

UNITED STATES DEPARTMENT OF THE INTERIOR  
GEOLOGICAL SURVEY

INVESTIGATIONS OF DOMESTIC RADIOACTIVE RAW MATERIALS,  
BERYLLIUM, AND OTHER TRACE ELEMENTS

PREPARED FOR U. S. ATOMIC ENERGY COMMISSION

MONTHLY REPORT-APRIL 1951  
TRACE ELEMENTS OFFICE

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INVESTIGATIONS OF DOMESTIC RADIOACTIVE RAW MATERIALS,  
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MONTHLY REPORT - APRIL 1951

SUMMARY

Significant data reported in April for projects in the Trace Elements program are summarized below:

Reconnaissance investigations, domestic.---A total of 82 mines prospects, or areas was examined in Arizona, Colorado, and New Mexico.

The Chinle formation in northern Arizona may contain a considerable tonnage of material that averages between 0.01 and 0.05 percent uranium. Total inferred reserves of about 4,000 tons of ore of this grade in the Chinle formation are estimated in seven deposits examined in April.

A torbernite deposit in the Coconino sandstone at the Orphan claim, Coconino County, Ariz., contains at least 100 tons of material assaying 0.5 percent equivalent uranium, and a very large quantity of material containing from 0.01 to 0.04 percent equivalent uranium.

Recent mine development at the Copper King shaft, Blackhawk claims, Larimer County, Colo., has exposed two pitchblende-bearing pyrite-sphalerite veins. Indicated reserves are 200 tons of material containing 1.0 percent uranium.

Reserves of uraniferous lignite and schroekingerite in the Red Desert area, Sweetwater County, Wyo., have been recalculated as follows:

<u>Material</u>	<u>Calculated ore</u> <u>(Measured, indicated, inferred)</u>	<u>Uranium</u> <u>(percent)</u>
Lignite	255,000,000 tons	0.005
Schroekingerite	11,700 tons	0.1

Airborne detection.---Airborne reconnaissance surveys are planned in the latter part of May of the Shinarump and adjacent formations in Arizona and Utah that are scheduled for examination by field parties this field season.

Colorado Plateau, exploration.--A total of 3,900 tons of new ore was found by 20,627 feet of drilling on Club Mesa, Uravan district, Montrose County, and on Blue and Moon Mesas, East Gateway district, Mesa County. An additional 8,091 feet of drilling was done on Long Park, Uravan district, Montrose County, and Outlaw Mesa, East Gateway district, Mesa County.

Colorado Plateau, geologic studies.--Results of the permeability study of the Salt Wash ore-bearing strata on Calamity Mesa, Mesa County, can be correlated with detailed geologic logs and with gamma-ray logs. This will aid in the interpretation of the gamma-ray logs.

Southeast phosphate.--The Virginia-Carolina Chemical Corp. has agreed (1) to give the Geological Survey all the data the Survey requires, and (2) to drill 33 hand-auger holes in areas that they will mine in the next two years. This drilling will begin about May 2 and probably will be completed in about one month. All holes will be logged by the gamma-ray logging unit.

Beryllium-bearing rocks.--Estimated reserves for the New Mexico and Texas beryllium studies are 30 tons BeO (indicated) and 140 tons BeO (inferred) in material containing more than 0.01 percent BeO, and more than 100,000 tons (inferred) of BeO in material containing 0.005-0.01 percent BeO.

Reports forwarded.--In April, two Trace Elements Investigations reports and seven Trace Elements Memorandum reports were transmitted to the Atomic Energy Commission.

Other projects.--In April, work similar to that previously in progress was continued on the following projects, and no outstanding results pertaining to these projects were reported.

Reconnaissance investigations, Alaska  
Northwest phosphate  
Montana, Wyoming, North Dakota, and  
South Dakota lignites  
Mill and raw-material sampling  
Laboratory investigations

## RECONNAISSANCE INVESTIGATIONS, DOMESTIC

Field work in progress

A total of 82 mines, prospects, or areas was examined in Arizona, Colorado, and New Mexico during April. A summary of all the reconnaissance field work in April is given in table 1 at the back of this report.

## Arizona

Reconnaissance examinations were made of 24 deposits in Arizona; 18 of the deposits were radioactive. Of these, eight are considered inadequate for ore production; eight have slight possibilities as potential producers of material containing from 0.01 to 0.2 percent uranium; and two, the Orphan claim and the Hosteen Nez Mining Co. claim No. 1, both in Coconino County, may produce small tonnages of ore containing 0.3 to 0.5 percent uranium.

The northern part of Arizona that is included in the Colorado Plateau Province shows the most favorable possibilities for potential uranium production. The Chinle formation, in particular, contains large tonnages of material that averages 0.01 to 0.05 percent uranium. A small amount of higher-grade material also could be produced from fossil plant remains. Although individual prospects are small, there are potentially a large number of them in this relatively unprospected formation.

Torbernite in Coconino sandstone at the Orphan claims, Coconino County.--The deposit on the Orphan claim, Coconino County, contains at least 100 tons of material assaying 0.5 percent uranium (assuming the radioactivity is attributable to uranium), and an unknown but very large quantity of material containing about 0.01-0.04 percent uranium. The potentialities for uranium production from this deposit are very good. An iron-stained shear zone, about 5 feet wide and at least 25 feet long, cuts a down-dropped block of Coconino sandstone. The shear zone contains torbernite in fractures, and the nearby sandstone is strongly impregnated with pyrite, arsenopyrite, and minor copper minerals.

#### Colorado

Pitchblende in the Copper King shaft, Blackhawk claims, Larimer County.--Recent mine development at the Copper King shaft, Blackhawk claims, Larimer County, has exposed two pitchblende-bearing pyrite-sphalerite veins on and below the 60-foot level. One of the veins averages two feet in width and is exposed for a distance of 50 feet horizontally in the drift and for 20 feet vertically in a winze. The other vein is exposed for 2 feet horizontally and 2 feet vertically on the southeast wall near the bottom of the winze. The wall rock is pre-Cambrian Sherman granite. Analyses of channel samples across these veins range from 0.017 to 2.17 percent uranium. Indicated reserves are estimated to be 200 tons of rock containing 1.0 percent uranium.

## Utah

Study of gamma-ray logs of exploratory drill holes in Utah.--

An investigation, on a part-time basis, was begun of gamma-ray logs that have been made, or will be run, in oil-test drill holes in Utah. This investigation is being made to obtain information on the radioactivity of subsurface rocks in Utah.

Field work recessed

## Wyoming

Uranium in schroekingerite and lignite in the Red Desert area, Sweetwater County, Wyoming.--In April, reserves of uranium-bearing lignite, and uranium-bearing schroekingerite ore at Lost Creek, in the Red Desert area, Sweetwater County, were recalculated as follows:

<u>Material</u>	<u>Calculated ore (Measured, indicated, inferred)</u>	<u>Uranium (percent)</u>
Lignite	255,000,000 tons	0.005
Schroekingerite	11,700 tons	0.1

The lignite reserves are estimated to contain about 96,000,000 tons of ash and 13,000 tons of uranium.

## Other projects

Field work of the following reconnaissance projects shown on figure 1 was recessed throughout April:

<u>Project</u>	<u>Project number as shown on figure 1.</u>
Fluorite	10
Autunite, etc., Marysvale region, Utah	11
Utah, Nevada, and northern California	12
Washington, Oregon, Idaho, and Montana	13
Reconnaissance of sedimentary rocks in Colorado	14
Reconnaissance of sedimentary rocks in Wyoming and Utah	15

Investigation of radon-bearing natural gases

## Texas

The instruments used on this project in the last field season have been overhauled and improved to permit semi-automatic operation by unskilled personnel. Field work in the Texas Panhandle gas field will be resumed as soon as personnel are available.

It is planned to have cable-tool coring done at one new well location to obtain samples of connate water as well as rock material for radioactivity analysis. Measurements of magnetic susceptibility will be made on samples of basement rocks as such samples become available. Radioactivity measurements will be made on these samples

for possible correlation with magnetic data, and routine radio-activity tests will be made on old samples of cuttings as well as on samples that can be obtained from the wells currently being drilled by the Canadial River Gas Co. Chemical analyses will be made when appropriate.

Where the original drilling data do not provide information on the porosity thickness of producing wells or the quantity of gas produced from each zone, this information probably can be obtained directly for each well by means of an "electricial pilot" survey. Because of the expense involved, this method probably should be reserved for wells in critical areas where high radon values are obtained and where the necessary drilling data are lacking.

The Bureau of Mines has a map showing the vertical magnetic intensity in the area south of the Canadian River, and the Canadian River Gas Co. has a similar map for the area north of the river. If the two maps can be combined satisfactorily, they will afford magnetic coverage of the entire area of present interest and may obviate the desirability of an aeromagnetic survey of the area. (See March Monthly Report, p. 11.) Thus it may be possible to delimit areas of different rock types and to correlate these rock types with those in areas more favorable for the occurrence of uranium.



## RECONNAISSANCE INVESTIGATIONS, ALASKA

Organization was continued during April of four parties to conduct field appraisals of areas in Alaska favorable for the occurrence of high-grade uranium ores. (See March Monthly Report, p. 12.) Most of these favorable areas have been described briefly. /

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/ Wedow, H. Jr., White, M. G., and Moxham, R. M., Interim report on an appraisal of the uranium possibilities of Alaska: U. S. Geol. Survey Trace Elements Memorandum Rept. 235, March 1951.

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Two parties (fig. 2, nos. 1 and 2) will work on the Seward Peninsula where the major area favorable for uranium is the York tin district. In this district zeunerite and other uraniferous minerals have been found in samples containing as much as 2.25 percent uranium. Other possibilities on the Seward Peninsula include a mineralized belt north of Nome, and a possible uranothorianite-copper lode in the eastern part of the peninsula.

A third field party (fig. 2, no. 3) will investigate a number of leads in southeastern Alaska, particularly hematitic copper deposits, hematically altered silicious rocks containing a primary (?) uranium mineral, a reported carnotite occurrence, and lodes in which silver-lead minerals are predominant or in which tetrahedrite and pyrite are common ore minerals. These favorable leads occur mostly in the southern part of southeastern Alaska, Prince of Wales and Gravina Islands and the Cleveland Peninsula.

The fourth party (fig. 2, no. 4) will make reconnaissances (1) of the zeunerite-bearing copper lode in the Russian Mountains of the Lower Yukon-Kuskokwim region; (2) of hematitic copper metalliferous lodes, principally silver-lead and gold-bismuth types, in other areas and districts of the Alaska Railroad region; and (3) of auriferous sulfide lodes on Nuka Bay, and the silver-lead prospects in the Hope Sunrise and Girdwood districts in the Gulf of Alaska region.

Organization was begun of a temporary radiometric laboratory in Fairbanks for the summer. Combined office and laboratory facilities are being furnished by the School of Mines of the University of Alaska.

By the middle of June it is expected that all four field parties will be either conducting operations or in the field and ready to operate as soon thereafter as weather permits. By mid-June also, it is expected that the temporary laboratory will be set-up and ready to receive samples for preliminary study.

Office and laboratory studies related to 27 other Alaskan reconnaissance projects (fig. 2) were continued in April. Resumes of these projects were given in the following previous monthly reports:

November	1949, pp. 19-29
December	1949, pp. 13-15
January	1950, pp. 16-18
February	1950, pp. 21-23
July	1950, pp. 18-19
October	1950, pp. 13-15

Work was continued of the final report on the uranium possibilities of Alaska.

## RECONNAISSANCE REPORTS

Reports currently are being prepared on phases or results of the following reconnaissance investigations in addition to the Alaskan projects mentioned above.

<u>Project</u>	<u>Project number as shown on figure 1</u>	<u>Monthly report containing summary of preliminary results.</u>
North Dakota lignites	4	April 1950, pp. 15-17 March 1950, p. 14 February 1950, p. 14 January 1950, p. 18 October 1949, p. 10
Northeastern states	5	June 1950, p. 10 May 1950, p. 13 January 1950, p. 21 September 1950, p. 4 July 1950, p. 4 February 1949, p. 9 September 1949, p. 8 August 1948, p. 6
Majuba Hill mine, Pershing County, Nev.	6	March 1949, p. 7
Colorado Front Range (to July 1, 1950)	7	January 1951, pp. 11-12 November 1949, pp. 11-12
Red Desert area Sweetwater County, Wyo.	8	April 1950, pp. 17-18

Reports also are being prepared on the results of the following studies or examinations made during the course of routine reconnaissance investigations:

- ( 1 ) Radioactivity in southeastern Kansas.
- ( 2 ) Blue Jay claim, Grant County, N. Mex.

- ( 3) Apache Trail uranium prospect, White Signal district, Grant County, N. Mex.
- ( 4) Uranium in the Copper King mine, Blackhawk No. 1 claim, Larimer County, Colo.
- ( 5) Stalin's Present property, Pershing County, Nev.
- ( 6) Uranium-bearing lignite beds at the Gamma property, Churchill County, Nev.
- ( 7) Virgin Valley opal district, Humboldt County, Nev.
- ( 8) East Walker uranium district, Lyon County, Nev.
- ( 9) Carnotite deposits at the Yellow Canary claims, Daggett County, Utah.
- (10) Garo carnotite deposits, Park County, Colo.
- (11) Radioactive deposits of the Harpuda Ranch, Custer County, Colo.
- (12) Report on the reconnaissance survey of the Sheeprock Mountains, Tooele County, Utah.
- (13) Uranium occurrences on the Merry Widow claim, White Signal district, Grant County, N. Mex.
- (14) Uranophane at the Silver Cliff mine, Lusk, Niobrara County, Wyo.
- (15) Supplement to Trace Elements Memorandum Report 215, "Proposed exploration for uranium in the Front Range Mineral Belt of Colorado."
- (16) Interim report on the Lost Creek schroeckingerite deposit, Sweetwater County, Wyo.
- (17) Uranium occurrence on the Autunite No. 8 claim, east side of the Thomas Range, Juab County, Utah.
- (18) The uranium-bearing deposits west of Clancey, Jefferson County, Montana.
- (19) Rare-earth and fluorite deposits of the Bear Lodge Mountains, Crook County, Wyoming.

The following papers were given by personnel of the Reconnaissance Group at the Geological Society of America meeting in April at Rapid City, Pennington County, S. Dak.:

- (1) Distribution of uranium deposits in the United States.
- (2) Pitchblende deposits in the United States.
- (3) Uranium in fluorite deposits.
- (4) Secondary uranium deposits in the United States.
- (5) Some uranium deposits in sandstone.
- (6) Uranium in black shales, lignites, and limestones in the United States.

#### AIRBORNE DETECTION

During April, the Oak Ridge National Laboratory completed the design and construction of the two additional sodium iodide crystal detectors. (See March Monthly Report, p. 15.) The two detectors with modified recording devices for correcting automatically the distance above source will be installed during the second week of May, and the balance of the month will be used to survey areas of the Shinarump and adjacent formations in Arizona and Utah that are scheduled for examination by field parties this field season.

## COLORADO PLATEAU, EXPLORATION

Exploration of the Carnotite deposits of the Colorado Plateau (fig. 1, project 25) continued in the areas listed under "Drilling continuing," in table 4 at the back of this report. Figures 3, 4, 5, 6, 7, and 8 show the areas of exploration. The estimated reserves given in table 4 include all material in layers 1 foot or more thick containing at least 0.10 percent  $U_3O_8$  or 1.00 percent  $V_2O_5$ . For completed projects the tonnages are taken from listings in final reports. Where projects are incomplete, tonnage figures are preliminary and are based largely on experience and visual estimates of the uranium and vanadium contents of the cores.

During April, a total of 28,718 feet was drilled, which is a 124 percent increase over March. This increase is due to the resumption of drilling in the Long Park area, Montrose County, Colo., and on Outlaw and Moon Mesas, Mesa County, Colo.

Field work in progress

## Uravan district, Montrose County, Colorado

Club Mesa.--Drilling continued on Club Mesa during April. Ten rigs were in operation at the start of the month, but three rigs were withdrawn to Long Park early in the month and three more rigs followed on April 15 (see below). A churn drill was added to Club Mesa on April 9. At the close of the month five rigs, including

the churn drill, were in operation. Of the 26 holes completed in April, two (Nos. 396 and 397) are in ore, and one (No. 405) is in mineralized material that is below the cut-offs for ore (fig. 4). The April drilling discovered one new deposit; the other holes in mineralized rock extended a deposit discovered earlier. The drilling was planned to test the ground in the central part of the mesa with wide-spaced holes, and to search for and define deposits in favorable ground southwest of the Club Mine. The wide-spaced drilling was completed during April. During May, drilling is planned to define further known deposits and to search for new deposits in favorable ground southwest of the Club Mine.

