and other incentives which stimulated prospecting interest throughout the States (Circulars 1-5). These circulars announced, among other things, prices paid for certain types of high-grade ores and carnotite-roscoelite ores, and bonus payments for ores assaying better than certain cut-off grades, for ores purchased before March 31, 1962.

8. To encourage development of new domestic uranium supplies, AEC announced Circular 6, issued effective March 1, 1951. Circular 6 offered a bonus payment on the first 10,000 lbs of U_3O_8 supplied by any property or mine in addition to the Circular 1-5 price schedules, for those mines which had not produced any uranium prior to that time. For ores that continually maintained more than 0.20% U_3O_8, an operation could receive up to $35,000 in Circular 6 bonus payments. The original Circular 6 program ran until March 31, 1960.

9. Nationwide, the search for uranium proved so successful that in 1961 the AEC announced that purchases of uranium ore after April 1, 1962, would be limited to annual quotas allocated to individual properties. Also from that date until the end of 1966, instead of buying ore at the graduated prices previously in effect, the Commission would pay $8.00 per pound for U_3O_8 in concentrates produced mostly from reserves discovered before November 24, 1958. As a result of this change, the production of uranium in the United States declined in 1961 for the first time since 1948. In 1962, the AEC proposed to continue the purchase of uranium until 1971 from those suppliers who would agree to defer delivery of a part of their pre-1966 quotas until 1967 and 1968, with the price paid in 1969 and 1970 not to exceed $6.70 per pound of U_3O_8. This was the so-called "stretch-out" program. Since January 1, 1971, when the AEC ceased its procurement program, the only market for uranium has been the nuclear electrical power industry.

10. The Tuba City mill did not "stretch-out," and their contract with AEC expired December 31, 1966.

11. Other mills receiving Arizona production which didn't "stretch-out" were the Climax Uranium Corporation mill at Grand Junction and the Cotter Corporation mill at Canon City, Colorado. The Atlas Minerals mill at Mexican Hat closed in 1965, but their contracts were consolidated with the Moab mill contract, which "stretched-out".

12. AEC buying station and mill at Monticello, Utah, closed December 31, 1959. VCA mill at Shiprock closed 1968 due to lack of ore. Rare Metals mill at Tuba City closed September, 1966, due to closing of Orphan Lode in August, 1966.

References

O'Rear (1966)
Bruyn, K. (1955) "Uranium Country" U. of Colorado Press, 165 p.

Carrizo Mountains

1. Uranium-bearing outcrops discovered in 1918 by John Wade of Farmington, New Mexico, who operated the Sweetwater Trading Post. He and local Navajos located numerous ore-bearing outcrops in eastern Carrizos, with best ones near MP-16.

2. Wade, operating as the Carriso Uranium Company, acquired 41 claims around MP-16 in 1920, and hired Navajos to mine high-grade ore for radium content (probably in part at Syracuse (RF&R) Mine). Thirty-seven gunny sacks were shipped to Beclabito T. P. in 1921 (?) and eventually to Colorado where several companies were buying radium ores. A probable buying point was Standard Chemical Company's Coke Ovens station near Naturita. The market for vanadium that Wade was anticipating never materialized and operations ceased. Area remained inactive until the 1940's.

3. In late 1941, VCA (Vanadium Corporation of America) entered into a lease arrangement with the Navajo Tribe for the 17 plots in the Western Carrizos which they mined during 1942-44 ("West Reservation Lease"). VCA ore was trucked to Monticello. In July 1942 they leased 12 plots in the Eastern Carrizos of Arizona and New Mexico ("East Reservation Lease").

4. In 1942 the federal government formed the Metal Reserves Company to expedite domestic vanadium production for the war effort. This program stimulated interest in the Carrizos and elsewhere. Mills were constructed at Monticello, Utah, and Durango, Colorado, and operated by VCA and USV, respectively.

5. Early in 1942, Curran Brothers and Wade (CB&W) of Farmington, New Mexico, obtained a prospecting lease from the U.S. Indian Service, Navajo agency and selected two plots, Syracuse and Valley View, for mining. Several Curran brothers had previous experience in Utah-Colorado prospecting for uranium.

