

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

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Contents

	Page
Summary - - - - -	1
Reconnaissance investigations - - - - -	2
Colorado - - - - -	2
Alaska - - - - -	2
Comprehensive investigations of specific types of occurrences or areas - - - - -	4
Colorado Plateau, geologic studies - - - - -	4
Colorado Plateau, exploration - - - - -	5
Northwest phosphate - - - - -	7
Southeast phosphate - - - - -	10
Black shales - - - - -	11
Asphaltic sandstone - - - - -	14
Monazite-bearing granites and stream placers of the Carolinas - - - - -	15
Mill and raw material sampling - - - - -	16
Beryllium-bearing pegmatites - - - - -	16
Laboratory investigations - - - - -	20
Research - - - - -	20
Analytical work - - - - -	20
Space and equipment - - - - -	21
Staff activities - - - - -	24
Technical reports - - - - -	24
Financial, administrative, and service reports - - - - -	26
Conferences - - - - -	26
Space and equipment - - - - -	26
Cooperative work - - - - -	27
Gamma ray well logs - - - - -	28

Illustrations

Illustrations at back of report

Figure 1. Trace Elements Program, Field Projects, October 1947

2. Trace Elements Program, Colorado Plateau Project,
October 1947.

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

MONTHLY REPORT - OCTOBER 1947

SUMMARY

Work was continued in October on all phases of the program for investigation of domestic sources of radioactive raw materials. Field work was recessed during the month on some projects, but work was resumed on black shales and will be started on the southeast phosphates in November. The problem of permanent space for the laboratory was resolved during the month.

Reconnaissance investigations in Alaska were finished for the season. Reports on these and similar work in Colorado are being prepared. The following comprehensive investigations were in progress: (1) Carnotite deposits of the Colorado Plateau region, including preparations for drilling to start in November; (2) Northwest phosphate deposits; (3) Chattanooga black shale in Tennessee; (4) Asphaltic sandstone in Utah; (5) Monazite-bearing granites of the Carolinas; and (6) Beryllium-bearing pegmatites in five areas. Field work on the Northwest phosphate deposits and on some beryllium projects was recessed during the month. Arrangements were made with the two major producers of sulfur to obtain samples of their products for the "Mill and raw material samplings" project.

Laboratory investigation consisted largely of preparation of a report on research in spectrographic methods of analyses for thorium. Analyses were made of plants and shale from the vanadium region of the Colorado Plateau and were in process on selected samples of Chattanooga shale. Space for long-term use as laboratory quarters was found in Building 213, Naval Gun Factory, Navy Yard, Washington, D. C., but will not be usable until August 1948. Temporary space is still needed.

Staff activities consisted of: (1) Preparation of reports of field investigations in Alaska and the United States; (2) Preparation of technical memoranda on specific subjects; (3) Conferences about the Colorado Plateau project; (4) Procurement and adaptation of space to program needs, both in the field and in Washington; (5) Obtaining samples of beryllium ore and black shales for experiments in treatment; and (6) Making arrangements with several major oil companies for examination of their gamma-ray well logs.

RECONNAISSANCE INVESTIGATIONS

Colorado

A preliminary reconnaissance examination of the radioactivity of igneous and metamorphic rocks and of pegmatite dikes in the Front Range of Colorado (fig. 1, project 1) was finished at the end of August and a report is being written.

The preliminary results indicate: (1) That dikes of granitic and syenitic rocks in Boulder, El Paso, and Jefferson counties and bodies of gneiss in Chaffee, Fremont, and Park counties are moderately large masses of more than normally radioactive rock; and (2) that amounts of radioactive minerals associated with many pegmatite dikes are so small that they could be recovered only as by-products of mica or feldspar mining. If laboratory results confirm the field determinations of radioactivity, additional investigation for large bodies of low-grade rock would be desirable.

The preliminary report will not be finished before April 1.

Alaska

One party finished field work for the season during the month and returned to Washington to prepare its report. Two other parties were working on reports after finishing field work in September.

A party that had been engaged in reconnaissance in areas accessible from the Richardson and Glenn highways between Valdez and Anchorage (fig. 1, project 10) finished field work in September. This

work completes preliminary information in the large area crossed by the highway system of Alaska. Field tests of many rock units of various types and ages, of areas of bedrock mineralization, and of concentrates from both mined and unmined stream gravels showed on insignificant content of radioactive material. Some laboratory work will be done to determine whether traces of radioactive materials that might warrant further local investigation are present in any of the samples.

The absence of radioactivity or its weakness in relatively abundant accessory minerals in quartz diorite of the Talkeetna Mountains supports a tentative conclusion, drawn from studies of minerals in placer deposits, that it may be possible to separate intrusive rocks in Alaska into those showing an association of radioactive elements and those lacking such an association.

This party also learned that persons in Anchorage have found, by use of Geiger counters, stream concentrates showing appreciable radioactivity and report an Alaskan deposit of ore in bedrock that is as radioactive as samples from Great Bear Lake. The position of the reported localities could not be learned because the discoverers will not divulge this information until they have a clear concept of the rights of an individual in the discovery of radioactive deposits.

A second party finished reconnaissance in the Seward Peninsula (fig. 1, project 11) for the season. Incomplete reports of their

results indicate that concentrates from dry stream channels in or adjacent to an allanite-bearing granite mass on Cape Nome contain no amounts of radioactive materials that warrant any further work. However, investigation of masses of syenite in the eastern part of the Peninsula, which was a principal objective of the season's work, has shown additional areas to be of some interest.

A third party (fig. 1, project 12), which made investigations in the uplands near the lower Yukon and Kuskokwim rivers, found that radioactive accessory minerals associated with certain facies of monzonitic intrusives were of possible interest. Samples collected from these intrusives and placer deposits were being prepared for laboratory study.