Long Park.--Drilling was resumed with three rigs in the vicinity of Long Park on April 2, under the contract awarded in February for drilling on both Long Park and Club Mesa. On April 15, three more rigs were added, and six rigs were operating at the close of the month. Of the 18 holes completed in April, one (no. 353) is in ore and four (nos. 331, 333, 339, and 347) are in mineralized material that is below the cut-offs for ore (fig. 5). This drilling extended two deposits discovered earlier. Most of the drilling was planned to obtain additional information on known deposits. Some of the drilling was done to appraise untested ground and to search for new deposits in favorable ground. During May four rigs will be used to define known deposits and to search for new deposits in favorable ground. The remaining two rigs will be used to appraise untested ground with wide-spaced holes.

## East Gateway district, Mesa County, Colorado

Blue Mesa.--Drilling continued on Blue Mesa during April with three rigs in operation until April 18, when one rig was moved to Moon Mesa (see below). Of the 65 holes completed on Blue Mesa in April, seven (nos. 130, 135, 159, 160, 168, 175, and 178) are in ore, and three (nos. 121, 152, and 182) are in mineralized material that is below the cut-offs for ore (fig. 6). This drilling discovered two new deposits and extended the known limits of four others. The drilling was done in favorable ground at the northern end of the mesa and was planned to define more completely the known deposits and to search for new deposits. This plan of drilling will continue during May. Some drilling also will be done along resistivity "highs" to determine the relationship of such features to ore deposits.

About 3,000 feet of drilling remains to be done to complete exploration of Blue Mesa, and this should be accomplished during May. On completion of the Blue Mesa drilling, the two rigs now on Blue Mesa will be moved to Moon Mesa.

Moon Mesa.--Drilling was resumed with two rigs on Moon Mesa on April 2, under the same contract awarded in late March for drilling on Blue and Moon Mesas. On April 18, one more rig was added, and three rigs were in operation at the close of the month. Of the 37 holes completed in April, three (nos. 16, 18, and 33) are in ore, and one (no. 15) is in mineralized material that is below the cut-offs for ore (fig. 7). This drilling discovered one new deposit and extended



the known limits of one other. The Moon Mesa drilling was planned mainly to test the ground to the southeast of the area tested previously (1950) with wide-spaced holes. Some drilling was done in known favorable ground to search for and define deposits. Drilling during May is planned mainly to appraise untested ground and to search for new deposits in favorable ground.

Outlaw Mesa.--Drilling was resumed on Outlaw Mesa on March 28 with three drill rigs, but no holes were completed during the month. (See March Monthly Report, p. 18.) Drilling continued during April, with three rigs in operation until April 2, when a fourth rig was added, followed by a fifth rig on April 10, and a sixth rig on April 12. Of the 13 holes completed in April, four (nos. 1104, 1110, 1116, and 1117) are in mineralized material that is below the cut-offs for ore (fig. 8). This drilling discovered one new deposit and extended the known limits of two others. The drilling was done in favorable ground in the central part of the mesa and was planned to define more completely the known deposits and to search for new deposits. This plan of drilling will continue during May. Some drilling may also be done along resistivity "highs" to determine the relationship of such features to ore deposits.

#### Radiometric logging of drill holes

Three gamma-ray logging units were used in the field during April, two on the Colorado Plateau and one in Florida. (See "Southeast phosphate.") Statistical data on gamma-ray logging of Colorado Plateau drill holes are given in table 4 at the back of this report.

A second gamma-ray logging unit mounted with a 2,000-foot capacity cable reel is being assembled and will be ready for field use early in May. This unit is being mounted in a used power-wagon and will displace one of the 400-foot capacity reel units until a new power-wagon is obtained.

Work was continued in compiling calibration data by which the gamma-ray logs can be interpreted in terms of equivalent uranium. It is hoped that calibration curves for the most useful time-constant settings will be completed in July.

One hole drilled through the potash-bearing formation near Carlsbad, Eddy County, N. Mex., was logged on April 7. Gamma-ray logs of this hole were made previously by the Schlumberger and Lane-Wells companies. A total of three holes through the potash-bearing beds (two holes logged in June 1950, see Monthly Report, June 1950, pp. 21-22) have been logged by Schlumberger, Lane-Wells, and Geological Survey gamma-ray logging units as part of the project of intercalibration of the gamma-ray logs made by logging units of these three organizations. The core recovered from the hole logged on April 7, is being scanned radiometrically.

Compilation and interpretation were continued of the measurements of gamma-ray absorption and scattering in continuous media (water) surrounding cylindrical cavities (drill holes). A report will be prepared on the results of this study.

### Resistivity studies

Field work was begun April 2 in the northern part of Blue Mesa, Mesa County, Colo., and resistivity measurements by horizontal profiling were made between wide-spaced drill holes in three areas to locate thicker parts of the ore-bearing sandstone for close-spaced exploratory drilling.

Profiling was done to depths ranging from 80 to 160 feet along 33 traverses in these areas. Zones of high resistivity that may be caused by changes in subsurface conditions were noted in two of the areas. In the third area a broad resistivity "high" may be caused by surface features. At least two of the anomalies will be tested by proposed drill holes.

### Field work recessed or completed

Areas in which exploration of the carnotite deposits of the Colorado Plateau was recessed or completed prior to April 1951, and for which final reports are not completed, are listed in table 4 at the back of this report.

#### Slick Rock district, San Miguel County, Colorado

Spud Patch and Legin group areas.--During April, specifications for a contract for additional diamond-drilling on the Spud Patch and Legin group areas were drawn up and sent out to prospective bidders. The bids for a minimum-maximum of 34,000 - 51,000 feet of drilling will be opened on May 21. Drilling will begin on or about July 2.

Field work planned

Uravan district, Montrose County, Colorado

Atkinson and Spring Creek Mesas.--During April, specifications for two drilling contracts, for Atkinson and Spring Creek Mesas, were drawn up and sent out to prospective bidders. The bids for the Atkinson Mesa contract for a minimum-maximum of 100,000 - 150,000 feet of drilling will be opened on May 16, and bids for the Spring Creek Mesa contract for a minimum-maximum of 60,000 - 90,000 feet of drilling will be opened on May 18. Drilling on both contracts will begin on or about July 2.

Radiometric scanning of core

The data on radiometric scanning of core are given in table 4 at the back of this report. As mentioned on page 20 of the March Monthly Report, a cut-off of 0.035 percent equivalent  $U_3O_8$  instead of 0.005 percent equivalent  $U_3O_8$  is being used for the selection of samples for assay, and only the core from holes that can not be probed by a gamma-ray field counter is being scanned. This change was effected on March 19, and the statistics for the March 20 - 31 period are included with the April data.

Claim inventory and appraisal

Claim inventory work continued during April. Attention was directed to compiling information needed to obtain exploration

agreements in areas to be drilled in the near future and needed to establish the location of claims in the general area shown on the quadrangle maps that are being prepared for publication. Descriptions of about 220 claim locations or claim changes were obtained from county records, and the locations of about 80 claims were determined by field work.

Information to claims owners and lessees

The number of requests received from claim owners, lessees, or from the Atomic Energy Commission, for information on Geological Survey drilling on private ground or on ground controlled by the Atomic Energy Commission, and the number of replies transmitted, are summarized below:

	<u>March 1951</u>	<u>April 1951</u>	<u>Total to date</u>
Number of requests	6	4	48
Number of replies	5	5	48

COLORADO PLATEAU, GEOLOGIC STUDIES

Field work in progress

Ground-water studies

Studies of the recent and past ground-water conditions of the carnotite-bearing beds were continued during April.

Water levels were measured again in the 18 observation diamond-drill holes on Calamity Mesa, Mesa County, Colo., as in March. Hydrographs indicating the seasonal water-level fluctuations are being utilized in conjunction with the permeability studies.

The permeability study of the Salt Wash ore-bearing strata on Calamity Mesa is continuing. The results of this study can be correlated with the detailed geologic logs. A relationship between the gamma-ray logs and the permeability of rocks can likewise be demonstrated, and this will aid in the interpretation of the gamma-ray logs.

Detailed geologic field mapping of the Salt Wash ore sand and overlying Brushy Basin conglomerate was continued on Atkinson Mesa, Mesa County, Colo. A relationship between the distribution of these conglomerates and ore deposits in the underlying Salt Wash ore strata is suggested and will be tested by drilling.

#### Field work recessed

#### Stratigraphic studies

Compilation of field data of the regional stratigraphic, lithofacies, and sedimentary structural studies of the Morrison formation was essentially completed. A formal preliminary report on the results is being prepared.

The sedimentology laboratory continued analysis of samples from the Morrison formation to provide data for a report on the sedimentology of the entire Morrison formation.

L. C. Craig and C. N. Holmes of the Geological Survey presented a paper on the Jurassic stratigraphy of Utah and Colorado at the meetings of the New Mexico Geological Society on April 6 at Albuquerque, N. Mex.

C. N. Holmes presented a paper on the Jurassic stratigraphy of Colorado at the meetings of the American Association of Petroleum Geologists on April 26 in St. Louis, Mo.

#### Regional mapping

Southwestern Colorado.--On April 30, the status of various phases of completion of the geologic maps of the 18 quadrangles covering the principal carnotite-producing area of southwestern Colorado was as follows:

	<u>Percent completed</u>
Compilation on topographic base maps	
from air photos . . . . .	65
Preparation of structural contour maps . . . . .	50
Preparation of structure sections . . . . .	50
Writing of texts to accompany geologic quadrangle maps . . . . .	5

The compilation of the geologic and structural contour maps of the Calamity Mesa, Red Canyon, and Atkinson Creek quadrangles, Mesa and Montrose Counties, is being expedited for use in planning drilling programs in the areas southeast of Outlaw Mesa, Mesa County, Colo.

Northeastern Arizona.--During April, compilation by Mahan plotter of the preliminary planimetric-geologic map and checking and editing

this compilation were continued. This work will continue concurrently with the field work during May and June, and should be about 45 percent complete by July 1.

The percentage of completion to date for the whole project (all four 15-minute quadrangles, see March Monthly Report, p. 24) is noted below by phases.

	<u>Percent completed</u>
Geologic mapping . . . . .	80
1949 mapping transferred to new photos . . .	80
Preliminary map compilation . . . . .	49
Checking and editing compilation . . . . .	30

#### Geochemical prospecting

Work was continued during April on the compilation of field data obtained by the Geochemical Prospecting party during the 1950 field season for use in the preparation of reports.

#### NORTHWEST PHOSPHATE

Field work of the Northwest phosphate projects (fig. 1, projects 30, 31 and 32) has been recessed until the 1951 field season. (See Monthly Report, December 1950, p. 29.)

Compilation and preparation of geologic maps and accompanying reports for open-file release on the Willis and Lyon quadrangles, Beaverhead County, Mont., were continued in April. Also continued were (1) compilation of geologic mapping in the Bear River region, Idaho; (2) statistical analyses of chemical data; (3) preparation of



stratigraphic and analytical data for publication; and (4) preparation of reports.

The report on phosphate rock mined in Montana and treated in Canada will be forwarded to the Atomic Energy Commission in May.

A mining company in Idaho reportedly is seriously considering erecting a sulfuric acid plant in Idaho and possibly entering into the phosphate fertilizer business. Their entry into this field would increase significantly the acid production and the phosphate consumption in the western field.

#### SOUTHEAST PHOSPHATE

In April, investigation of the Florida phosphate deposits consisted principally in the following: (1) study of the relationship of the phosphate in the Hawthorn and Bone Valley formations; (2) sampling T.V.A. drill holes in the hard-rock phosphate district near Dunnellon, Citrus County; (3) sampling and gamma-ray logging of current company prospect holes; (4) sampling faces of active phosphate mines; (5) preparing contour isopach, and assay maps of the matrix and overburden, and contour maps of the basement; and (6) preparation of reports. Tabular data pertaining to the sampling and gamma-ray logging activities of the project are given in table 5.

The study was continued of the character, grade, and amount of phosphate in the Hawthorn formation, and the relationship of the phosphate to the origin and accumulation of phosphate deposits in the overlying Bone Valley formation.

Tracts of land on which records have been furnished by each company are listed in the illustrations (fig. 9, sheet B). Progress in compiling company data and preparing isopach and contour maps also is given (fig. 9, sheets C, D, E, F, and G).

As a result of a conference during April with representatives of the Virginia-Carolina Chemical Corp., it was agreed that that company will give the Geological Survey all of the data the Survey requires. In addition, a drilling program of 33 holes was planned for land owned by Virginia-Carolina Chemical Corp., in areas that will be mined in the next two years. The holes will be drilled starting about May 2 by hand auger (two holes per 40 acres) at Company expense, and it is anticipated that the drilling will be completed in about one month. All holes drilled will be logged by the gamma-ray logging unit. As soon as the drilling is completed, the Geological Survey will begin to collect the information on prospecting from the files of Virginia-Carolina Chemical Corp.

In April, information was received on recent drilling by International Minerals and Chemical Corp., and additional information on drilling is expected in May.

Reports are being prepared on the following: (1) recommendations for a new drilling program on company-owned land; (2) uranium and phosphate in the western part of the Bonny Lake mine; (3) uranium and phosphate in the eastern part of the Bonny Lake mine (a detailed report); (4) uranium and phosphate in the Hamilton tract, Polk County; (5) study of gamma-ray logs of prospect holes in the Florida land-pebble

phosphate district; (6) distribution of uranium in the pebble and concentrate fractions of the matrix in the land-pebble phosphate area; and (7) uraniferous phosphate rock near Charleston, Charleston County, S. C.

Reports (1) and (2) above will be forwarded to the Atomic Energy Commission early in May.

#### MONTANA, WYOMING, NORTH DAKOTA, AND SOUTH DAKOTA LIGNITES

Field study of lignites in Montana, Wyoming, North Dakota, and South Dakota (fig. 1, project 45) will be resumed probably early in June. In April, work was continued on evaluating data accumulated during the 1950 field season and on preparing reports.

#### MILL AND RAW-MATERIAL SAMPLING

Compilation of data was continued for interim reports on the results of spectrographic analyses of samples for many minor elements.

#### BERYLLIUM-BEARING ROCKS

All field work related to the investigation of beryllium-bearing rocks and supported by the Atomic Energy Commission was discontinued on June 30, 1950.

Estimated reserves for the Texas-New Mexico beryllium studies are as follows:

<u>BeO</u> <u>(tons)</u>	<u>BeO</u> <u>(percent)</u>
28 (indicated)	0.01
142 (inferred)	0.01
X00,000 (inferred)	0.005 - 0.01

Laboratory studies and compilation of data were continued for the preparation of reports on the following sub-projects.

Beryllium investigations in pegmatites:

- Black Hills area, Custer County, S. Dak.  
(fig. 1, project 60)
- Newry-Rumford area, Oxford County, Maine  
(fig. 1, project 61)
- Crystal Mountain district, Larimer County, Colo.  
(fig. 1, project 62)
- Raymond district, Rockingham County, N. H.  
(fig. 1, project 63)
- Pala, Rincon, and Mesa Grande districts,  
San Diego County, Calif.  
(fig. 1, project 64)
- Henderson, Jackson, and Transylvania Counties, N. C.  
(fig. 1, project 65)
- Mount Antero district, Park County, Colo.  
(fig. 1, project 66)
- Quartz Creek district, Gunnison County, Colo.  
(fig. 1, project 67)
- Middletown district, Middlesex County, Conn.  
(fig. 1, project 68)
- Nevada and Arizona  
(fig. 1, project 69)
- Harding pegmatite district, Taos County, N. Mex.  
(fig. 1, project 70)
- King's Mountain-Shelby district, Cleveland County, N. C.  
(fig. 1, project 72)

Beryllium studies not related to pegmatites:

- New Mexico and Texas  
(fig. 1, project 70)
- Colorado and Tri-State district  
(fig. 1, project 71)
- Nevada and California  
(fig. 1, project 73)

## LABORATORY INVESTIGATIONS

Research

Detailed reports of progress in laboratory research projects are given in quarterly and annual reports. A report on the progress of research projects for the first quarter of calendar year 1951 is in preparation. The table summarizing research data will be omitted from this and succeeding monthly reports as the research projects are listed below by title.