6. During 1942-1944, Wade, Curran and Company developed the Martin, Saytah, Saytah Canyon, Main Claim, Eurida, and Syracuse (RF&R) Mines. Ore mined by Wade, Curran and Company was shipped by truck and rail to Metal Reserve's mill at Durango. VCA shipped ore from west reservation plots 1 and 6-13 during 1943-44 to its mill at Monticello, Utah.

7. Total 1942-44 production from the Carrizos (Martin, North Martin, Saytah, Main Claim (MC), Saytah Canyon, Eurida and Rattlesnake Mines plus mines near milepost 16 along Arizona-New Mexico border) total 8,400 tons @ 2.18% V_2O_5 and about 0.17% U_3O_8 . Much of the uranium left behind in the mill tailings at Durango, Colorado and Monticello, Utah, were reprocessed at Durango for uranium in the late forties as part of the Manhattan Project. The Metal Reserve's program terminated March, 1944, resulting in shutting down of Carrizo vanadium mines.

8. Union Mines Development Corporation (UMDC) was organized in 1943 by the Army Corps of Engineers under the Manhattan Project to evaluate uranium resources of the Salt Wash Member of the Morrison Formation (and the Entrada Formation in Colorado) on the Colorado Plateau. UMDC's chief field geologist, based at their Grand Junction field office, was Benjamin N. Webber. Party chiefs in Arizona included John Harshbarger (for Eurida and Segi Ho Cho areas) and A. H. Coleman (for east Carrizo area). Elements of UMDC involvement and works are found in RMO-444 by E. H. Eakland, Jr. (1st Eurida Party chief), and RMO-437 (final report of UMDC), and RMO-1000 (summary of Colorado Plateau work). UMDC was active through 1946. UMDC geologists recommended the acquisition of 960 acres in the western and

Carrizo Mountains (continued)

northwest Carrizos by federal government leases that they thought had the best uranium potential. Although UMDC knew about Monument Valley occurrences, they did no work in that region.

9. In 1947 the AEC was created and began a procurement program on the Colorado Plateau. First procurement contracts with VCA signed May 1947.

10. Mining for uranium for the AEC was resumed by VCA in late 1948. Ore was hauled first to Naturita, Colorado, and later to Durango, Colorado. Early independent miners shipped ore to Durango.

11. In February, 1949, a contract between AEC and VCA allowing purchases of concentrates from VCA's Durango mill increased VCA Carrizo production.

12. In January, 1952, AEC opened a buying station at Shiprock, New Mexico, further boosting production from Carrizos.

13. New AEC and company drilling started in 1953, resulting in renewed mining along Saytah Wash and Cove Mesa. Most productive years were 1955-1959 for the Carrizos. Late 1954, Kerr-McGee Shiprock mill opened, which received ore from independent mines. AEC Shiprock buying station closed.

14. 1963-1966 production came from Kerr McGee's Block K Mine (discovered by a single AEC drill hole), Cove Mesa plot 7, Cato Sells' Cove Mesa Mines, VCA's Plot 6 and adjacent Hoskie Henry properties.

15. Last shipments made in 1966 as known ore bodies were depleted.

16. Total Carrizo Mountains production, including New Mexico's majority of eastern Carrizo area, is 119,558 tons containing 524,827 lbs U_3O_8 and 4,650,980 lbs of V_2O_5. Arizona's portion of this is 90,300 tons containing 364,900 lbs U_3O_8 and 3,166,200 lbs V_2O_5.

Lukachukai Mountains

1. Only the northwest tip of the mountains were examined in 1943-1946 by UMDC (Union Mines Development Corporation) personnel. Due to lack of occurrences on Mexican Cry Mesa, and the false belief that the pre-Chuska unconformity cut out all Salt Wash outcrops to the southeast, the UMDC declared the Lukachukais to be an unpromising area for further searching. (UMDC had been organized for under the directorship of the Army Corps of Engineers, and given the task of accessing the nation's uranium potential).