COMPREHENSIVE INVESTIGATIONS OF SPECIFIC TYPES OF OCCURRENCES OR AREAS

Many of the projects summarized below are essentially long-range projects in geologic research. Dates of completion of such projects can be set only tentatively until the basic problems involved become more clearly delimited by additional data.

Colorado Plateau, geologic studies

Geologic studies in the carnotite-vanadium region of the Colorado Plateau were continued by two field parties (fig. 1, project 20).

These parties are engaged in areal geologic mapping and detailed stratigraphic studies of the ore-bearing beds with particular reference to the Morrison in the vicinity of Paradox Valley. Progress of

work this season and the area mapped prior to 1947 are shown on the accompanying map, figure 2. This work is expected to furnish the regional geologic background necessary for a comprehensive interpretation of the carnotite deposits and for guidance of exploration beyond presently known areas of mineralization. No significant changes of long-range plans developed during the month.

The areal geologic mapping will be recessed during November until the field season of 1948. At that time, it is hoped another party can be added to this work.

It is expected that the field phase of this work will take at least two years. The final report will be completed after fiscal year 1950.

Colorado Plateau, exploration

One party (fig. 1, project 21) mapped the Legin group of claims in the Egnar-Slick Rock districts (see fig. 2) and began mapping on the Lower group of claims in the same district. Another party completed preparation of the base map for the Charles T group of claims and began detailed stratigraphic and geologic studies necessary to guide drilling.

The mapping on the Legin group is to determine the possibilities of establishing trends from a few natural exposures and a small amount of past drilling as a guide in recommending additional drilling.

John M. Johnson, Naturita, Colorado was the successful bidder for 5,000 feet of drilling in the Egnar-Slick Rock district. Drilling will begin on the Charles T group of claims as soon as the contract is

approved in Washington, probably early in November.

Some of the early drilling will be to test favorable ground near the known deposits. Some other widely spaced holes will be drilled to test areas behind covered outcrops and unexplored ground some distance away from exposures, in order to determine the possibilities of establishing favorable trends by such drilling. More than the 5,000 feet of drilling specified in the present contract will be required to test thoroughly all the area in and adjacent to the Charles T group, but provision can be made for additional drilling if hopeful results are obtained.

The altitude of the Charles T group, 7,000 feet, is so high that weather may preclude drilling all winter. In this event, operations can be transferred to the Lower group, which is at a much lower elevation.

Messrs. W. G. Fetzer and P. C. Leahy, Atomic Energy Commission, conferred with R. P. Fischer, Geological Survey, in the field and with W. P. Huleatt, Geological Survey, in Denver on plans for the exploration project. In both places Mr. Leahy offered help and facilities to aid in the field work, which was much appreciated. E. D. Bransome, President, and D. W. Viles, General Superintendent, Vanadium Corporation of America, visited the party at Naturita in response to a letter from the Atomic Energy Commission and indicated a policy of full cooperation with the Geological Survey's work. Representatives of two companies,

Joy Manufacturing Company and Boyle Bros. Drilling Company, visited the Charles T group of claims in connection with preparation of bids for drilling.

The availability of Mr. Leahy for staking claims and a letter of October 30 to Mr. T. B. Nolan from Dr. P. L. Merritt, Atomic Energy Commission, clarify policies about mineral-entry on Government-owned land and Government entry on privately-owned land, which govern the nature of agreements that can be negotiated in the operation of this project.

Four additional people joined the project during October, and others will be assigned in the near future as they finish other commitments.

The Colorado Plateau exploration project is expected to continue for at least another year. Summary interim reports will be prepared as work is completed in individual areas, or as significant results warrant. A final report or reports will be prepared at the conclusion of the project or major parts thereof.

Northwest phosphate

General.—Field work in the Bear River region continued until late October, but field work in most of the other areas is recessed or completed.

Objectives of the investigation of Northwest phosphate deposits were outlined in the monthly reports for July and August.

Some preliminary conclusions from the season's work are reviewed here. The discovery of new lines of outcrop of the Phosphoria formation in many areas where areal geologic mapping has been in progress in Montana, Wyoming, and Utah emphasizes the need for much more areal mapping, before even the general distribution of the phosphate deposits will be accurately known. Such mapping is a fundamental step in appraisal of western phosphate resources and, hence, of their uranium content.

Mapping in Montana has shown that the phosphate thickens westward and that the geologic structures also become more complex in that direction. The same is true in the Idaho-Wyoming part of the region. In general, the more westerly deposits will have to be mined by underground methods, and considerable exploration will be required to demonstrate continuity of the beds. On the other hand, the more easterly deposits should be thinner and less phosphatic than those to the west and in simple structures. In areas where the beds are close to the surface some strip mining may be possible. Continuity can be demonstrated with relatively little exploration. Many analyses and probably much more sampling will be necessary before the distribution of uranium can be correlated with the features outlined above.

Nearly 2,500 samples were cut during the field season: about 400 in Montana; 1,800 from 11 localities in southeastern Idaho, western Wyoming and northern Utah; and 75 from localities in the Uinta Mountains.

Bear River region, Idaho, Wyoming, and Utah.—A party based at Montpelier, Idaho continued sampling complete sections of the Phosphoria

formation (see fig. 1, project 30) until late in October.

Trenches at the mouth of Johnson Creek, Sec. 23, T. 8 S., R. 43 E. and at the south end of Dry Valley, Sec. 14, T. 9 S., R. 44 E. were sampled. A total of 13 sections were trenched and sampled during the season. Field work will be resumed in the 1948 season.

Lyon quadrangle, Montana.—Field work in the Lyon quadrangle has been recessed until the 1948 season, when geologic mapping will be resumed and sampling of the phosphatic beds begun (fig. 1, project 31).