## Chemical

Chemical research projects in progress are as follows:

- (1) Determination of micro amounts of lead in minerals, rocks, and ores as an aid in determining geologic age.
- (2) Development of a short procedure for estimation of oil content of shale and phosphate rock.
- (3) Study of immersion liquids of high refractive index and liquids of high specific gravity. (This is also a mineralogic study.)
- (4) Studies of current methods for the determination of many different elements and compounds in radioactive rocks, minerals, and ores.
- (5) Statistical interpretation of chemical and radiometric analyses.

## Mineralogic

Research studies in progress are as follows:

- (1) Carnotite project.
  - a. Lead and uranium isotope studies.
  - b. Minerals of the carnotite deposits.
  - c. Study of the clays associated with the ore deposits.
- (2) Phosphate project.
  - a. Mineralogy and petrology of the Florida pebble phosphates.
  - b. Mineralogy and petrology of the north-west phosphates.
- (3) Properties of uranium minerals.
- (4) Colorado Front Range project.
  - a. Mineralogy and petrology of veins and dikes in the Central City district, Gilpin County, Colo.
  - b. Mineralogy and petrology of fluorite deposits at Jamestown, Boulder County, Colo.
- (5) Mineralogy and petrology of lignites and shales.

## Spectrographic

Research projects in progress are as follows:

- (1) Detection of thorium in amounts as small as 0.001 percent.
- (2) Detection of lead in amounts of less than one part per million to aid in geologic-age studies.
- (3) Continuing studies in methods of analysis.

### Radiometric

Radon determinations were made on 14 water samples, and beta-gamma counts were made on nine samples.

Research projects in progress are as follows:

- (1) Establishing a control chart for the performance of the Tracerlab automatic scaler.
- (2) Continuing studies to improve the counting methods.
- (3) Development of a rapid radiochemical method for the determination of uranium and thorium in monazite.

### Reports

Preparation was continued of the reports on the results of laboratory investigations listed in the March Monthly Report, pages 31 and 32. Reports on (1) a fluorimeter for solutions, and (2) hydrothermal uranothorite in fluorite breccias from the Blue Jay mine, Jamestown, Boulder County, Colo., were forwarded to the Atomic Energy Commission in April. (See "Reports forwarded.")

### Analytical work

Routine analytical work completed during April is shown in table 6 at the back of this report.

### Public samples

A total of 80 samples was received by the Geological Survey from the public during April, including 20 taxpayer samples forwarded by the Atomic Energy Commission and 60 samples received directly.

Inventory of equipment

In April, the following laboratory plant and equipment were received by the Geological Survey from the working fund advances from the Atomic Energy Commission.



REPORT OF LABORATORY PLANT AND EQUIPMENT  
 PURCHASED FROM WORKING FUND ADVANCES FROM  
 U. S. ATOMIC ENERGY COMMISSION

April 1 - 30, 1951

<u>Number and Description of Units Purchased</u>	<u>Purchase Price or Constructed Cost</u>	<u>Location</u>
1 Projector combination	\$205.00	NGF
1 Hotpack Model #305 Constant-temp. bath	690.00	NGF
3 Spencer #P41AC polarizing microscopes with attachments	1,826.25	NGF
1 Pneumatic current controller CONO EB-51 complete	257.50	NGF
k Air compressor, Westinghouse Model 1BYCH-13 with attachments	257.38	NGF

## REPORTS FORWARDED

Technical and other reports and memoranda prepared by the Trace Elements Office for transmittal to the Atomic Energy Commission include: (1) Trace Elements Investigations reports on specific areas, types of material, or laboratory and field techniques, (2) Trace Elements Memorandum reports on results of field projects, and on miscellaneous subjects, and (3) financial and administrative reports.

The reports listed below were transmitted to the Atomic Energy Commission in April on the dates given after the report titles.

Trace Elements Investigations Reports:

Trace Elements Investigations Report 144,  
"Hydrothermal uranothorite in fluorite breccias  
from the Blue Jay mine, Jamestown, Boulder  
County, Colorado," by G. Phair and K. Onoda;  
April 11, 1951.

Trace Elements Investigations Report 150,  
"Domestic resources of uranium and thorium -  
A summary based on investigations by the U. S.  
Geological Survey," by V. E. McKelvey, L. R. Page,  
R. P. Fischer, and A. P. Butler, Jr.; April 21,  
1951 (Series A, draft copy).

Trace Elements Memorandum Reports:

Trace Elements Memorandum Report 187,  
"Preliminary reserve statement 11, Reserve Block A,  
Long Park vicinity, Montrose County, Colorado,"  
by W. L. Newman; April 16, 1951.

Trace Elements Memorandum Report 188,  
"Preliminary reserve statement 12, Reserve Block B,  
Long Park vicinity, Montrose County, Colorado,"  
by H. G. Stephens; April 5, 1951.

Trace Elements Memorandum Reports (continued):

Trace Elements Memorandum Report 189,  
"Preliminary reserve statement 13, Reserve Blocks  
D, E, F, and G, Outlaw Mesa, Mesa County, Colorado."  
by G. K. Brasher and D. A. Jobin; April 20, 1951.

Trace Elements Memorandum Report 202,  
"Results of diamond-drill exploration and plans for  
additional drilling on Outlaw Mesa, Mesa County,  
Colorado," by G. K. Brasher and D. A. Jobin;  
April 18, 1951.

Trace Elements Memorandum Report 203,  
"Recommendations for a shift in emphasis of diamond-  
drilling on the Colorado Plateau," by R. P. Fischer;  
April 30, 1951.

Trace Elements Memorandum Report 248,  
"Monazite in the southeastern states," by  
J. B. Mertie, Jr.; April 24, 1951.

Trace Elements Memorandum Report 252,  
"A fluorimeter for solutions," by M. H. Fletcher  
and E. R. Warner; April 24, 1951.

Financial report:

"Trace Elements Program work plan and operating  
budget, fiscal year 1952 - April 4, 1951;"  
April 6, 1951.

## FINANCIAL STATEMENT

Total expenditures.--The total expenditures for the month of April and for the period July 1, 1950, through April 30, 1951, under appropriation 1415908.001, Working Fund advances, Geological Survey, 1951, are as follows:

	<u>April 1 - 30</u>	<u>July 1, 1950 - April 30, 1951</u>
Operations	\$185,292.64	\$1,518,485.89
Plant and equipment	3,182.26	14,360.17

## INTRODUCTION TO TABLES

Caution.--The data contained in the following tables should be interpreted only with regard to the related remarks in the text of the report, and the qualifying footnotes as given in the tables.

Remarks.--The cost figures shown for each project in the following monthly tables represent the direct Branch operating cost, as explained in the Monthly Report, January 1950, page 61. Division and Bureau services for the entire Trace Elements program are shown in a single amount given below:

	<u>April 1 - 30</u>	<u>July 1, 1950 - April 30, 1951</u>
Division and Bureau costs	\$35,419.00	\$422,234.00

The outstanding obligations as of April 30, 1951, about which detailed information to permit assignment to particular projects is not yet available, are \$9,733.

The cost figures shown on table 2 for Laboratory "Space and equipment" represent the direct obligations recorded during the periods indicated, whereas the cost figures given above for "Plant and equipment" in the "Financial statement" are the actual expenditures made for laboratory plant and equipment during the periods indicated. The laboratory plant and equipment received each month are shown on the "Inventory of equipment."

The table summarizing the data on mapping, sampling, and drilling for the beryllium projects is not included in this report and will not be included in succeeding monthly reports until such time as field study of beryllium-bearing rocks is resumed.

Table 1.--Summary of domestic reconnaissance investigations, April 1951

<u>State</u>	<u>Project</u>	<u>Project number, fig. 1</u>	<u>Area, claim, or mine</u>	<u>Location</u>	<u>Material</u>	<u>Inferred reserves, ore rock, (short tons)</u>	<u>Radioactivity (percent equivalent uranium)</u>	<u>Remarks</u>
Arizona	Ariz., N. Mex., S. Calif.	16	Grant property	Apache County	Petrified and carbonized tree trunks with carnotite	<100	0.01-0.05 (percent uranium)	In Chinle formation.
			Hosteen Nez Mining Co. claim 1	Coconino County	Carnotite coatings and concretions with manganese oxides	650	0.01-0.05	same
			Hosteen Nez Mining Co. claim 2	same	Petrified wood and manganese nodules as float	500 25	0.01-0.05 0.10-0.30	same
			White Mesa Copper district	same	Navajo sandstone with malachite	0	Negligible	Several dumps tested.
			Orphan claim	same	Torbernite in Coconino sandstone	100 Very large	0.5 0.01-0.04	See text.
			Vanadinite claims	Gila County	Carnotite reported none found	0	Negligible	Dumps, adits and pits tested.
			D.O. Roller claim	Maricopa County	Fractured iron-stained basic dike	0	Weak	-
			Monte Cristo mine	same	Silver ore	0	Negligible	Heads, concentrates, raw ore and dump tested.
			Lucky Strike claim	same	Pyrite, chalcopyrite, wulfenite, galena, etc.	0	Negligible	Ore possibly "planted" on dump.
			Midnight Owl claim	same	Radioactive material in stockpile of columbite	--	--	Pegmatites.

Table 1.--Summary of domestic reconnaissance investigations, April 1951 (continued)

<u>State</u>	<u>Project</u>	<u>Project number, fig. 1</u>	<u>Area, claim, or mine</u>	<u>Location</u>	<u>Material</u>	<u>Inferred reserves, ore rock (short tons)</u>	<u>Radioactivity (percent equivalent uranium)</u>	<u>Remarks</u>
Arizona	Ariz., N.Mex., S.Calif.	16	Unnamed <sup>a/</sup>	Navajo County	Weak radioactivity in carbonaceous shale	675	Low grade	In Chinle formation.
			Frank DeBell Tract No. 1	same	Uranium in carbon-bearing shale and sandstone lens	2000	0.01-0.03 (percent uranium)	A small amount of higher grade material present.
			Frank DeBell Tract No. 2	same	Carnotite in petrified tree trunks	<100	0.01-0.02	Reserves estimated.
			D.O. Roller property	same	Radioactive material in jasper lens	500	0.01-0.05 (percent uranium)	In Chinle formation.
			Roble Spring deposit	Pima County	Radioactive carbonaceous shale seam in limestone	15	0.03-0.05	-
			Kids Sample claim	same	Samaraskite in pegmatite	-	Negligible	-
			Woolley, Shorty & Honey Bee claims	Pinal County	Low radioactivity in silicified iron-stained shear zone	Very large	0.01	Width of shear zones range up to 100 feet.
			Kitten No. 1 claim	Yavapai County	Autunite, pyrite and fluorite disseminated in altered granite	<5	0.05-0.2	Zone of radioactivity, about 15 inches wide, is traceable for 15-20 feet.
Golden Fleece shaft; Golden Fleece cross-cut; Hidden Treasure cross-cut	same	Unreported	0	Negligible	Dumps and 400 feet of workings tested.			

<sup>a/</sup> Found by airborne radiometric traverse.

Table 1.—Summary of domestic reconnaissance investigations, April 1951 (continued)

State	Project	Project number, fig. 1	Area, claim, or mine	Location	Material	Inferred reserves, ore rock, (short tons)	Radioactivity (percent equivalent uranium)	Remarks
Colorado	Front Range	7	Doctor tunnel	Clear Creek County	Pyrite, chalcopyrite sphalerite and galena	-	-	No abnormal radioactivity.
			Placer "clean up"	Gilpin County	Black sand containing magnetite, garnet and possibly monazite	-	0.003	Weak radioactivity.
			Sec. 1, T. 3 S., same R. 73 W.	same	Bostonite dike with fluorite and minor sulfides	-	0.005	Low radioactivity.
			Copper King shaft, Blackhawk claims	Larimer County	Pitchblende, pyrite and sphalerite	200	1.0 (percent uranium)	See text.
			Caribou mine	Boulder County	Galena, sphalerite and pyrite	See Monthly Report, January 1951, pp. 11 and 44		New development work on the 920- and 1040-foot levels has exposed no abnormally radioactive rocks.
	Taxpayer unit	2A	Leyden prospect	Jefferson County	Carnotite (?) in Laramie sandstone, and abnormally radioactive silicified coal	-	-	Recent developments inspected and samples taken. Detailed mapping contemplated.
New Mexico	White Signal district	9	Areas surrounding the White Signal district	Grant County	Copper-silver-uranium-bearing material	a/	-	About 50 pits and abandoned mine workings were traversed radiometrically.

a/ Reserves included in New Mexico, Arizona, and southern California project figures, table 3.



Table 2.--Summary of personnel and estimated costs by projects, April 1951

Project	Number of personnel, total		Estimated project cost, in dollars		
	Last month	This month	Last month	This month	Total
Reconnaissance, domestic	26	33	13,243	17,078	135,896
Reconnaissance, Alaska	5	5	1,466	1,800	17,450
Airborne detection	1	1	1,122	1,094	19,725
Colorado Plateau, exploration	62	71	87,756	375,192	1,243,023
Colorado Plateau, geologic studies	12	11	6,698	5,572	70,282
Northwest phosphate	19	19	9,059	2,810	22,077
Southeast phosphate	14	13	6,197	6,830	57,172
Montana, Wyoming, North Dakota and South Dakota lignites	3	3	1,087	1,312	15,921
Mill and raw-material sampling	1.5	1.5	479	486	4,636
Beryllium-bearing rocks	4	4	-7,592 <sup>a/</sup>	2,868	15,535
Laboratory investigations	105	103	37,337	48,878	404,039
Space and equipment			7,748	3,810	41,458

\* See "Introduction to tables".

<sup>a/</sup> Adjustment made by transferring charges to Geological Survey appropriations.

Table 3.--Summary of reconnaissance data, April 1951

Project or activity RECONNAISSANCE INVESTIGATIONS, DOMESTIC	Area mapped, square miles		Radiometric test- ing, car traverse miles (M) or out- crop width ft. (F)		Number of localities sampled		Number of samples taken		Estimated reserves, inferred un- less otherwise designated, in short tons		
	This month	Total	This month	Total	This month	Total	This month	Total	Last month	This month	Total
Active: <u>a/</u> New Mexico, Arizona and southern California	0.05	2.52	350(M) 31,000(F)	707(M) 31,000(F)	13	29	27	69	70,000	4,625	544,450 2,900 <u>b/</u> 2,415 <u>m/</u>
Colorado Front Range	0	26.25	750(F)	170.5(M) 121,618(F)	3	30	6	242	0	200	8,180 503 <u>b/</u>
White Signal district, New Mexico <u>h/</u>	0	0	2,500(F)	2,500(F)	2	2	8	8	0	0	0
Recessed:											
Fluorite	0	13.5	0	283(M) 54,270(F)	0	108	0	168	0	0	1,126,100
Marysvale autunite	0	0.73	0	395(M) 42,000(F)	0	46	0	165	0	0	16,000
Utah, Nevada and northern California	0	0.46	0	250(M) 30,800(F)	0	34	0	181	0	0	286,955 <u>c/</u> 7,000 <u>b/</u>
Washington-Oregon-Idaho- Montana	0	1.5	0	1,262(M) 23,240(F)	0	23	0	66	0	0	84,670
Reconnaissance of sedimentary rocks in Colorado	0	1.8	0	1,472(M) 112,500(F)	0	38	0	154	0	0	963,705
Reconnaissance of sedimentary rocks in Wyoming and Utah	0	0.7	0	1,333(M) 131,500(F)	0	51	0	147	0	0	228,300
Taxpayer property studies	0	1,109	0	6,288(M) 114,050(F)	0	57	0	477	0	0	272,300
Other Geological Survey Groups	0	2.1	0	45(M) 25,000(F)	0	5	0	47	0	0	0
Red Desert area, Wyoming <u>k/</u>	0	58	0	365(F) <u>u/</u>	0	1	0	208	0	255,000,000 <u>d/</u>	11,700 <u>e/</u> 255,000,000 <u>d/</u>

Table 3.--Summary of reconnaissance data (continued) April 1951

Project or activity RECONNAISSANCE INVESTIGATIONS DOMESTIC	Area mapped, square miles		Radiometric test- ing, car traverse miles (M) or out- crop width ft. (F)		Number of localities sampled		Number of samples taken		Estimated reserves, inferred un- less otherwise designated, in short tons		
	This month	Total	This month	Total	This month	Total	This month	Total	Last month	This month	Total
Completed: North Dakota lignite	0	3			0	98	0	252	0	0	23,000,000 f/ 1,000 f/ 150,000,000 f/ 44,000,000 f/
Northeastern states	0	0			0	75	0	166			
Majuba Hill, Nevada	0	3			0	1	0	30			
a/	Detailed information on domestic reconnaissance projects active in April is given in table 1.										
b/	Indicated reserves.										
c/	Revised from March Monthly Report.										
d/	Uraniferous lignite, 0.005 percent uranium.										
e/	Schroeking-erite-bearing ore, 0.1 percent uranium, revision of previous estimate.										
f/	See "North Dakota lignite," Monthly Report, June 1949, p. 7.										
g/	See "North Dakota lignite," Monthly Report, April 1950, p. 15.										
h/	Data for previous work in White Signal district are included in figures for New Mexico, Arizona, and southern California project.										
k/	Exploration began in this area in October, 1950, and recessed December, 1950.										
m/	Measured reserves.										
n/	Footage of core scanned.										