2. Dan Hayes, raised near Hite, Utah, prospected for copper near his home on claims originally worked by his father. In 1948 he sold the claims, located in eastern Utah's White Canyon area, to Cooper-Bronson Mining Company which developed them into the rich Happy Jack Mine, a copper-uranium association in Moenkopi Formation. Hayes also held valuable claims in Lisbon Valley next to the fabulous find in 1952 by Charlie Steen of his Mi Vida Mine.

Lukachukai Mountains (continued)

3. Dan Phillips, Koley Black (local Navajos) and Dan Hayes prospected in 1949 in the Lukachukais south of Cove School and staked claims which bore the names of the two Navajos. Willie Cisco, another Navajo prospector, showed ore samples from the southside Lukachukai mesas to geologists of the Walter Duncan Mining Company of Cortez, Colorado. F. A. Sitton of Dove Creek, Colorado, followed advice of Hayes, and negotiated with the B.I.A. and Navajo Tribe to obtain first Lukachukai mining permits. He organized F. A. Sitton, Inc. and built first roads up Mesa I in 1950 and initiated shipments of ore out of Lukachukais in that year. He shipped from Mesas I, II and IV.

4. Climax Uranium Company began prospecting about this same time and acquired mining permits on Mesa IV½ from Frank Nacheenbetah in 1950.

5. In August, 1951 the Navajo Uranium Company of Cortez, Colorado, (under R. O. Dulaney, Jr., Edward Key, Jr., and "Buffalo" Kennedy) acquired Sitton's interest and continued mining on Mesa II, etc.

6. AEC began drill projects in 1950 and built more access roads. By spring 1951, drill programs were in progress on Mesas I, II, III and IV. AEC drill programs ran until August, 1955.

7. Transfer of Navajo Uranium Company's interests to Kerr-McGee Oil Industries, Inc., approved by the B.I.A. January 26, 1953 (transfer of operations underway in fall, 1952). Kerr-McGee was the first major oil company to engage in full-scale uranium exploration. Kennedy was retained as manager of Kerr-McGee's Navajo Uranium Exploration Division.

8. AEC buying station opened in Shiprock, New Mexico in January 1952. Kerr-McGee built a mill there which began operating in October, 1954.

9. VCA acquired Kerr-McGee's Shiprock mill and Lukachukai leases in March, 1963 with B.I.A. approval on July 29, 1963. The mill finally closed in 1968 due to lack of ore.

10. Climax Uranium Corporation properties (Frank #1, Frank Jr.) shipped their ore to the Climax mill at Grand Junction, Colorado. Since Climax didn't participate in the AEC's stretch-out program (see note later), their production in 1966-67 went for non-AEC sales to electric utility companies.

11. Final shipments from the Lukachukais in May, 1968.

12. Foote Minerals of Naturita, Colorado, purchased VCA interests around 1970.

References

Chenoweth and Malan (1973)
Dare (1961),(USBM IC-8011)
Chenoweth (pers.comm.,1981)

Monument Valley

1. Carnotite noted by Gregory in 1917 (USGS Prof. Paper 93).
2. VCA leased ore-bearing outcrops in August, 1942 (properties became Monument #'s 1 and 2).
3. 1942-44 vanadium ores were shipped to Monticello, Utah (a few thousand tons came from Monument 1 - no Monument 2 production during 1942-44 can be confirmed).
4. Mining resumed at Monument 1 and 2 in 1948 by VCA under AEC program. Ore shipped to VCA mill at Naturita, Colorado, later Durango.
5. Early non-VCA ore shipped to AEC mill at Monticello (1948 - early 1950's).
6. Drilling in 1955-56 located large deposits in the Ojetah syncline (Moonlight, Starlight, etc.).
7. From 1955-1968, VCA operated a concentrator plant located one mile east of Monument 2 Mine, built because of high transportation costs of low-grade ores to their Durango or Shiprock mills. From summer 1955 to July 1964 a mechanical separator concentrated high grade slimes from low grade sand residues. From 1964 to 1968 a heap leach facility produced yellowcake from low grade new ore and sand residue. Monument 2 ores were further processed at VCA facilities at Naturita in 1948-1958, Durango in 1949-1963, and Shiprock in 1963-1968.
8. During 1957-1963, a mill at Mexican Hat, Utah was operated by TZ minerals (Texas-Zinc) for Texaco and New Jersey Zinc, and by Atlas Minerals in 1963-65. This mill recovered copper from Monument Valley ores. Nearly all of the Monument Valley VCA ores were processed here. Some small operators, distrustful of TZ, shipped their ores to Tuba City, Arizona.
9. Last Monument Valley ore was from Monument #2 in 1969, just after the VCA mill at Shiprock closed. This shipment went to Atlas Minerals Moab mill.