Willis quadrangle, Dell, and Small Horn Canyon areas, Montana.—Continuous field work in the southwest quarter of the Willis quadrangle was recessed early in September (fig. 1, project 32). However, some mapping was done intermittently during October and will be continued in November as weather permits. Geologic mapping and sampling will be resumed again in the 1948 season.

Madison Range, Montana.—Field work was completed in the Madison Range (fig. 1, project 33) in September. A report on this area is scheduled for the end of the fiscal year, provided chemical analyses are completed.

Other projects.—Geologic investigations in several areas in which phosphate deposits are not the primary interest, but where they are being studied as part of the economic geology, were enumerated in the July 1947 report. These projects are not shown on the map. They are referred to only when the month's work bears directly on the phosphate deposits. No

work of this kind was done in October.

Southeast phosphate

Arrangements were completed for starting the field investigation of the Florida phosphate deposits November 1. Most of the personnel has been assigned, and the full complement for two parties will be available late in December. Project headquarters will be established at Plant City, Florida.

The principal economic objectives of the investigation, as previously pointed out in discussing the Northwest phosphate projects, are the determination of the distribution, grade, thickness, and reserves of uranium-bearing phosphate and other minor elements of possible commercial value that may be present in the phosphate beds. The principal scientific objectives are to determine the origin of the rocks and the elements contained in them, the habits of these elements, and the factors controlling their distribution. If achieved, this phase of the work will provide direction to the further search for uranium and other minor elements in the phosphatic rocks. Knowledge of the habits and factors controlling distribution are important not only for proper evaluation of reserves but also for improving methods of recovery.

To achieve these various purposes, it will be necessary to examine voluminous data already gathered by the companies; to plot significant parts of these data on suitable maps to bring out features of the distribution; to describe and sample as many complete sections as possible

of the phosphatic and associated beds; and to analyze the samples for uranium, vanadium, other minor elements, and phosphate.

Mr. John C. Rabbitt, U. S. Geological Survey, attended the semi-monthly staff meeting at Battelle Memorial Institute on October 3 and discussed results of recent work there. Mr. Rabbitt agreed to get detailed flow sheets of plants engaged in treating Florida phosphate.

Plant samples were received from the Virginia-Carolina Chemical Corporation, Nichols, Florida and forwarded to the Battelle Memorial Institute. The results of beta-counting of these samples at Battelle showed no striking difference in uranium content from those of samples from other plants in the field.

Investigation of the Florida phosphate deposits is planned as a project of two or more years duration. Fairly complete interpretative results can be expected only after completion of the field work. Significant progress and economic results, however, will be presented from time to time in interim or special reports as the data warrant.

Black shales

At the present time only the Chattanooga black shale is being examined. In the future, however, other radioactive black shales, now known or that may be found in the course of reconnaissance investigations, will eventually be examined in more detail as conditions permit.

Chattanooga shale.—Field investigation of the Chattanooga black shale was resumed during October by one party (fig. 1, project 40).

Several additional men will join the party in November, and by the end of December the party will be fully staffed.

The area of investigation is in the southeastern part of DeKalb County and nearby parts of White, Warren, and Van Buren counties, Tennessee. This area is the most promising now known for exploration in sufficient detail to determine mineable reserves.

The plan of investigation includes geologic mapping of the Chattanooga shale and overlying formation, trenching and sampling the shale at the outcrop, drilling to obtain data behind the outcrop, and driving an adit (tunnel) to determine the physical characteristics of the shale. The geologic map will show the elevation, structure, and areal distribution of the Chattanooga shale and the thickness of the shale and overlying rocks. Information to be shown on the geologic map is necessary for planning exploration, for mining, for interpreting the results of sampling, and for computing reserves.

Trenching and sampling at the outcrop will provide data for determining the continuity of stratigraphic units and of uranium content and for computing reserves. Careful study of the stratigraphy will be required at the same time in order to correlate information obtained at different points.

During October the area was examined in reconnaissance. Suitable sites for 16 trenches, 15 proposed drill holes, and an adit were selected. The elevation of the Chattanooga shale has been determined at numerous places for use in interpreting the structure of the beds. Measuring,

sampling, and describing outcrops of the shale will start in November.

The total footage of the proposed drilling will be from 1500 to 4500 feet depending on the number of holes finally decided upon. Permission has been obtained from the Tennessee Department of Highways and Public Works for drilling on the rights of way of State Highway No. 56, from the County Commissioners of DeKalb County to drill on the rights of way of the county roads and on the County Poor Farm, and from the Tennessee Valley Authority to drill on lands under their control in Warren, White, and Van Buren counties. The Tennessee Valley Authority will be furnished with copies of logs of all drill holes.

In a memorandum, dated October 17, the Geological Survey requested the Atomic Energy Commission to obtain permission for the Geological Survey to drive an adit on the property of the Nashville District, Corps of Engineers, U. S. Army.

In response to an informal request from the Atomic Energy Commission, three samples of black shale weighing 200-lb., 2-ton, and 5-ton respectively, were taken at U. S. Geological Survey locality S. 100 in the northern part of Jackson County. These samples represent the same interval of rock that was sampled in 1946 and sent to the Battelle Memorial Institute for preliminary studies of extraction methods. Chemical analyses of the 1946 sample showed from 0.008 to 0.009 per cent uranium. The 5-ton sample was shipped to Battelle Memorial Institute late in October, and the other two samples were held in Knoxville for pick-up by the Atomic Energy Commission.

Arrangements were made with the Magnolia Petroleum Company to obtain

a core of the Chattanooga shale from their No. 1 Patterson well near Gruetli, Grundy County. This locality is about 25 miles south of the present area of investigation but will furnish much needed information from an area where the Chattanooga is deeply buried.