Table 4.-- Summary of exploration, Colorado Plateau project, April 1951

Project or activity	Drilling, radiometric scanning, and sampling					Indicated and inferred reserves found by drilling (short tons)			Remarks	
	Holes			Feet or samples (s)			Last month	This month		Total
	Last month	This month	Total	Last month	This month	Total				
EXPLORATION										
Drilling concluded, reports finished, combined totals			2,052			137,012			103,315	
Drilling recessed or concluded										
Carrizo Mtns., Apache Co., Ariz.			24			3,032			100	
Spud Patch area, San Miguel Co., Colo.			136			16,936			0	
Upper group area, San Miguel Co., Colo.			186			14,577			8,500	
Jo Dandy area, Montrose Co., Colo.			46			8,947			50,000	
Legin group area, San Miguel Co., Colo.			333			40,039			39,100	
Subtotal			2,777			220,543			201,015	
Drilling continuing										
Club Mesa, Montrose Co., Colo.	30	26	411	11,335	10,502	95,150	500	2,000	143,000	
Long Park, Montrose Co., Colo.	0	18	348	0	3,634	103,806	0	0	130,000	
Blue Mesa, Mesa Co., Colo.	20	65	184	1,504	5,466	21,583	300	1,300	1,700	
Moon Mesa, Mesa Co., Colo.	0	37	51	0	4,659	6,085	0	600	700	
Outlaw Mesa, Mesa Co., Colo.	0	13	1,116	0	4,457	178,703	0	0	200,000	
Subtotal	50	159	2,110	12,839	28,718	405,327	800	3,900	475,400	
Total drilling	50	159	4,887	12,839	28,718	625,870	800	3,900	676,415	
Gamma-ray hole scanning	63	No data	No data	8,138	No data	No data				
Radiometric core scanning	44	26	4,701	4,913 3s	824 27s	325,663 7,887s				Revised to show <u>core feet scanned</u> rather than <u>hole feet</u> , as shown prior to April.

Table 5.—Summary of mapping, sampling, and drilling by projects, April 1951

Project or activity	Area mapped or processed, square miles		Number of localities sampled		Number of samples taken		Drilling						Estimated reserves, inferred unless otherwise designated, in short tons		
							Number of holes			Feet					
	This month	Total	This month	Total	This month	Total	Last month	This month	Total	Last month	This month	Total	Last month	This month	Total
<u>Northwest phosphate</u>															
Whole project	0	399 <u>d/</u>	0	22	0	386	-	-	-	-	-	-	-	-	-
Bear River region, Idaho, Wyoming, Utah	0	172	0	17	0	315	-	-	-	-	-	-	-	-	-
Lyon quadrangle, Mont.	0	200 <u>d/</u>	0	0	0	0	-	-	-	-	-	-	-	-	-
Willis quadrangle, Mont.	0	20	0	0	0	0	-	-	-	-	-	-	-	-	-
Other areas, Mont.	0	7 <u>d/</u>	0	5	0	71	-	-	-	-	-	-	-	-	-
<u>Southeast Phosphate</u>															
Whole project	0	390.25	2	461	1748	80692	55	48	397	3354	3307	23,054	0	0	45,000 to 120,000 <u>a/</u> (leached zone) 1,662,667,600 <u>c/</u>
TVA drilling <u>b/</u>	-	-	-	-	0	1159	55	48	252	3354	3307	16,987	-	-	-
AEC drilling	-	-	-	-	0	5146	0	0	145	0	0	6,067	-	-	-
Mine sampling	-	-	2	461	50	3600	-	-	-	-	-	-	-	-	-
Samples from company drilling	-	-	-	-	1398	53250	-	-	-	-	-	-	-	-	-
Gamma-ray well logging	-	-	-	-	-	-	56	57	601	1704	1866	19,164	-	-	-
Miscellaneous	0	388.5	0	72	300	17537	-	-	-	-	-	-	-	-	-
<u>Montana, Wyoming, North Dakota and South Dakota lignites</u>															
	0	*	0	*	0	*	-	-	-	-	-	-	-	-	-

- Not applicable

\* Unreported

a/ Tons of metallic uranium, see Monthly Report, June 1950, p. 31.b/ Drilling being carried out in fiscal year 1951.c/ Tons phosphate, see Trace Elements Investigations Rept. 141.d/ Revised from March Monthly Report.

Table 6.--Summary of laboratory analytical work, April 1951.

Project	Analytical work										Mineralogic work, number of reports completed <sup>b/</sup>	Number of samples received, total	Number of samples on hand to be analyzed, total		
	Uranium		Thorium <sup>a/</sup>		Other elements, number of determinations		Radiometric, number of samples measured		Spectrographic, number of samples analyzed				This month	Last month	This month
	Last month	This month	Last month	This month	Last month	This month	Last month	This month	Last month	This month					
TOTAL ANALYTICAL WORK	1774	1941			1413	541	3648	4685	423	444			1205	9572	6502
<u>Colorado Plateau, carnotite ore</u>	153	27			356	54	194	27					3	24	0
<u>Northwest phosphate</u>	230	241			477	327	482	2570					33	106	26
<u>Southeast phosphate</u>	980	1382			62	0	2701 <sup>c/</sup>	1580					749	9400	6429
<u>Lignites</u>	0	21			0	9	0	0					0	0	0
<u>Black shales</u>	0	20			0	0	0	267							
Miscellaneous samples includes samples from reconnaissance examinations	411	250			518	151	271	241					420	42	47

<sup>a/</sup> Included in number of determinations of other elements.<sup>b/</sup> Unreported<sup>c/</sup> 1,094 of these samples were entered erroneously under "Miscellaneous" in the March Monthly Report.

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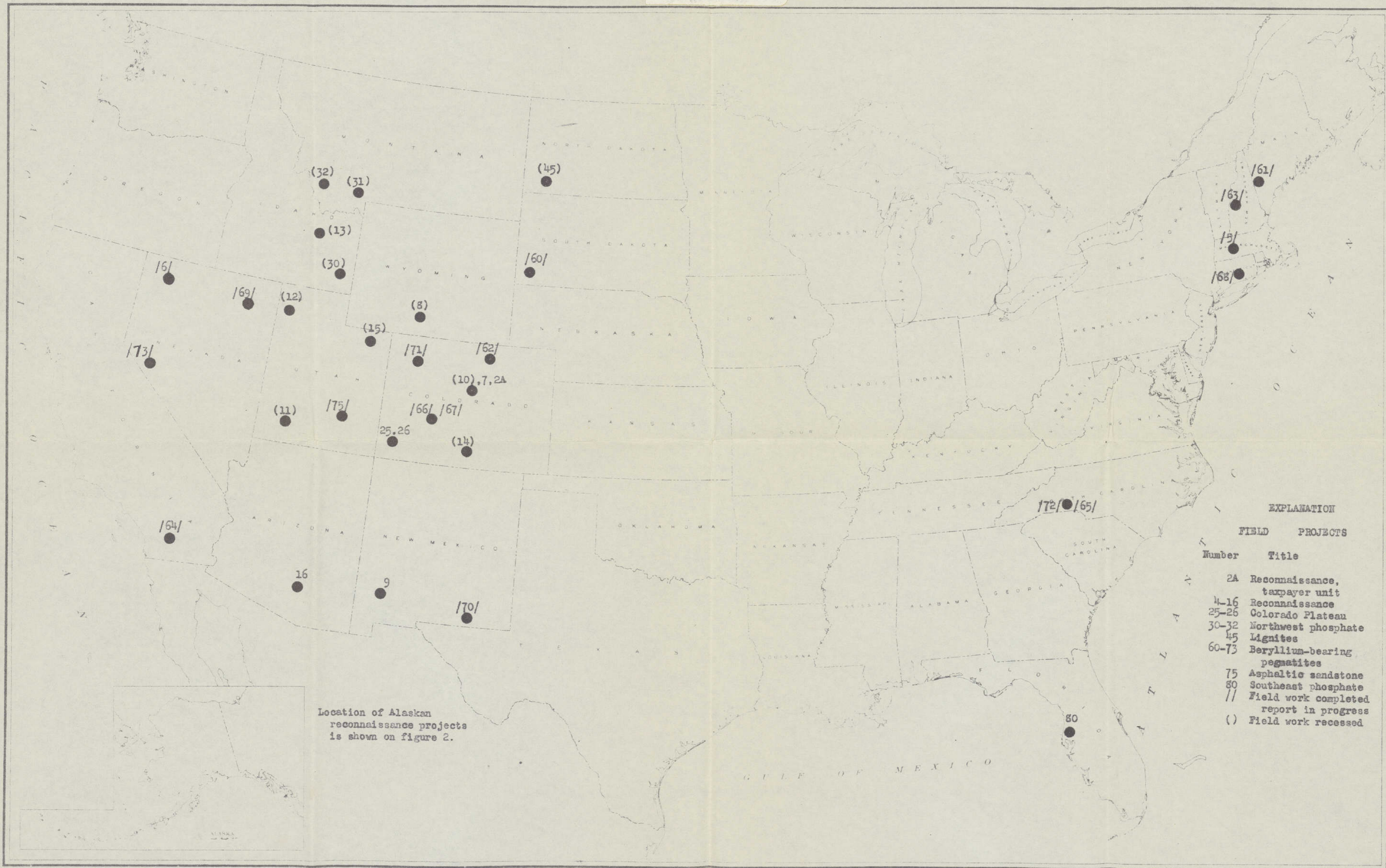


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Location of Alaskan reconnaissance projects is shown on figure 2.

FIELD PROJECTS  
Trace Elements Office  
April 1951

Base compiled by U. S. Geological Survey  
Projection and gage line by the U. S. Coast and Geodetic Survey  
State road and township  
North American Datum



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fig. 2

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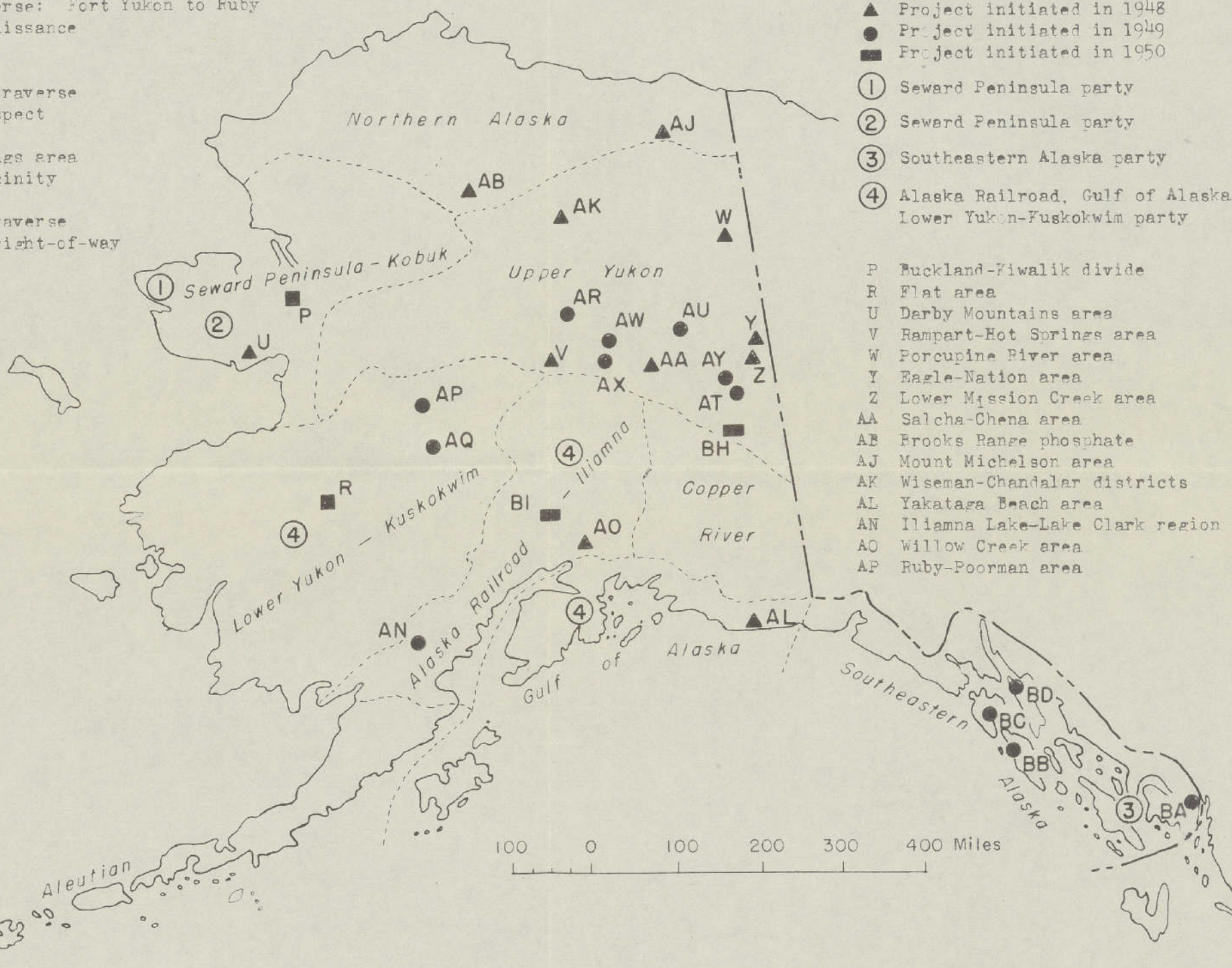


EXPLANATION (continued)

- AQ Nixon Fork area
- AR Yukon River traverse: Fort Yukon to Ruby
- AT Fortymile reconnaissance
- AU Circle district
- AW Goodluck Creek
- AX Elliott Highway traverse
- AY Copper Creek prospect
- BA Hyder district
- BB Goddard Hot Springs area
- BC Chichagof and vicinity
- BD Funter Bay area
- BH Tok-Eagle Road traverse
- BI Alaska Railroad right-of-way traverse

EXPLANATION

- Project initiated in 1947
- ▲ Project initiated in 1948
- Project initiated in 1949
- Project initiated in 1950
- ① Seward Peninsula party
- ② Seward Peninsula party
- ③ Southeastern Alaska party
- ④ Alaska Railroad, Gulf of Alaska, Lower Yukon-Kuskokwim party
- P Buckland-Kiwalik divide
- R Flat area
- U Darby Mountains area
- V Rampart-Hot Springs area
- W Porcupine River area
- Y Eagle-Nation area
- Z Lower Mission Creek area
- AA Salcha-Chena area
- AB Brooks Range phosphate
- AJ Mount Michelson area
- AK Wiseman-Chandalar districts
- AL Yakataga Beach area
- AN Iliamna Lake-Lake Clark region
- AO Willow Creek area
- AP Ruby-Poorman area