References

Chenoweth and Malan (1973)
Ford, Bacon, Davis (1977, p.2-2)

Cameron Area

1. Hosteen Nez, an independent Navajo prospector, found uranium ore in the Kayenta Formation east of Cameron in 1950 and had Mr. L. Hubbell, the trader at Winslow, confirm the identification with AEC personnel. Early shipments were made to Durango for low lime ore, and to Monticello for high lime ore.

Cameron Area (continued)

2. AEC-BIA negotiations in 1949-50 at Window Rock allowed for the hiring of local Navajo uranium prospectors by Walker-Lybarger Construction Company (AEC prime contractor). Charlie Huskon, a Cameron resident, became such a prospector and located a number of Chinle Formation occurrences in 1951. Mining permits given to him by the Navajo Tribe were used for mining the Huskon orebodies by the Arrowhead Mining Company of Grand Junction, Colorado. The Navajo prospector program was more successful at Cameron than at any other region on the Reservation.

3. Early shipments of ore went to Monticello, Utah.

4. Arrowhead Uranium Company began shipments in 1953 to Bluewater, New Mexico from Huskon 1-8, 10.

5. Production down in 1955, waiting for local market for the ore.

6. AEC opened buying station on January 12, 1956 at Tuba City. Rare Metals Corporation of America bought out Arrowhead interests (including most of the Charles Huskon properties) in February, 1955 and opened their mill at Tuba City in July, 1956. First concentrate purchased by AEC from the mill July, 1956.

7. a. The Tuba City mill was constructed to receive Cameron area ores. Its lifetime was extended as a result of agreements to process Orphan Lode ores. In early operations, about 300 tons of ore per day were processed using an acid leach, sand-slime separation and resin-in-pulp ion exchange process. High lime ores from the Orphan required the installation of a carbonate leach circuit which was operational during 1963-1965.

   b. During its lifetime, the mill received additional ores from the following areas: Independent Monument Valley producers on Mitchell Mesa and Hoskinnini Mesa, most Black Mountain ores, the last ores from the Anderson Mine and the Sierra Anchas, the Star Claims of Cochise County, and the sole shipment from the Morale Claim of the Hopi Buttes.

   c. Robert S. Shriver, operator of the Rebel Mine, Deer Flats area of White Canyon, Utah, shipped to Tuba City for six months or so. These may represent the only ores processed here which originated from outside Arizona. He also operated the Mitchell Mesa property of Navajo County, where he suffered fatal injuries while hauling ore alone at the mine in 1962.

   d. When the AEC closed the Cutter (Globe) buying station in June, 1957, stockpiles of ores from the Anderson Mine were bought by the Kerr-McGee mill at Grants, while stockpiles of Dripping Spring (Sierra Ancha) ores and miscellaneous ores were bought by Rare Metals' Tuba City mill.

   e. Mill ownership merged into El Paso Natural Gas Company in July, 1962.

Cameron Area (continued)

7. f. With the alkaline leach circuit starting in April, 1963, due to high-lime ore from the Orphan Lode, the plant treated 200 tons per day until it closed in September, 1966.

   g. During its lifetime, the Tuba City mill processed 800,000 tons of ore with average grade of 0.33% U_3O_8 and produced 2,348 tons of U_3O_8 in concentrate form.