It is estimated that a preliminary report on the chief results and conclusions of the investigation in the area of southeastern DeKalb County will be ready when analyses are available, possibly by March 1948. The more comprehensive investigation of the Chattanooga and other black shales, however, will be a project of several years duration. Significant results will be presented in interim reports.

Asphaltic sandstone

The field investigation of uranium-bearing asphaltic sandstone of the Shinarump conglomerate in the vicinity of Shinarump Mesa and Temple Mountain, Emery County, Utah (fig. 1, project 70) was finished in August, and a report is being written.

Emphasis was given to details of stratigraphy, and particularly to the stratigraphic relations of more highly mineralized areas, in the hope of developing criteria of use in determining the localization of mineralized areas and genesis of the deposits.

Preliminary results from the present work indicate (a) that ore bodies are relatively small, lenticular, restricted to definite stratigraphic zones, and related to conditions of sedimentation; and (b) that tonnage will probably be less than estimated by other agencies. Confirmation of the second conclusion must await completion of laboratory work.

Considerable laboratory work and drafting remain to be done, and it is probable that a report will not be ready before March 1948.

Monazite-bearing granites and stream
placers of the Carolinas

Investigation of the monazite-bearing granites of the Carolinas was continued by one party in September (fig. 1, project 50).

The investigation will include preparation of a reconnaissance geologic map of the monazite-bearing granites and study of the distribution of monazite and other accessory minerals in various granites and phases of them. In addition to indicating areas where the monazite content of bedrock should be studied in more detail and the relationships between bedrock and monazite content of placers, the work should prove a significant contribution to the knowledge of monazite in general.

Sampling of various granites to obtain information on the distribution of monazite, zircon, and other accessory minerals was continued during October. Preliminary results to date indicate (1) that the different granitic rocks have distinctive suites of heavy minerals; (2) that the percentages of heavy minerals between points only a few feet apart may differ considerably, a fact not formerly recognized; and (3) that the monazite-bearing granite has several facies characterized by different suites of heavy minerals. The extent and significance of these different facies are problems that will have to be studied in connection with mapping of the monazite-bearing granite because, for example, the particular types

of minerals associated with monazite may affect the method of recovering it. They may also be indicative of its relative abundance.

Field work on the monazite-bearing rocks of the Carolinas will be temporarily recessed in November until additional men to be assigned to this project have completed other commitments.

A report on previous reconnaissance sampling of monazite placer deposits in North Carolina will probably be finished during January.

Mill and raw material sampling

The larger samples from some of 14 placer operations in Idaho are being examined in the laboratory to identify the minerals present and to determine their approximate proportions. Some of these will be forwarded to the Massachusetts Institute of Technology for further work.

The Kennecott Copper Company has agreed to supply the Geological Survey with samples of mill heads and mill and smelter products of its domestic operations. The samples will probably be received in the course of the next two or three months. Arrangements were completed with the Freeport Sulphur Company and the Texas Gulf Sulphur Company to obtain samples of their source materials and products. Samples from various tailings piles in the vicinity of Juneau, Alaska are still in the process of collection.

Beryllium-bearing pegmatites

Investigations of beryllium-bearing pegmatites were in progress during October in the southern part of the Black Hills, South Dakota;

in the Crystal Mountain district, Colorado; in New Hampshire; and in the Pala and Rincon districts, California. Some intermittent work continued in the Newry-Rumford district of Maine.

Black Hills pegmatites, South Dakota.—Detailed studies of the distribution of beryl at the Peerless mine and at the Dan Patch No. 2 pegmatite in the Keystone area and at the Helen Beryl pegmatite in the Custer district were made by two parties (fig. 1, project 60). Mineralogic studies were begun in the laboratory.

Results of investigations of the Peerless and Dan Patch No. 2 pegmatites indicate that they should be considered for further exploration. Specific proposals for this will be made at a later date. Diamond drilling of the Helen Beryl will be started when the successful bid has been approved, probably in December.

Reserves of beryl at the Peerless mine, based on studies not yet completed, are estimated to be an indicated 350 tons of beryl above the present workings and an inferred 1500 tons of beryl in other parts of the property. About one-third of the beryl could be recovered by hand sorting, but the remainder would require beneficiation. Scrap mica, feldspar, amblygonite, cassiterite, and columbite-tantalite are other possible products that might help sustain any operation for recovering beryl.

Detailed mapping of the Dan Patch No. 2 pegmatite is completed. On the basis of the detailed study, indicated and inferred reserves are estimated to be 25 tons of beryl and 1100 tons of potash feldspar.

Evidence that the deposit thickens in depth suggests that exploration would show additional reserves.

New measurements of zones that have been exposed by recent mining at the Helen Beryl pegmatite indicate that the beryl content ranges from 0.03 per cent beryl in the feldspar-mica intermediate zone to 1.2 per cent beryl in the quartz-spodumene core. Estimates of reserves will be made after completion of the drilling planned.

Work at the Helen Beryl is completed except for the drilling. Study of the Peerless, Elkhorn and Tin Mountain mines will be continued in November. A preliminary report on the Dan Patch No. 2 pegmatite may be ready in January.

Newry-Rumford pegmatite areas, Maine.—Continuous field work on Maine pegmatites (fig. 1, project 61) was recessed in September, but study of new workings in the Red Hill pegmatites (Rumford area) was done intermittently during October.

Crystal Mountain district, Colorado.—Detailed mapping and study of individual pegmatites and areal mapping were continued by one party in the Crystal Mountain district, Larimer County, Colorado (fig. 1, project 62).

Investigations at the Big Boulder and Hyatt Beryl pegmatites were preparatory to recommending exploration (see monthly report, August 1947, p. 17). Beryl was noted in 14 of 100 bodies of pegmatite in Sections 25, 26, 35, and 36, T. 7 N., R 72 W., and Sections 29, 30, 31, and 32, T. 7 N., R. 71 W. that were examined in reconnaissance. Three of the 14

pegmatites, the A.E. Ball and two groups of pegmatites in Section 30, T. 7 N., R. 31 W., contain sufficient beryl to warrant additional study.