INDEX MAP OF ALASKA SHOWING LOCATION OF ALASKAN TRACE ELEMENTS PROJECTS  
IN PROGRESS DURING APRIL 1951



fig. 2

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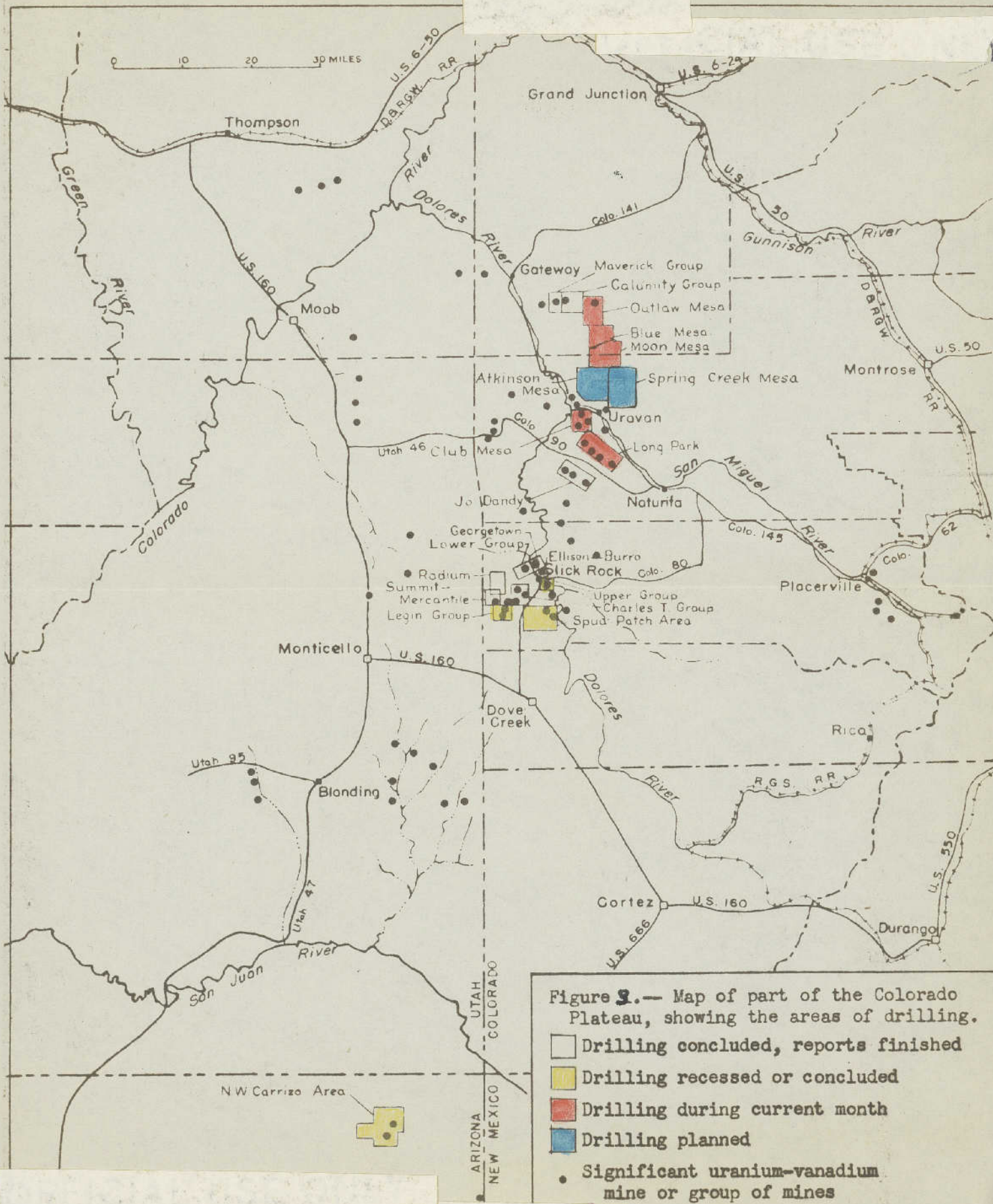




Fig. 3

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Approximate base of the  
ore-bearing sandstone

RAVEN MINE

SHAMROCK MINE

CLUB MINE

TRAMP MINE

Contour interval 100 feet  
Datum is mean sea level

CLUB MESA Montrose County, Colorado

CLAIM INDEX

1 Lucky Strike	16 Rainy Day	31 R. A. M.	46 Big Shot
2 Mary	17 B & M	32 Beta Wonder	47
3 Virginia	18 Commodore	33 Beta	48 Tramp No. 1
4 Hunter	19 Yellow Jacket	34 Surprise	49 Tramp No. 2
5 Irene	20 Kaiser	35 Surprise No. 1	50 Tramp No. 3
6 Shamrock	21 J. M.	36 Telluride	51 Tramp No. 4
7 Old Salt Lick	22 Rambler	37 Chemist	52 Old Taylor
8 Lost Horse	23 Beaver	38 Chemist No. 2	53 Old Hickory
9 Truscott	24 Elk	39 Lola	54 U. S. Grant
10 Ranch View	25 Mill No. 1	40 Raven-20472	55 William McKinley
11 Raymond	26 Mill No. 2	41 Crack Shot	56 John Adams
12 Little Johnny	27 Mill No. 3	42 Bird Shot	57 Jack Rabbit
13 Salt Lake Ext.	28 Mill No. 4	43 Buck Shot	58 Pearl Walker
14 Antelope	29 Mill No. 5	44 Half Shot	
15 Raven-20271	30 Joe Junior	45 Sure Shot	

EXPLANATION

- Diamond-drill holes, U.S.G.S. (classification of holes is by visual estimates, modified by gamma-ray logs, radiometric counts, or chemical assays, when available).
- <sub>52</sub> Barren
- <sub>72</sub> Weakly mineralized (less than 0.1% U<sub>3</sub>O<sub>8</sub> and 1.0% V<sub>2</sub>O<sub>5</sub>, or less than 1 foot thick regardless of grade).
- <sub>368</sub> Ore-bearing (0.1% or more U<sub>3</sub>O<sub>8</sub> or 1.0% or more V<sub>2</sub>O<sub>5</sub> and 1 foot or more thick).
- Current month drill hole.
- Ground underlain by carnotite-bearing rock found by U.S.G.S. drilling.
- Mine workings (approximate outline).
- Area tested by other drilling (individual holes not shown).

Figure 4



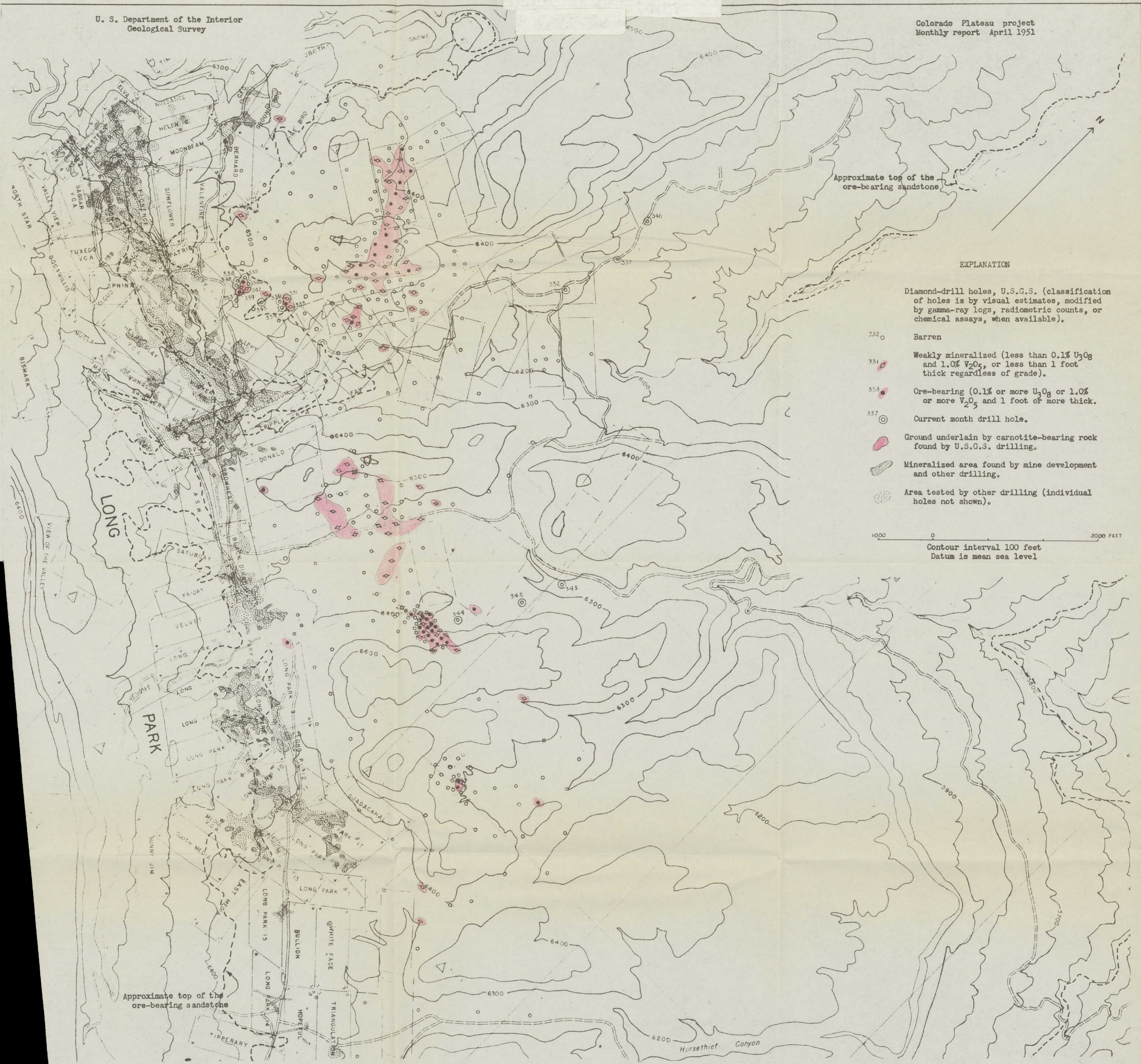
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Fig. 4

UNITED STATES GOVERNMENT

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EXPLANATION

- Diamond-drill holes, U.S.G.S. (classification of holes is by visual estimates, modified by gamma-ray logs, radiometric counts, or chemical assays, when available).
- 332 ○ Barren
  - 331 ● Weakly mineralized (less than 0.1% U<sub>3</sub>O<sub>8</sub> and 1.0% V<sub>2</sub>O<sub>5</sub>, or less than 1 foot thick regardless of grade).
  - 558 ● Ore-bearing (0.1% or more U<sub>3</sub>O<sub>8</sub> or 1.0% or more V<sub>2</sub>O<sub>5</sub> and 1 foot or more thick).
  - 337 ○ Current month drill hole.
  - Ground underlain by carnotite-bearing rock found by U.S.G.S. drilling.
  - ▨ Mineralized area found by mine development and other drilling.
  - Area tested by other drilling (individual holes not shown).

1000 0 3000 FEET  
Contour interval 100 feet  
Datum is mean sea level

LONG PARK AND VICINITY, MONTROSE COUNTY, COLORADO

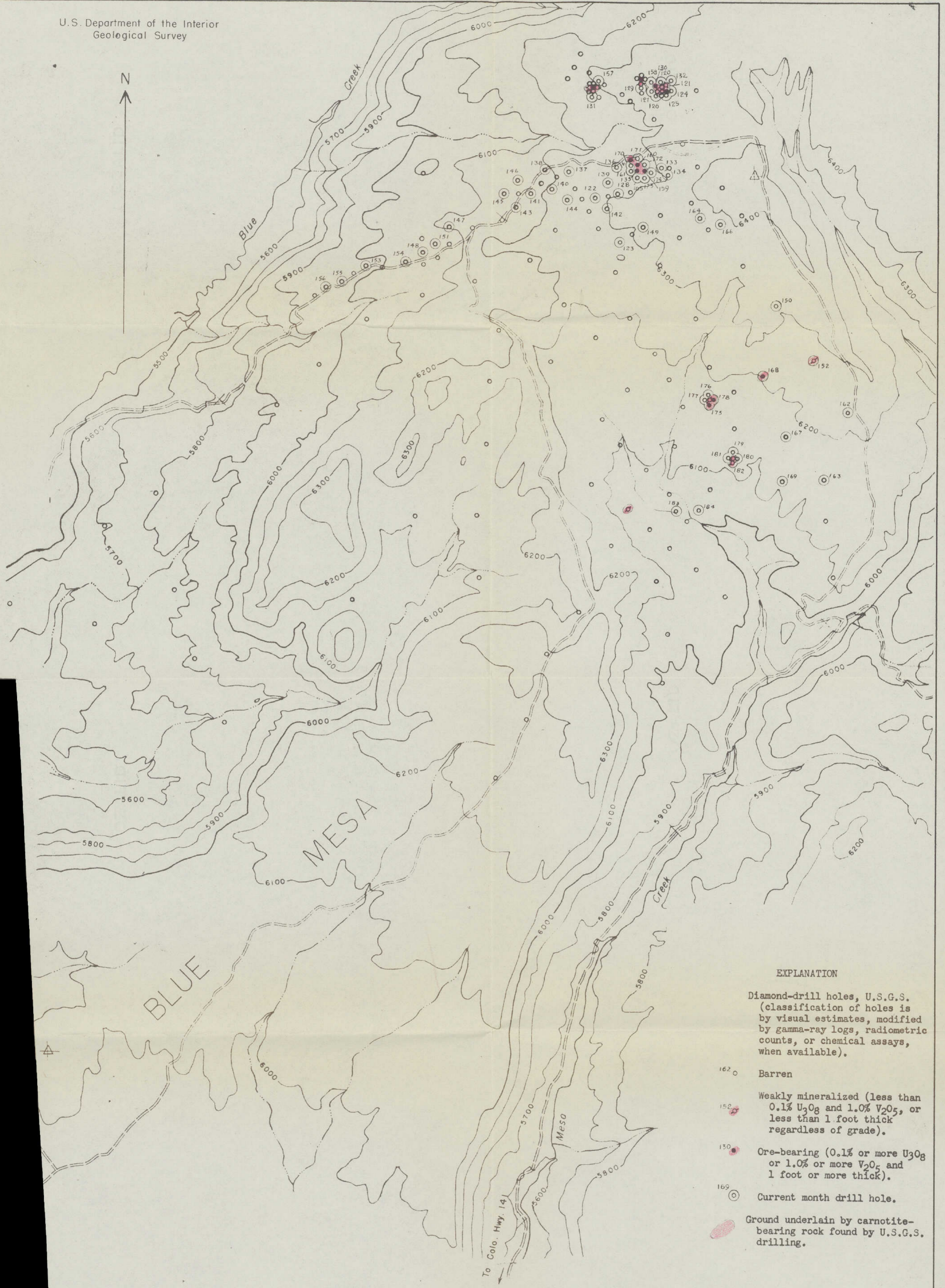


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Fig. 5

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EXPLANATION

Diamond-drill holes, U.S.G.S. (classification of holes is by visual estimates, modified by gamma-ray logs, radiometric counts, or chemical assays, when available).

- 162 ○ Barren
- 152 ● Weakly mineralized (less than 0.1%  $U_3O_8$  and 1.0%  $V_2O_5$ , or less than 1 foot thick regardless of grade).
- 130 ● Ore-bearing (0.1% or more  $U_3O_8$  or 1.0% or more  $V_2O_5$  and 1 foot or more thick).
- 169 ○ Current month drill hole.
- Ground underlain by carnotite-bearing rock found by U.S.G.S. drilling.

BLUE MESA, MESA COUNTY, COLORADO

1000 0 3000 FEET  
Contour interval 100 feet. Datum is mean sea level.