8. Peak production in 1956 from Cameron area mines.

9. Most significant Cameron area mines were Jack Daniels (39,800 tons during 1956-1963); Charles Huskon #4 - Paul Huskie #3 (37,800 tons during 1953-1960); Charles Huskon #3 (27,300 tons during 1953-1961); Charles Huskon #1 (23,100 tons during 1951-1961); and Ramco #20 (22,600 tons during 1956-1960). Rare Metals' Ramco pits collectively produced about 47,600 tons of ore between 1956 and 1960. Rare Metals also acquired Charles Huskon Mines #1, 3, 5-8, 10-12, 14, 17 and 26 from Arrowhead in 1955. Charles Huskon Mines #4, 9, 18, 19 and 20 were operated by UTCO Uranium Corporation during 1956-1959.

10. Late production (1961-63) is recorded from Charles Huskon #1, 3, 6, 10, 11, 12 and 17; Evans Huskon #2; Jack Daniels; Julius Chee #3; Yazzie #2, 101 and 312; and Section 9.

11. Cameron discoveries in the early 1950's led to considerable prospecting around the Black Mesa basin, but no similar deposits were found outside of some already known ones around Holbrook.

References

Ellsworth (AEC TM-7, 1952)
Akers, et al (1962, GQ-162)
Chenoweth and Malan (1973)
ERDA Report GJT-5(77) - Engineering Accessment of Tuba City Tailings

Orphan Lode

1. Original Orphan Lode claim staked by Daniel L. Hogan and Henry Ward in 1893.

2. Continued copper prospecting through early 1920's. Hogan patented the claim in 1906, three years before the establishment of Grand Canyon National Park. Patent papers signed by President Theodore Roosevelt. Hogan had been one of Roosevelt's "Rough Riders" in Cuba.

3. Claim sold to Madeline Jacobs in August, 1946.

Orphan Lode (continued)

4. Radioactivity in ore samples from old workings noted by Harry Granger, USGS, in 1951. (Tested samples were in a garage in Prescott).
5. Golden Crown Mining Company acquired mineral rights in 1953. Five short jack hammer holes drilled in old Hogan adit in 1955-56.
6. Based on drilling results an early tramway was constructed in March, 1956, but proved ineffective. A second tramway was built in May, 1956.
7. First ore shipped April, 1956. Early production was about 1,000 tons per month @ 1.0% U_3O_8.
8. Drilling in 1958-59 located "B" ore zone and the annular ring ore zone.
9. A 1,600 ft shaft and 1,400 ft cross cut to the 400 ft mine level were completed in 1959. In August, 1959 initial ore removal through the shaft. Production increased to 7,000 tons per month at a lower grade of 0.40 - 0.45% U_3O_8.
10. Ore bin on headframe collapsed into shaft in December, 1961; mine shut down and Tuba City mill closed.
11. Bill to mine in Park Service land outside (north) of claim passed U.S. Congress May, 1962, in exchange for NPS ownership of the claim 25 years hence, in 1987. Tuba City mill converted to alkaline leach circuit in 1962 to handle high-lime Orphan ores, and began renewed activity in March, 1963.
12. Mining resumed at Orphan in November, 1962.
13. Tuba City mill (Rare Metals Corporation of America) contract with AEC expired at end of 1966. This plus financial troubles of Western Equities (owners since 1961) caused mine to close in August, 1966. The troubles included FTC suspension of Western Equities stock on the Exchange due to "stock manuvering" by Westex personnel.
14. Cotter Corporation of Canon City, Colorado acquired Orphan from bankruptcy court in 1967. Mine opened and shipments began to the company mill via railroad in 1967. Cotter's AEC contract had expired so they made sales to electric utilities.
15. Due to high costs, etc., Orphan closed in April, 1969.