Investigation of the Hyatt Beryl and Big Boulder pegmatites will be completed early in November, but areal mapping will be continued during the month.

New Hampshire pegmatites.—A reconnaissance examination of pegmatites in New Hampshire was continued by one party (fig. 1, project 63), on a project that is being conducted in cooperation with the State of New Hampshire.

More than 15 pegmatites were examined in the towns of Gilsum, Springfield, Groton, Orford, Walpole, Keene, and Raymond. Sketch maps were made of some bodies. Possible source rocks were also investigated at Red Hill, Berlin, and Stark.

Reconnaissance investigation of pegmatite deposits of feldspar and of some granitic and syenitic rocks that are possible sources of feldspar or other minerals will probably continue through November and then be recessed until the field season of 1948. Some preliminary samples will be examined in the laboratory during the winter.

California pegmatites.—One party is studying pegmatites of the Pala, Rincon, and Mesa Grande districts, San Diego County, California (fig. 1, project 64). The study is a cooperative project with the State of California. The districts are being mapped on a scale of 1:7920 and more important pegmatites on scales of 1:120 or 1:240.

The main emphasis in these districts has been on the gem minerals, but four beryl-bearing pegmatites have been studied in the Pala district and three in the Rincon district.

Field work in the entire area will be completed about July 1948.

LABORATORY INVESTIGATIONS

Research

Laboratory research during the month consisted largely of the preparation of reports on methods of analyses involving more than one laboratory technique. Revision of a report on "Spectrographic behavior of thorium in the presence of various carriers" has been set aside temporarily while further experimental work is done to reconcile differences in sensitivity obtained in earlier and later work. This report includes the description of a method of spectrographic determination of thorium after chemical concentration. It appears probable that as little as 0.0002% ThO_2 can be determined by this method.

Analyses of a composite sample of 5 specimens of thorium-bearing limestone from Great Slave Lake, Canada showed 0.19 per cent ThO_2 and 0.006 per cent U. A preliminary report on the results of laboratory investigation of this limestone is in process.

A report on chemical methods of determining thorium was transmitted to the Atomic Energy Commission (see below "Technical reports").

Analytical work

Again, only a little analytical work was done because of the relatively

small amount of space available and occupation of several members of the staff with problems of procurement of space and equipment.

Chemical.—Analyses were made of shale from above the vanadium- and carnotite-bearing sandstone in the Colorado Plateau and of plants collected from the vicinity of vanadium deposits. Analyses of samples of Chattanooga shale collected for a special study of effects of weathering were in process.

Spectrographic.—Routine spectrographic analyses were made of samples of minerals from Alaska for use in preparation of reports on field investigations.

Mineralogic.—Mineralogic studies of concentrates from Idaho placer operations were in process.

Radiometric.—Only a few routine measurements of radioactivity were made, mainly on unsolicited samples from individuals. Nothing significant was found.

Space and equipment

Washington Laboratory.—The problem of permanent space for the laboratory work of the program was finally resolved during the month when it was found that space in Building 213, Naval Gun Factory, Washington SE, D. C. was available and could be completed to meet the needs of the Geological Survey.

The attempt to secure permanent space in buildings now housing the Laboratory of the Public Roads Administration reached an impasse early

in the month. About October 16 the Geological Survey was informed that the Commandant of the Washington Navy Yard had been ordered to make space available to the Geological Survey. The space is in Building 213 and consists of the fifth and sixth floors. Representatives of the Geological Survey and the Bureau of Ordnance, Navy Department, and Public Buildings Administration inspected the building on October 20. Walls, steel work, and roof have been installed for the fifth and sixth floors, but finishing was indefinitely postponed because of the low priority of the Navy's need for the space. It appeared that completion and adaptation of this space would be the most feasible way of securing suitable permanent laboratory space within a reasonable time.

The suggestion of the Geological Survey that completion of about one-third of each floor would be the most suitable arrangement for its needs was acceptable to the Navy Department. This would provide about 45,000 square feet of space. The cost of finishing the construction and adapting part of the floors to laboratory needs is estimated to be about \$200,000. The work would be done under the direction of the Navy Department according to specifications approved by the Geological Survey.

These arrangements were discussed in a telephone conversation between Messrs. H. Burke Fry, Atomic Energy Commission, and T. A. Hendricks, Geological Survey, on October 23. As a result of this conversation, it was indicated that the Geological Survey should go ahead with arrangements for completion of this space.

A formal request asking permission for the Geological Survey to complete and use this space was addressed to the Secretary of the Navy on October 28. It was recommended that August 1, 1948 be stipulated as the date for finishing the construction and adaptation of the parts of the fifth and sixth floors that would be used for the laboratory. The Geological Survey will reimburse the Navy Department for the costs of construction and for costs of necessary services such as water, gas, and electricity. Security guards for the laboratory will be supplied by the Geological Survey, which will inform the Commandant of the Navy Yard about special provisions made for Security.

Arrangements for permanent space still left unsolved the problem of temporary space where pressing laboratory work could be done until permanent quarters are ready.

On October 10, the Bureau of Mines, Department of the Interior, was asked permission to use part of the Mill Building, Bureau of Mines Station, College Park, Maryland for temporary quarters for some facilities. No decision had been reached by the end of the month.

A memorandum to Mr. A. A. Wells, Atomic Energy Commission, on October 29 stated that negotiations through Public Buildings Administration to obtain space for temporary use in laboratory buildings of the Public Roads Administration at the National Airport had reached an impasse. Some space, such as this, is necessary to supplement that at College Park. The Airport Administrator of the Civil Aeronautics Administration has jurisdiction over

this space and refused to consider assigning any of it to the Geological Survey.