Fig. 6

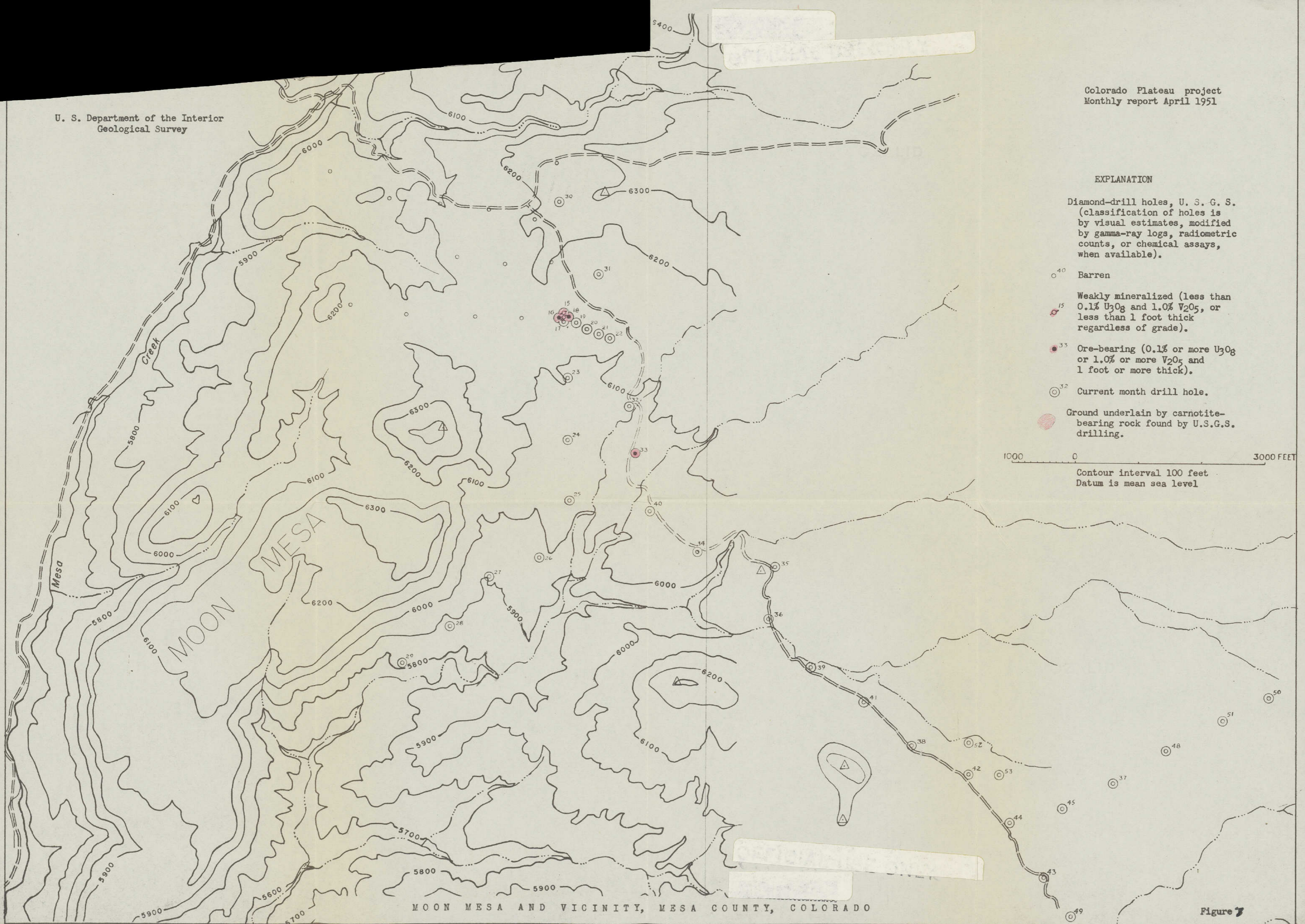


EXPLANATION

Diamond-drill holes, U. S. G. S.  
(classification of holes is  
by visual estimates, modified  
by gamma-ray logs, radiometric  
counts, or chemical assays,  
when available).

- <sup>40</sup> Barren
- <sup>15</sup> Weakly mineralized (less than  
0.1% U<sub>3</sub>O<sub>8</sub> and 1.0% V<sub>2</sub>O<sub>5</sub>, or  
less than 1 foot thick  
regardless of grade).
- <sup>33</sup> Ore-bearing (0.1% or more U<sub>3</sub>O<sub>8</sub>  
or 1.0% or more V<sub>2</sub>O<sub>5</sub> and  
1 foot or more thick).
- <sup>32</sup> Current month drill hole.
- Ground underlain by carnotite-  
bearing rock found by U.S.G.S.  
drilling.

1000 0 3000 FEET  
Contour interval 100 feet  
Datum is mean sea level



MOON MESA AND VICINITY, MESA COUNTY, COLORADO

Figure 7



Fig. 7

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VALID

VALID

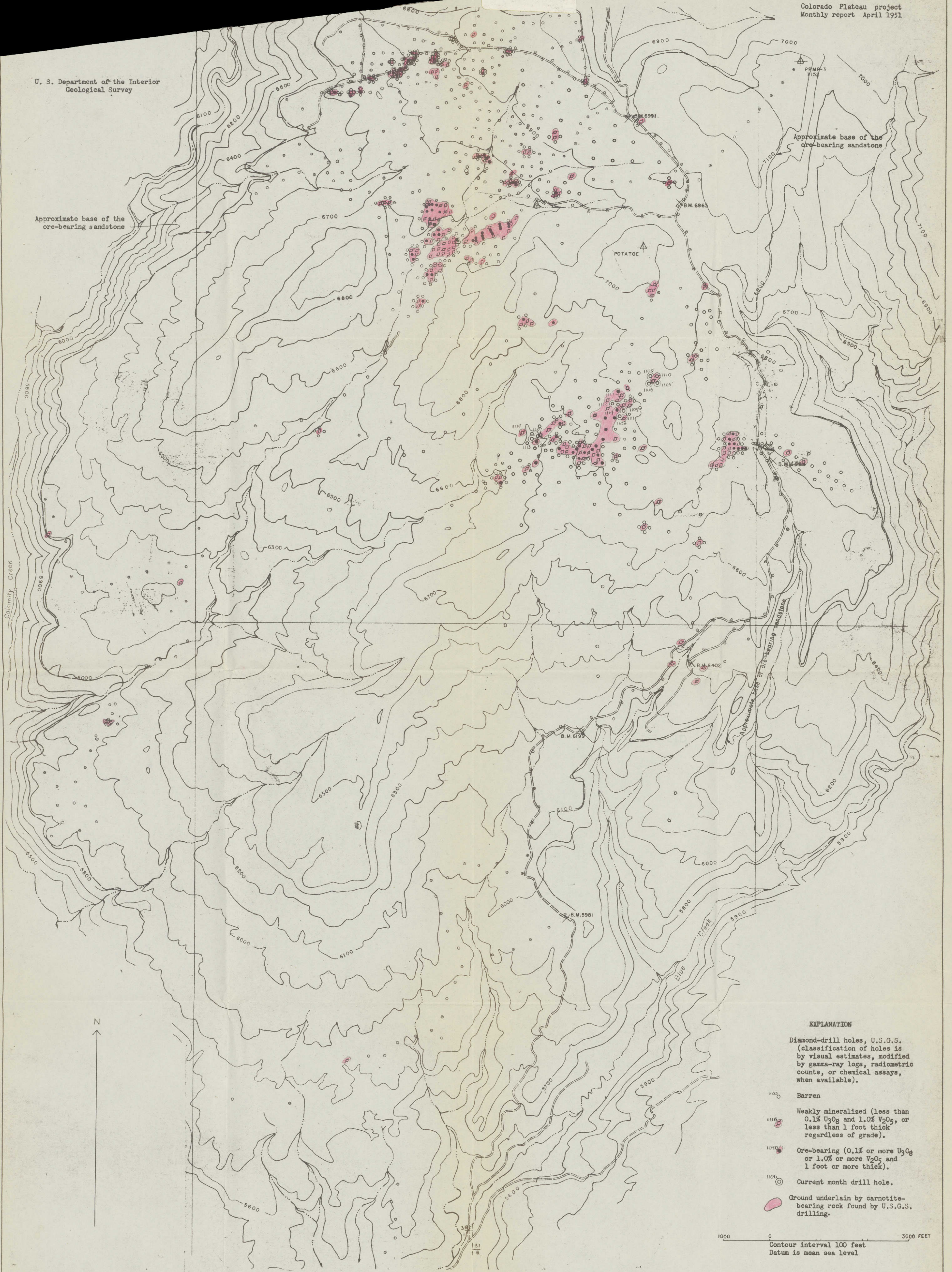
VALID

VALID

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U. S. Department of the Interior  
Geological Survey



EXPLANATION

Diamond-drill holes, U.S.G.S.  
(classification of holes is  
by visual estimates, modified  
by gamma-ray logs, radiometric  
counts, or chemical assays,  
when available).

- 1105 ○ Barren
- 1116 ● Weakly mineralized (less than 0.1%  $U_3O_8$  and 1.0%  $V_2O_5$ , or less than 1 foot thick regardless of grade).
- 1050 ● Ore-bearing (0.1% or more  $U_3O_8$  or 1.0% or more  $V_2O_5$  and 1 foot or more thick).
- 1106 ○ Current month drill hole.
- Ground underlain by carnotite-bearing rock found by U.S.G.S. drilling.

1000 0 3000 FEET  
Contour interval 100 feet  
Datum is mean sea level

OUTLAW MESA, MESA COUNTY, COLORADO



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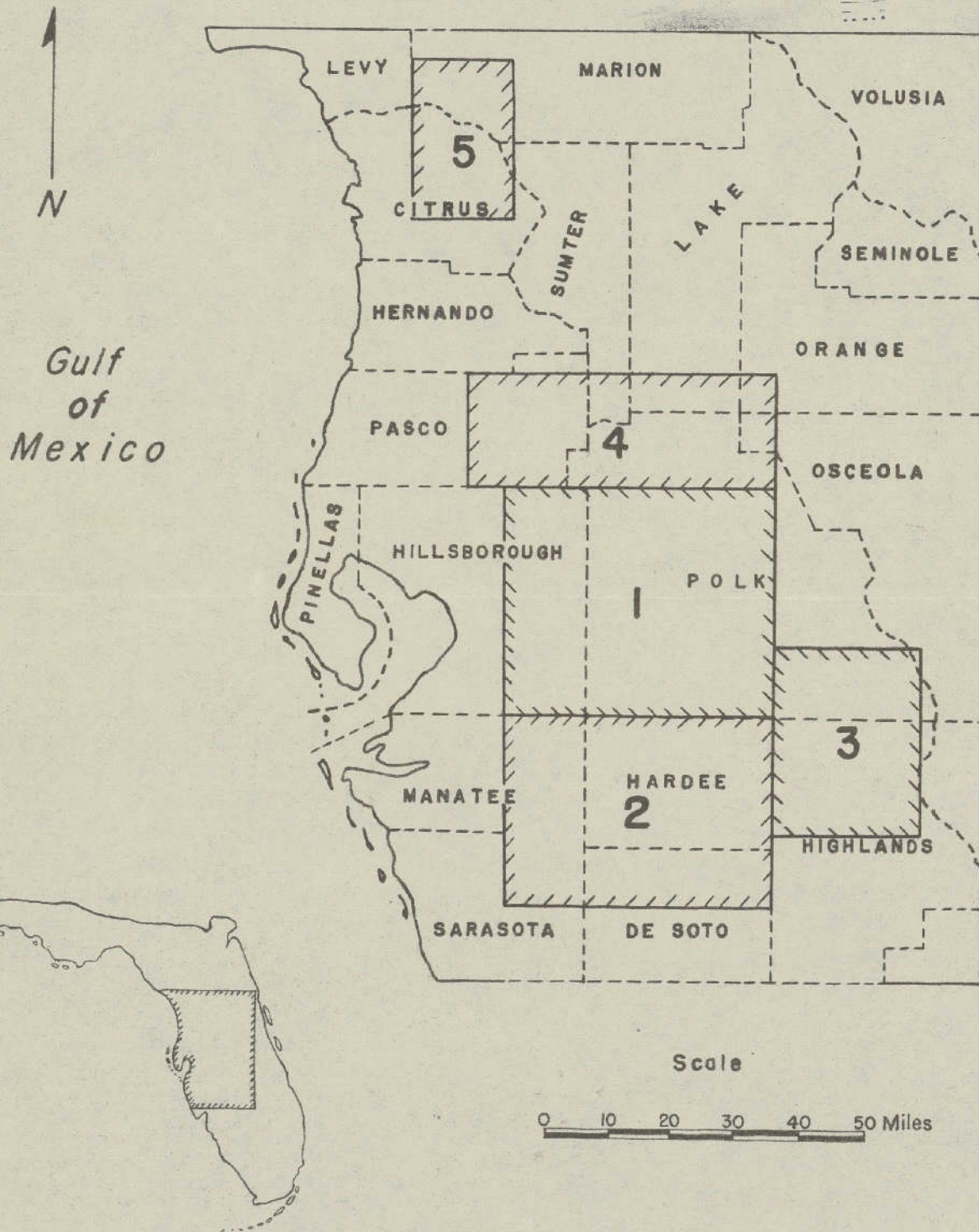


# FLORIDA PHOSPHATE PROJECT

*Fig. 9  
Sheet A*

INDEX TO PROGRESS MAPS

APR 1951







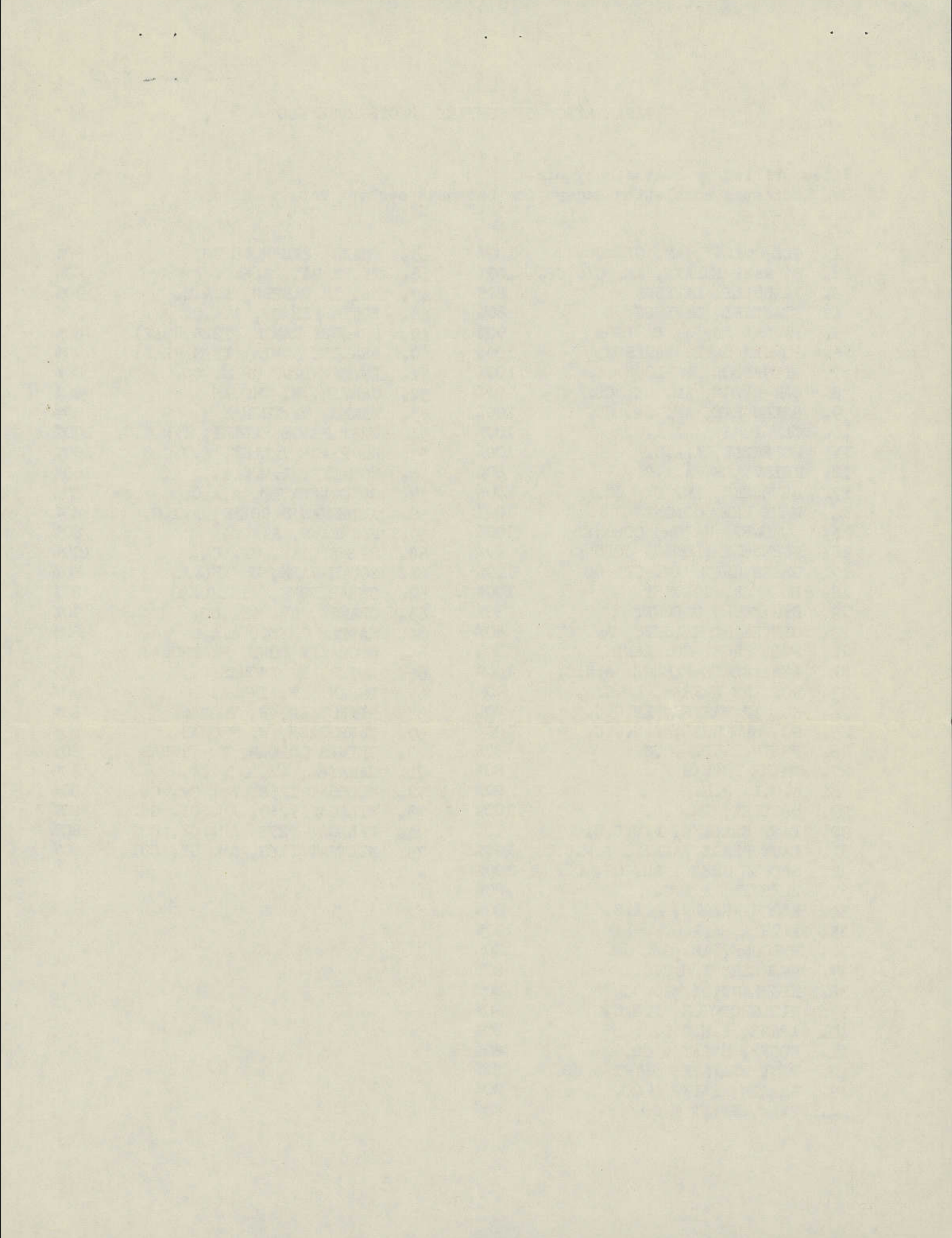
## EXPLANATION OF COMPANY TRACTS RECEIVED

Sites drilled by TVA: a,b,c, etc.