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Other Parts of Colorado Plateau

1. Intensive prospecting throughout the Colorado Plateau located most surface occurrences by the early 1950's.
2. Uranium was discovered in the old copper mine in Hack Canyon. Initial shipments made in 1950 to AEC buying station at Marysvale, Utah.
3. Uraniferous petrified wood located in Marble Canyon area. Shipments in 1949-50 made to AEC buying station in Monticello, Utah.
4. Salt Wash deposits near Rough Rock (Black Mesa area) shipped by Tom Klee and Tom Wilson to Monticello, Utah and Durango, Colorado in 1951 and 1953.
5. USGS located several uraniferous diatremes in the Hopi Buttes in 1952. Production from Morale claim began in 1954.
6. Ruth and other deposits near Holbrook made initial shipments to Bluewater, New Mexico in 1953.
7. Toreva deposits near Tah Chee School (Black Mountain area) shown to AEC geologists in 1954. Production from the area sent to Bluewater, New Mexico starting that year.

Basin and Range Country

1. USGS reported pitchblende at the Happy Jack Mine, Wrightstown district, Santa Cruz County in 1917 (USGS Bulletin 624 by Schrader).
2. Carnotite reported near Tombstone by Butler and Allen (1921).
3. The AEC procurement program, started in 1947, initiated a massive prospecting effort throughout the Basin and Range country. By the early 1950's most of the surface occurrences had been located. Prospecting was initially confined to the ranges, with very little effort in the basin fill.
4. Early producers were:

   Hillside Mine, Yavapai County (1950),
   White Oak Mine, Santa Cruz County (1951-52) and
   Red Bluff Mine, Gila County (located 1950, produced in 1953)

   All ore was shipped to AEC buying station at Monticello, Utah where there were no restrictions on the type of ore accepted.
5. Development was hindered by lack of market (local buying station) although the AEC paid six cents per ton mile for the first 100 miles of shipping distance, to encourage mining as announced in Circular 5.

Basin and Range Country (continued)

6. Due to intense activity in the Sierra Ancha the AEC established an ore buying station at the Cutter siding just east of Globe, which opened July 5, 1955. Ores were received here from southern Arizona, southern New Mexico, and southern California. The buying station closed because of lack of ore on June 30, 1957.

7. After closure of the Cutter buying station, Sierra Ancha and Anderson Mine ores were shipped to the AEC buying station at Grants, New Mexico.

8. The Anderson Mine of Yavapai County shipped to:

   AEC Cutter during 1955-57,
   AEC Grants during 1957,
   and Rare Metals Mill at Tuba City in 1958-59.

   The Anderson Mine ore at Cutter was later purchased from AEC by Kerr-McGee at Grants; the other Cutter ores were purchased by Rare Metals' Tuba City mill.

9. Some of the last production under the AEC buying program in the Basin and Range Country came from the Hope and Little Joe Mines (Gila County) and the Star claims (Cochise County). This ore was shipped to Tuba City.

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GJBX recent reports for Arizona

(1) NURE Aerial Gamma-Ray and Magetic Reconnaissance Survey

Flagstaff	GJBX-157 (79)
Phoenix	
El Centro	GJBX-12 (80)
Lukeville	
Salton Sec.	
Ajo	
Marble Canyon	GJBX-16 (80)
Grand Canyon	GJBX-35 (80)
St. Johns	GJBX-126 (79)
Gallup	
Shiprock	GJBX-116 (79)
Mesa	
Tucson	
Clifton	GJBX-23 (79)
Silver City	
Nogales	
Douglas	
Kingman	
Prescott	
Williams	GJBX-59 (79)
Las Vegas	

(2) Hydrogeochemical and Stream Sediment Analyses (HSSR)

Salton Sea	NTMS	GJBX-113 (80)
Prescott	NTMS	GJBX-122 (79)
Williams	NTMS	GJBX-71 (79)
Las Vegas	NTMS	GJBX-123 (78)
Kingman	NTMS	GJBX-122 (78)

(3) Papago Indian Reservation, Water Sample Analysis

GJBX-102 (79)

(4) Artillery P.K. Orientation Study, Mohave County

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