The Commandant of the Navy Yard, Washington, D. C. was willing to make available about 17,000 square feet of space for temporary use. This, however, is not ready for immediate occupancy and would have to be converted for laboratory use. The various possibilities still had not been resolved by the end of the month.

Meanwhile, the contract for major items of laboratory furniture and equipment was let on October 8. An order was also placed for furniture for use in any temporary quarters, so that there would be a minimum of delay in starting work once temporary quarters could be found.

Denver sub-laboratory.—Supplies and equipment for the Denver sub-laboratory have begun to arrive. The greater part of the equipment will probably be received within the next month and a half, and installation can begin.

STAFF ACTIVITIES

Technical reports

The reports referred to here are: (1) Trace Elements Investigations report on specific areas or types of materials; and (2) Memorandum reports in response to requests for information on particular phases of projects or the over-all program.

Trace Elements Investigations reports.—Only those reports are mentioned here that have been completed by the authors and are being edited.

Reports are now in preparation for the following areas:

Tennessee and Kentucky - An interim report on the relation of radioactivity and stratigraphy in the Chattanooga shale. This report is in final typing.

Tennessee, Kentucky, West Virginia, and Pennsylvania - Radioactivity of coals, shales, and asphaltites; awaiting typing.

Kentucky, Indiana, Illinois, and Arkansas - Results of a reconnaissance investigation of coal, shale associated with coals, and miscellaneous types of rocks in these states. A hydrothermally altered igneous rock at Magnet Cove is appreciably radioactive, but the tonnage is insignificant. The Chattanooga shale or its equivalent exhibits radioactivity similar to that in Tennessee, but in Arkansas the radioactivity is less. Other materials examined are not appreciably radioactive. Report is awaiting typing.

Alaska - Reports of reconnaissance investigations in 5 areas.

North Carolina - A report on placer deposits of monazite.

Spectrographic - A report summarizing spectrographic data on 24 elements.

The following report was transmitted officially to the Atomic Energy Commission in October:

Trace Elements Investigations Report 44: The determination of thorium in high grade and low grade ores.

Memorandum reports.—A memorandum report was prepared on the following topic:

Analysis of Colorado shale - A memorandum on "Analysis of shale from Club group of mines, Uravan, Montrose County, Colorado" was transmitted to the Atomic Energy Commission on October 14. Shale obtained

20 to 30 feet above vanadium-bearing sandstone contains 0.016% V_2O_5 and 0.003% U as determined by chemical analyses.

Financial, administrative, and service reports

The reports mentioned here include financial reports and memoranda on administration of the program and the services necessary for operation of the program.

Financial.—It has been agreed that reports of the expenses by projects will be submitted quarterly. The first quarterly financial report will be available in November.

Conferences

Formal conferences between the members of the Geological Survey and the Atomic Energy Commission were held on the Colorado Plateau and in Denver.

Colorado Plateau investigations.—Messrs. W. G. Fetzner and P. C. Leahy, Atomic Energy Commission, conferred with Mr. W. P. Huleatt in Denver on October 8 and with R. P. Fischer, U. S. Geological Survey, at Naturita on plans for the exploration project (see above "Colorado Plateau, exploration").

Space and equipment

Matters pertaining to space and equipment other than for the laboratories are summarized here.

Grand Junction, Colorado.—Official notice was received on October 30

that Room 301, Post Office Building, Grand Junction, has been temporarily assigned to the Trace Elements Office for use as project headquarters after November 1.

Invitations to bid on plumbing installations for Building 2013, U. S. Engineer Depot, Redlands were sent to contractors on October 29. Material for other alterations and fittings has been assembled.

Denver Federal Center.--A new group of armed guards replaced temporary guards at the Denver office on October 22.

Three rooms in Building 12-B, in addition to those listed in the memorandum of September 16, 1947 to the Security Officer, Atomic Energy Commission, were assigned to the Trace Elements Office on October 7. This space will serve as offices and drafting rooms for future additional personnel.

Cooperative work

Cooperative work includes miscellaneous activities in cooperation with the Atomic Energy Commission or its contracting agencies. Most of the activities are only indirectly related to a specific project conducted by the Geological Survey.

Beryllium samples.--Three samples of beryllium ore, two from the Elkhorn pegmatite and one from dumps of the Etta mine, Black Hills, South Dakota, were shipped to Prof. A. M. Gaudin, Massachusetts Institute of Technology, for use in experiments on treatment of beryllium ore. Descriptions of the samples were furnished in a covering letter, copies of which

were given to the Atomic Energy Commission.

Thorium in Florida phosphate rock.--Three ground samples of Florida phosphate rock, in which thoria had been determined by a combination spectrographic and chemical method, and a covering memorandum were transmitted to the Atomic Energy Commission on October 10.

Black shale samples.--At the request of the Atomic Energy Commission, three samples of Chattanooga black shale, 200-pound, 2-ton, and 5-ton respectively, were collected. Information about these samples is given elsewhere in this report (see above "Black shales").

Information on Geological Society of America Project.--The Geological Society of America furnished the Geological Survey with the originals of requests for funds and progress reports for the project of Prof. W. L. Whitehead, Massachusetts Institute of Technology, on "Measurement of the variation in radioactivity of selected sedimentary rocks." Examination of these documents indicates that Prof. Whitehead's investigation does not materially overlap the proposed project of the Geological Survey for obtaining and appraising gamma-ray logs of oil wells. At the first convenient opportunity a member of the Trace Elements Office will visit Prof. Whitehead to ascertain more fully the scope of his investigation in order that unnecessary duplication of effort may be avoided.