80% indicates completion except for basement contour map.

1. OLD COLONY, AM. CY. CO.	100%	45. PHARR, PEMBROKE CO.	80%
2. B. HART ESTATE, AM. CY. CO.	100%	46. TIGER BAY, A.A.C.	80%
3. SANGULLY, DAVISON	80%	47. No. 12 WASHER, A.A.C.	90%
4. STANDARD, DAVISON	80%	48. SOUTH PIERCE, A.A.C.	80%
5. PAUWAY NO. 4, DAVISON	90%	49. BRADLEY LANDS (T32S,R24E)	80%
6. BONNEY LAKE, DAVISON	100%	50. BRADLEY LANDS (T31S,R24E)	90%
7. RIDGEWOOD, DAVISON	100%	51. INDEPENDENT CHEM. CO.	80%
8. OAK RIDGE, AM. CY. CO.	100%	52. CARTER, W. THOMAS	80%
9. GREEN BAY, AM. CY. CO.	100%	53. BAKER, W. THOMAS	80%
10. CARMICHAEL, A.A.C.	100%	54. WEST PEACE VALLEY, I.M.C.C.	100%
11. HOPEWELL, A.A.C.	100%	55. N. PEACE VALLEY, I.M.C.C.	100%
12. KEYSVILLE, A.A.C.	80%	56. NORALYN, I.M.C.C.	100%
13. BREWSTER, AM. CY. CO.	100%	57. CONSOLIDATED, A.A.C.	80%
14. MARY LEE, CORONET	100%	58. ALDERMAN'S CREEK, A.A.C.	80%
15. CORONET (UPPER) CORONET	100%	59. FISHHAWK, A.A.C.	80%
16. HOPEWELL (LOWER) CORONET	90%	60. SIDNEY, AM. CY. CO.	100%
17. GREEN HEAD, AM. CY. CO.	100%	61. SOUTH VARN, W. THOMAS	80%
18. ELEANOR, CORONET	100%	62. SWEARINGEN, W. THOMAS	80%
19. BIG FOUR, CORONET	80%	63. ORANGE, AM. CY. CO.	90%
20. CLEVELAND HEIGHTS, AM. CY.	80%	64. SADDLE CREEK, A.A.C.	80%
21. POIK PHOS. CO. LANDS	80%	65. MOCCASIN POND, W. THOMAS	80%
22. PEBBLEDALE-PIERCE, A.A.C.	100%	66. DOVER, W. THOMAS	80%
23. NO. 122 WASHER, I.M.C.C.	90%	67. DURANT, W. THOMAS	80%
24. NO. 12 WASHER, I.M.C.C.	80%	68. PETROVICH, W. THOMAS	80%
25. NO. 6 WASHER, I.M.C.C.	100%	69. EBERSBACH, W. THOMAS	80%
26. PRAIRIE, I.M.C.C.	80%	70. GRIMES GOLDEN, W. THOMAS	80%
27. WAYNE THOMAS	80%	71. MANATEE, AM. CY. CO.	80%
28. A.C.L. R.R.	80%	72. WILDCAT T25S, Am. Cy. Co.	80%
29. BRADLEY, I.M.C.C.	100%	73. WILDCAT T26S, AM. CY. CO.	80%
30. EAST BRADLEY, I.M.C.C.	90%	74. WILDCAT T27S, AM. CY. CO.	80%
31. EAST PEACE VALLEY, I.M.C.C.	100%	75. WILDCAT T28S, AM. CY. CO.	80%
32. SADDLE CREEK, AM. CY. CO.	100%		
33. BOYETTE, A.A.C.	80%		
34. BLOOMINGDALE, A.A.C.	80%		
35. LITHIA, A.A.C.	100%		
36. WELCOME, AM. CY. CO.	80%		
37. MEJULLA, I.M.C.C.	80%		
38. HIGHLAND, I.M.C.C.	80%		
39. HILLSBOROUGH, I.M.C.C.	80%		
40. DRANE, I.M.C.C.	80%		
41. COONS, SWIFT & CO.	80%		
42. WEST BRADLEY, SWIFT & CO.	80%		
43. WARREN, SWIFT & CO.	80%		
44. VARN, SWIFT & CO.	80%		







R21E

R22E

R23E

R24E

R25E

R26E

R27E

Completed.  
 " , no basement.  
 In progress.  
 Not worked on.  
 Rec'd this month.  
 T.V.A. drilling.