Gamma-ray well logs

Preliminary arrangements were successfully completed with several major oil companies to examine gamma-ray logs of their wells. Examination

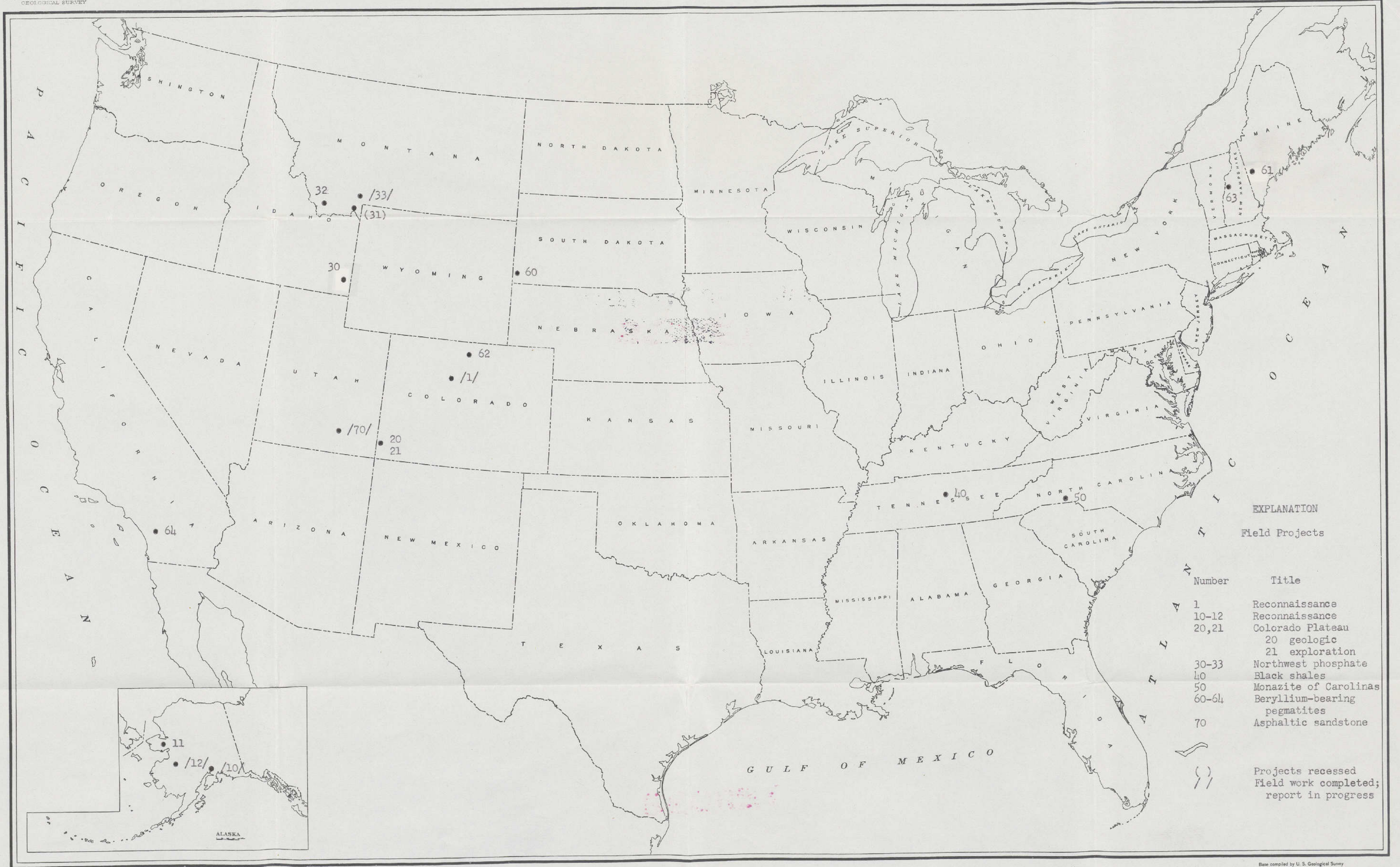
of such logs should furnish information on the trends of radioactivity within formations that cannot be readily obtained by examination at the outcrop. It may also reveal other radioactive rocks that have not been tested at the surface. This investigation will probably start in January.

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Figure 1

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

UNITED STATES
BASE MAP



0 10 20 30 40 50 Miles
1953

Base compiled by U. S. Geological Survey
Projection and shore line by the U. S. Coast and Geodetic Survey
Albers equal-area projection
North American datum

TRACE ELEMENTS PROGRAM
FIELD PROJECTS
OCTOBER 1947

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Figure 1



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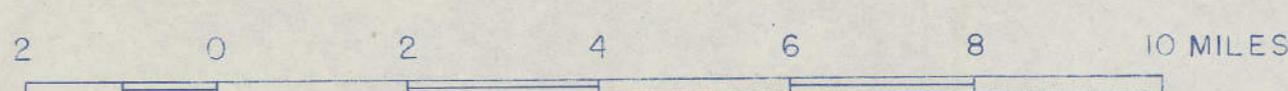
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OFFICIAL USE ONLY

SIMPLIFIED GEOLOGIC MAP
OF THE
VANADIUM REGION OF SOUTHWESTERN COLORADO
AND
SOUTHEASTERN UTAH
COMPILED BY R.P. FISCHER
1944

SCALE

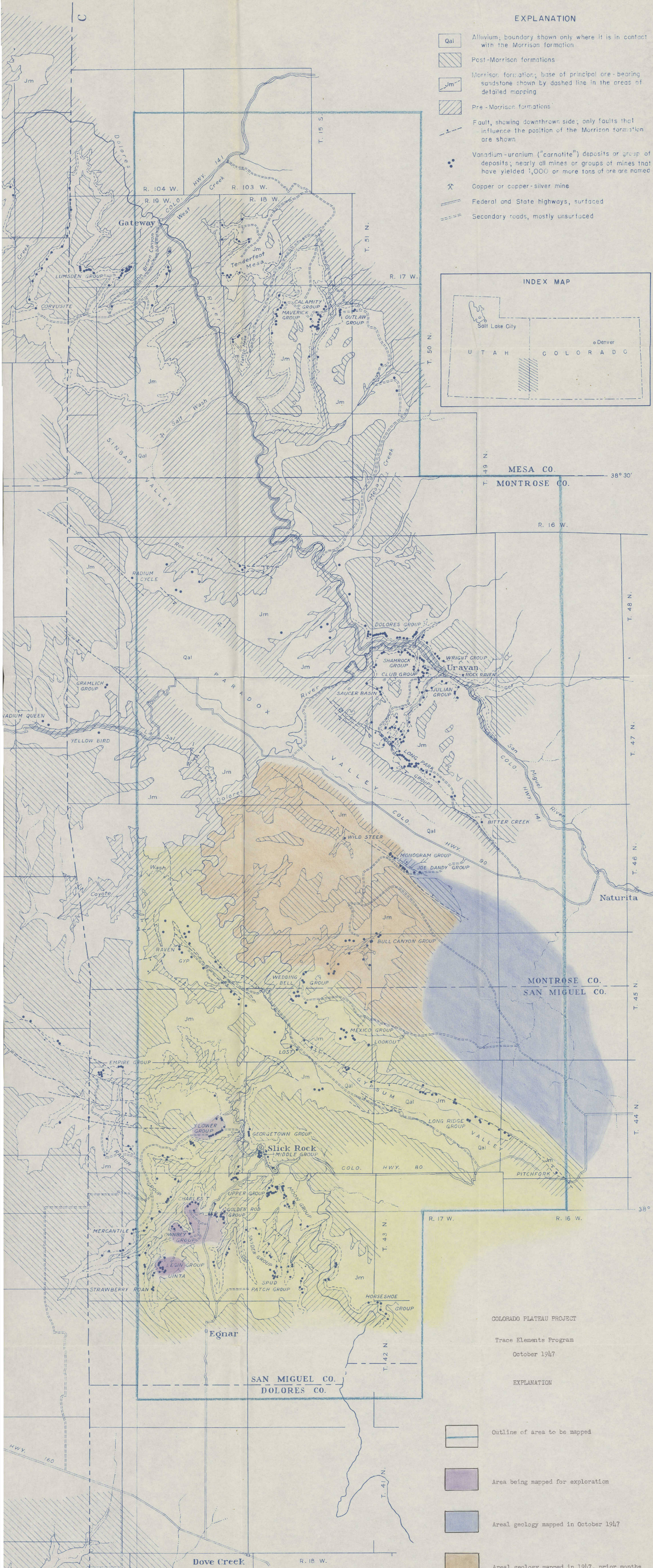
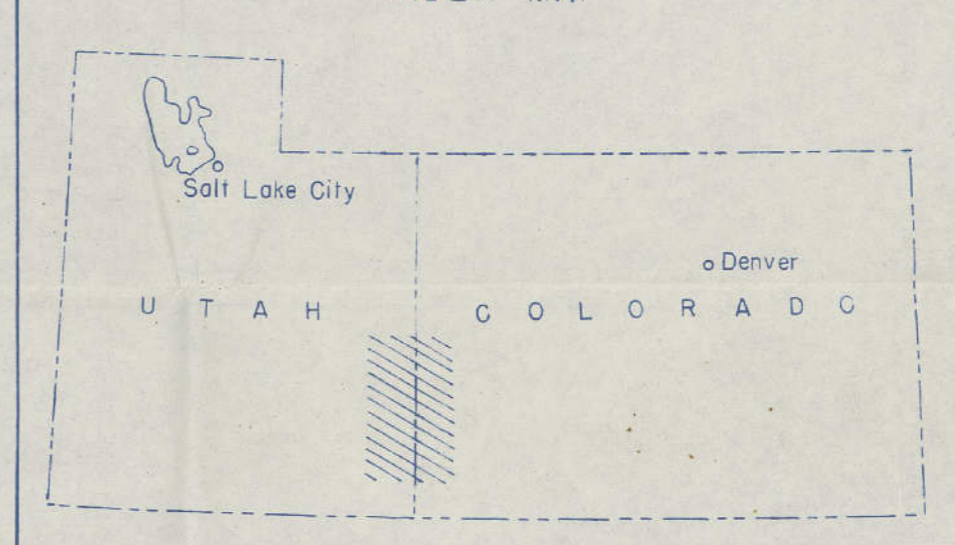


Adjustments necessary in the compilation of the township grid from several sources have resulted in slight distortion of parts of the map.

EXPLANATION

- Alluvium; boundary shown only where it is in contact with the Morrison formation
- Post-Morrison formations
- Morrison formation; base of principal ore-bearing sandstone shown by dashed line in the areas of detailed mapping
- Pre-Morrison formations
- Fault, showing downthrown side; only faults that influence the position of the Morrison formation are shown
- Vanadium-uranium ("carnotite") deposits or group of deposits; nearly all mines or groups of mines that have yielded 1,000 or more tons of ore are named
- Copper or copper-silver mine
- Federal and State highways, surfaced
- Secondary roads, mostly unsurfaced

INDEX MAP



MESA CO.
MONTROSE CO.

MONTROSE CO.
SAN MIGUEL CO.

SAN MIGUEL CO.
DOLORES CO.

COLORADO PLATEAU PROJECT
Trace Elements Program
October 1947

EXPLANATION

- Outline of area to be mapped
- Area being mapped for exploration
- Areal geology mapped in October 1947
- Areal geology mapped in 1947, prior months
- Areal geology mapped before 1947

UNITED STATES GEOLOGICAL SURVEY
BUREAU OF GEOLOGICAL SURVEY

CONTRACT

NO.

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