T27S

T28S

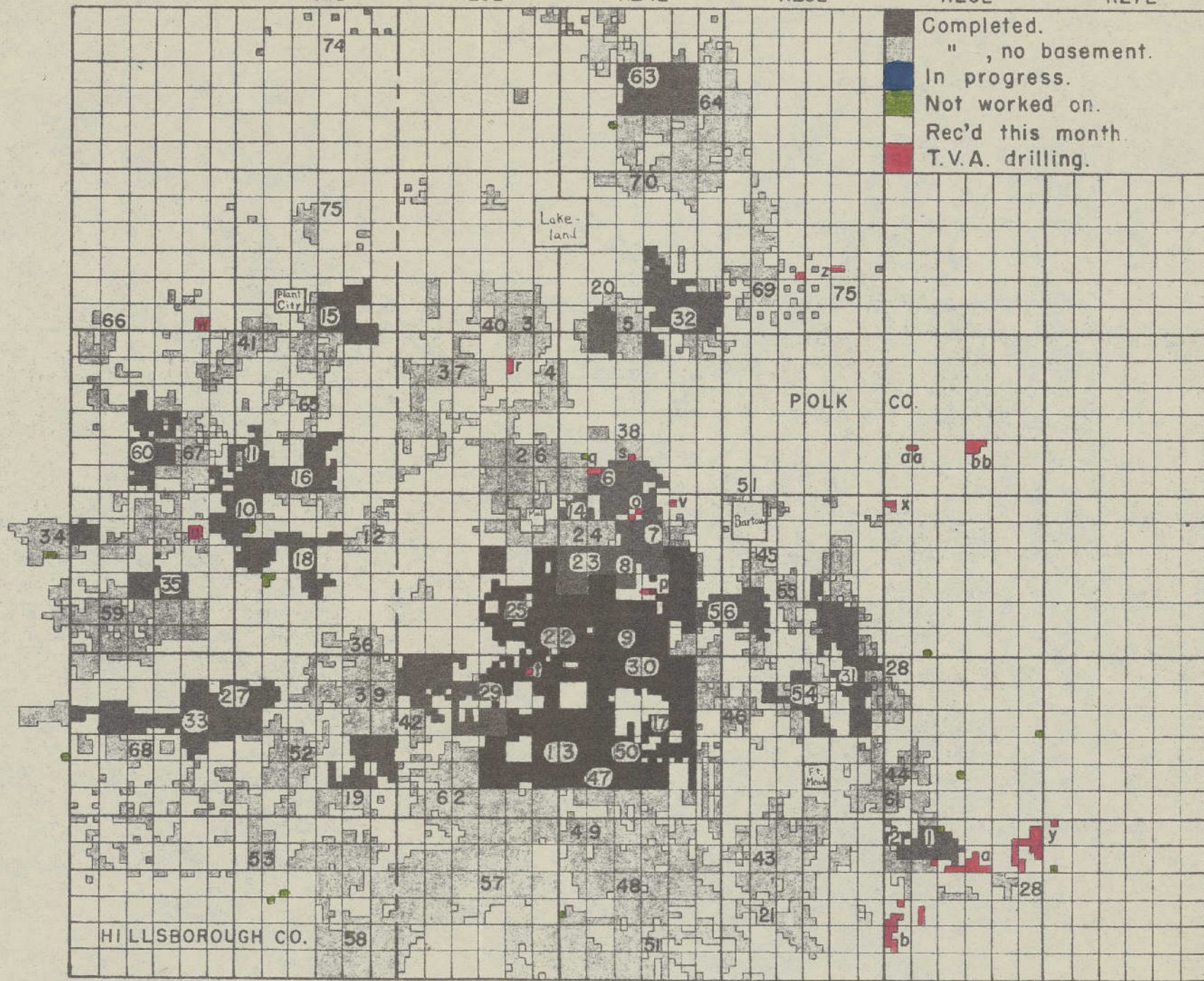
T29S

T30S

T31S

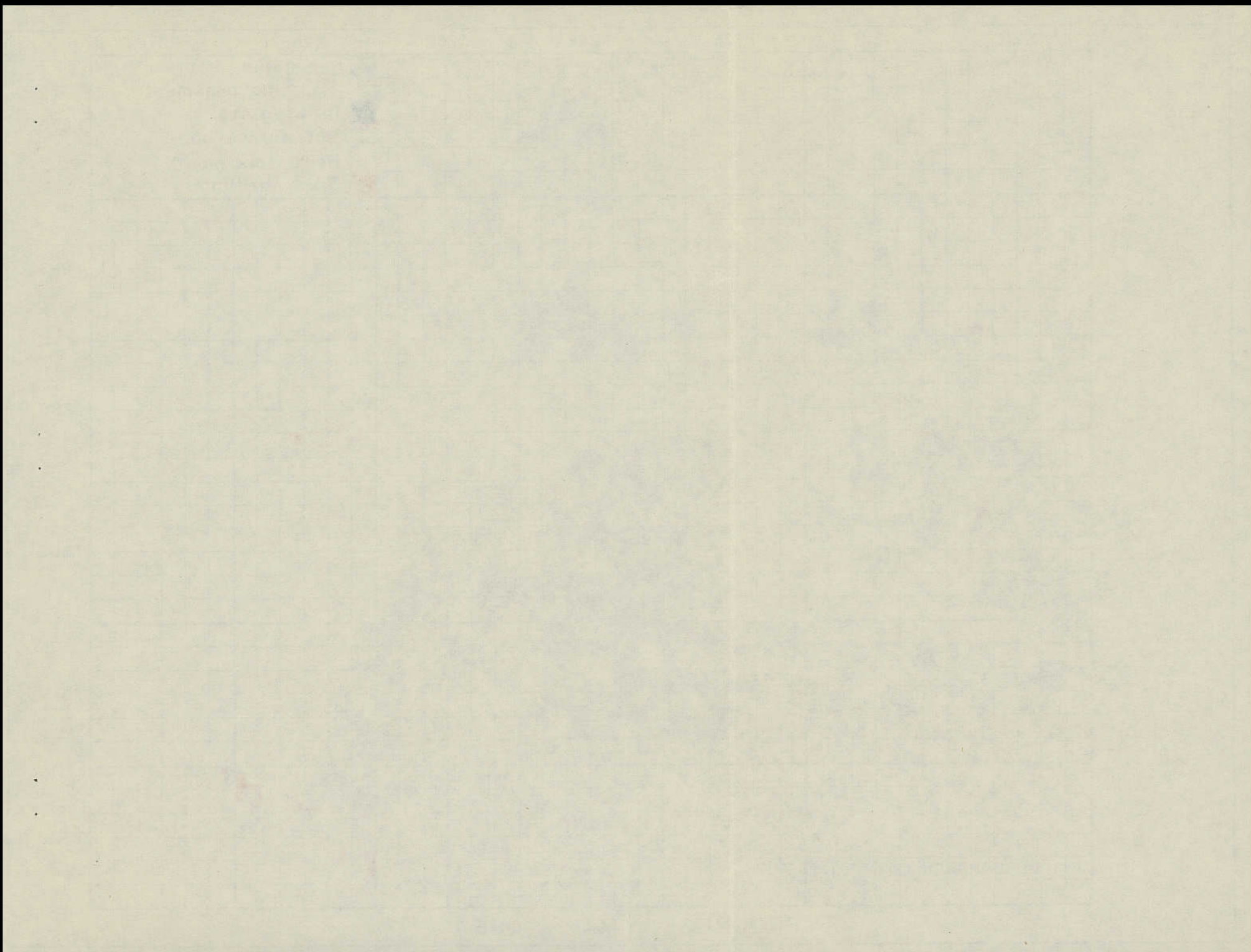
T32S

Sheet C

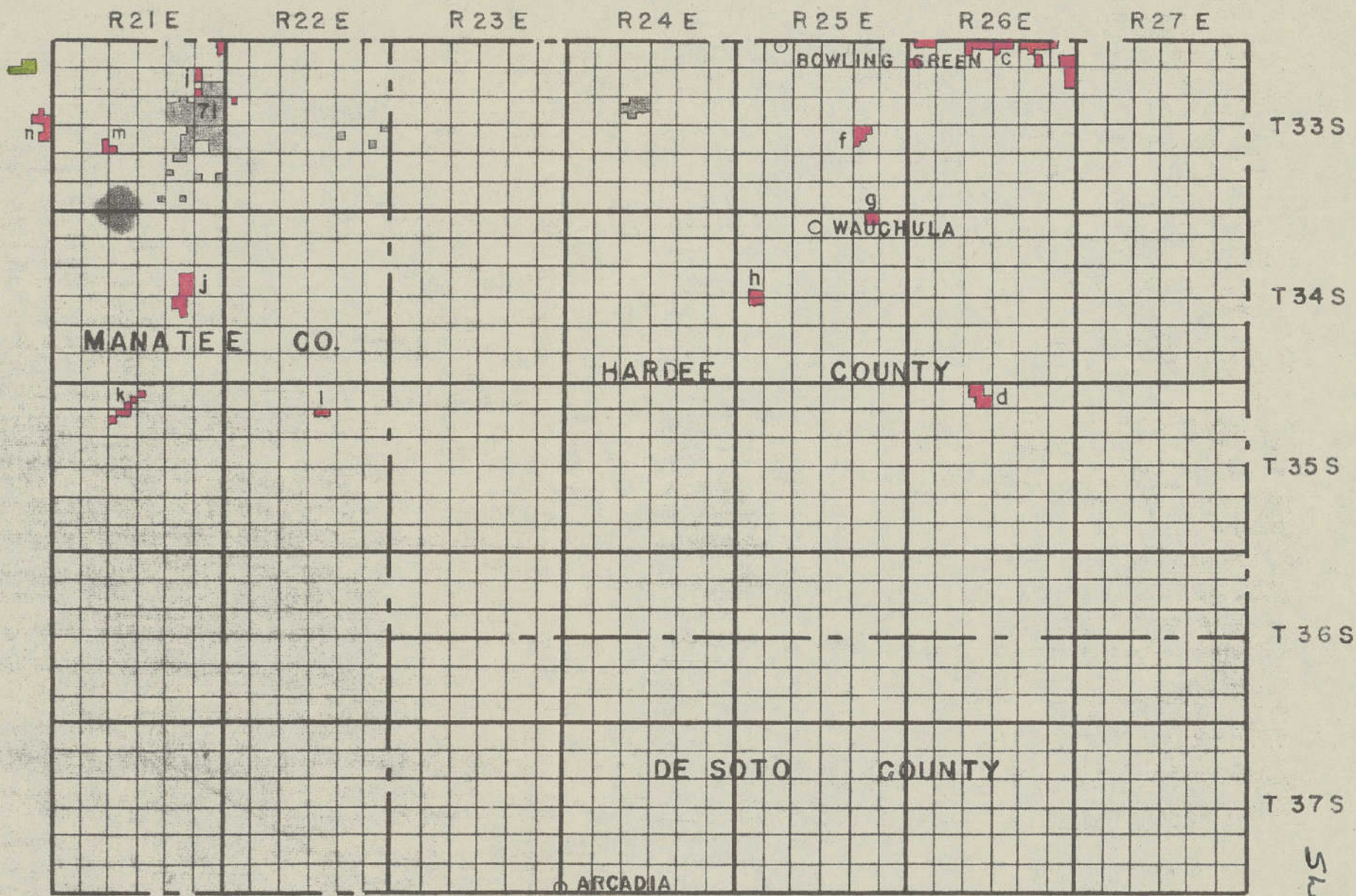


PROGRESS MAP AREA I





U S GEOLOGICAL SURVEY



PROGRESS MAP AREA 2

*Sheet D*



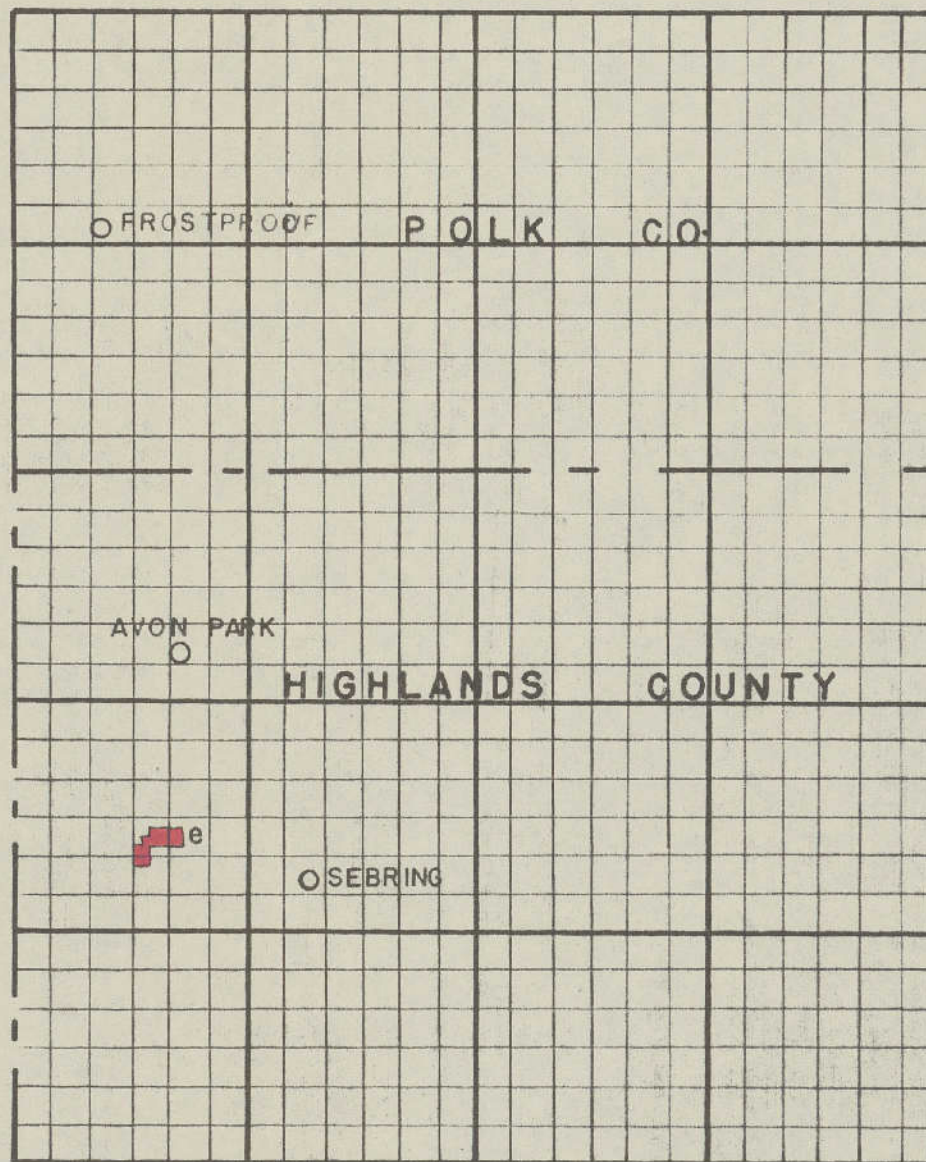
This image shows a blank sheet of graph paper with a light blue grid pattern. The grid consists of approximately 20 columns and 25 rows of small squares. There are some faint red and blue marks on the paper, possibly from a previous page or a stamp.

R 28 E

R 29 E

R 30 E

R 31 E



T 31 S

T 32 S

T 33 S

T 34 S

T 35 S

○ FROSTPROOF

P O L K C O .

AVON PARK  
○

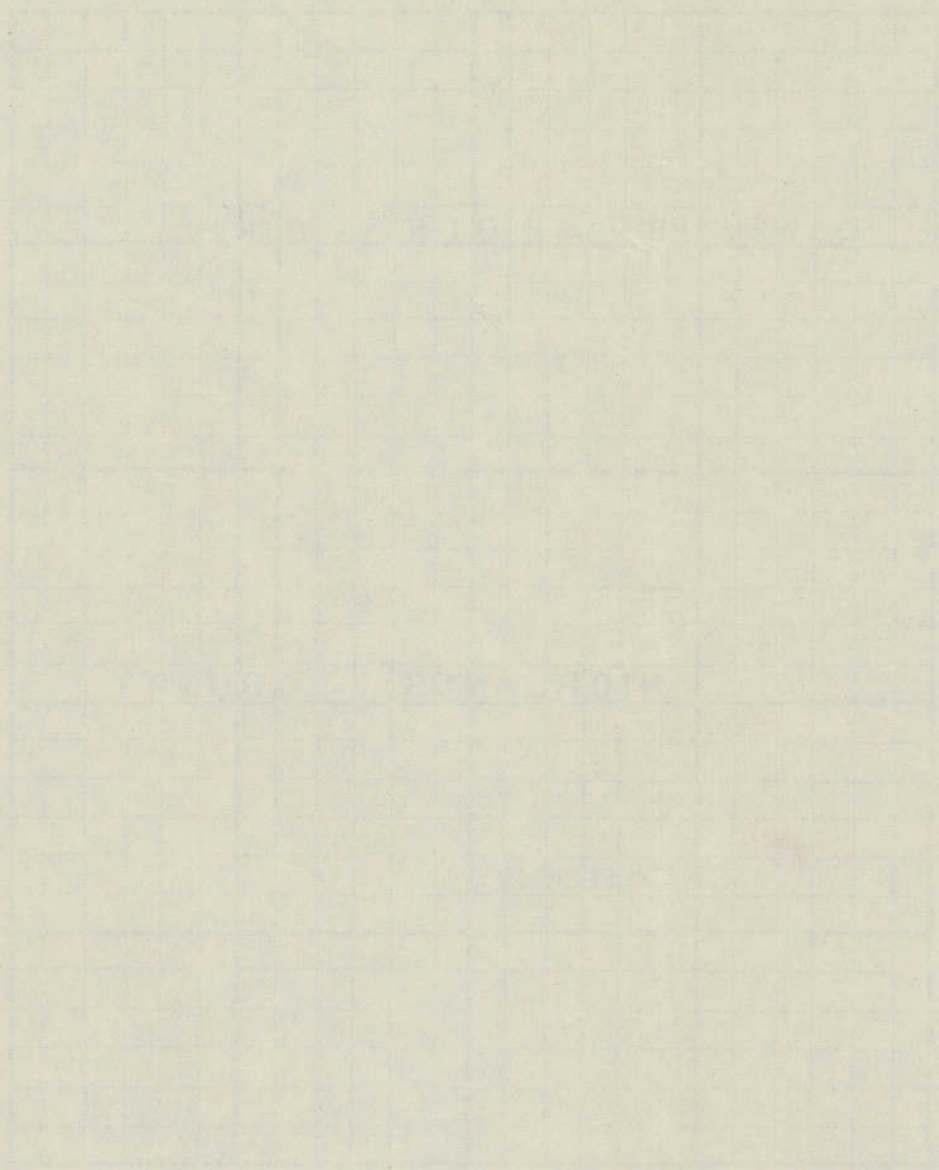
HIGHLANDS COUNTY

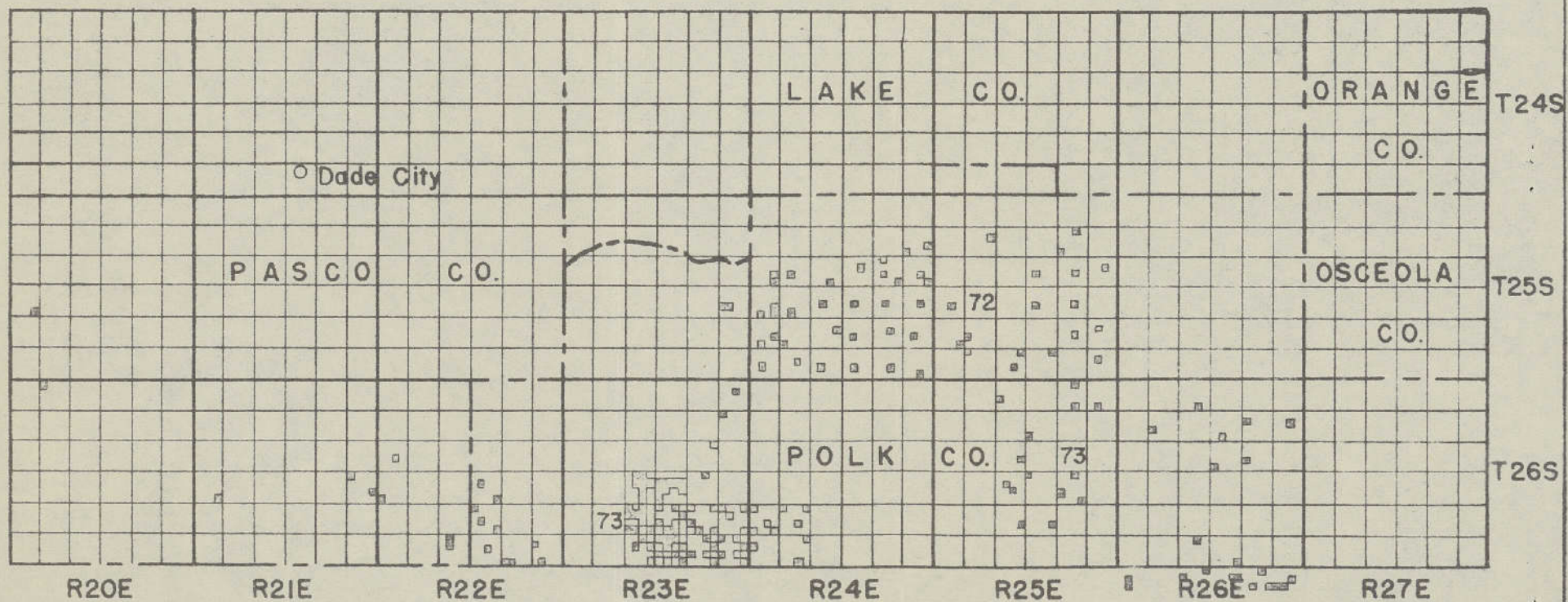


○ SEBRING

*Sheet E*



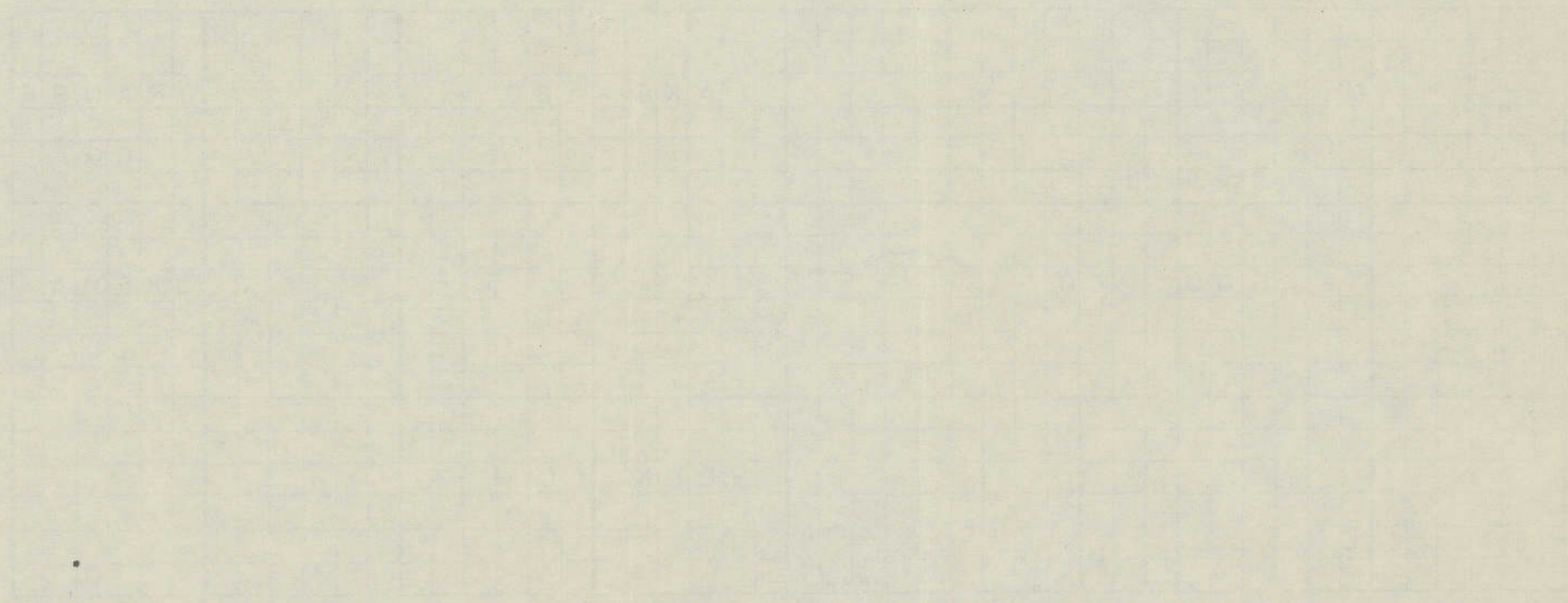




PROGRESS MAP AREA 4

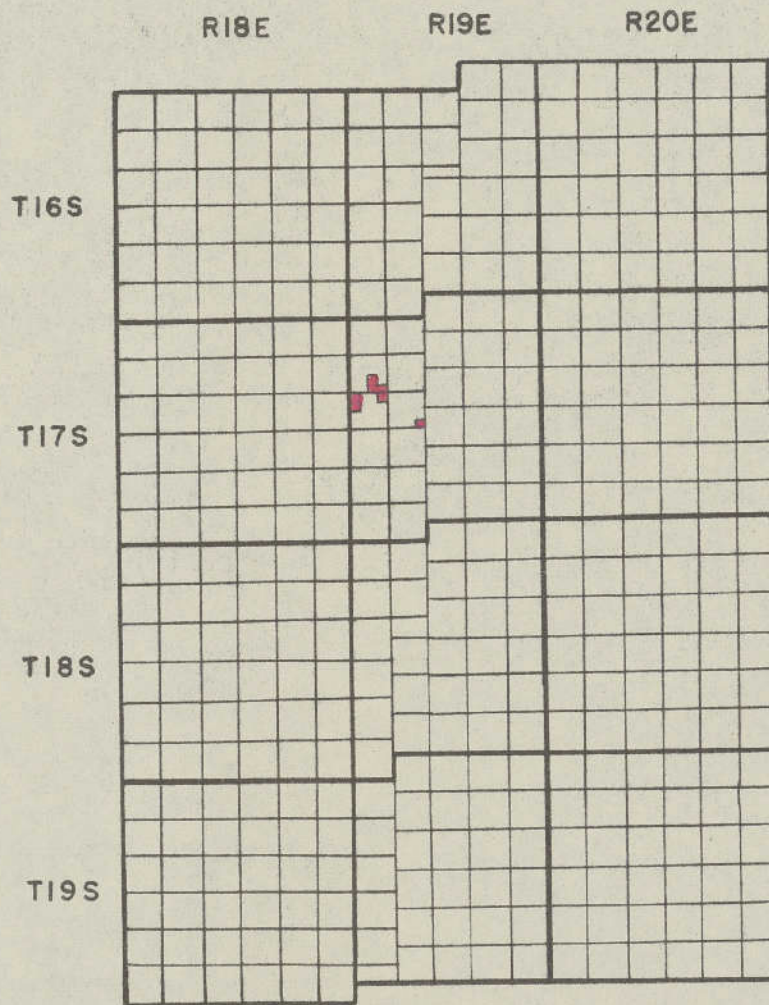
Sheet R





KEY TO SECTION  
NUMBERS

R19E				
			2	1
6	5	4	11	12
7	8	9	14	13
18	17	22	23	24
19	20	27	26	25
30	29	34	35	36
31	32	3	2	1
6	5	10	11	12
7	8	15	14	13
18	17	22	23	24
19	20	27	26	25
30	29	34	35	36
31	32	3	2	1
6	5	10	11	12
7	8	15	14	13
18	21	22	23	24
19	28	27	26	25
30	33	34	35	36
31	4	3	2	1
6	9	10	11	12
7	16	15	14	13
18	21	22	23	24
19	28	27	26	25
30	33	34	35	36



PROGRESS MAP AREA 5

*Sheet 6*



