DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

MISCELLANEOUS FIELD STUDIES
MAP MF-569
SHEET 1 OF 2

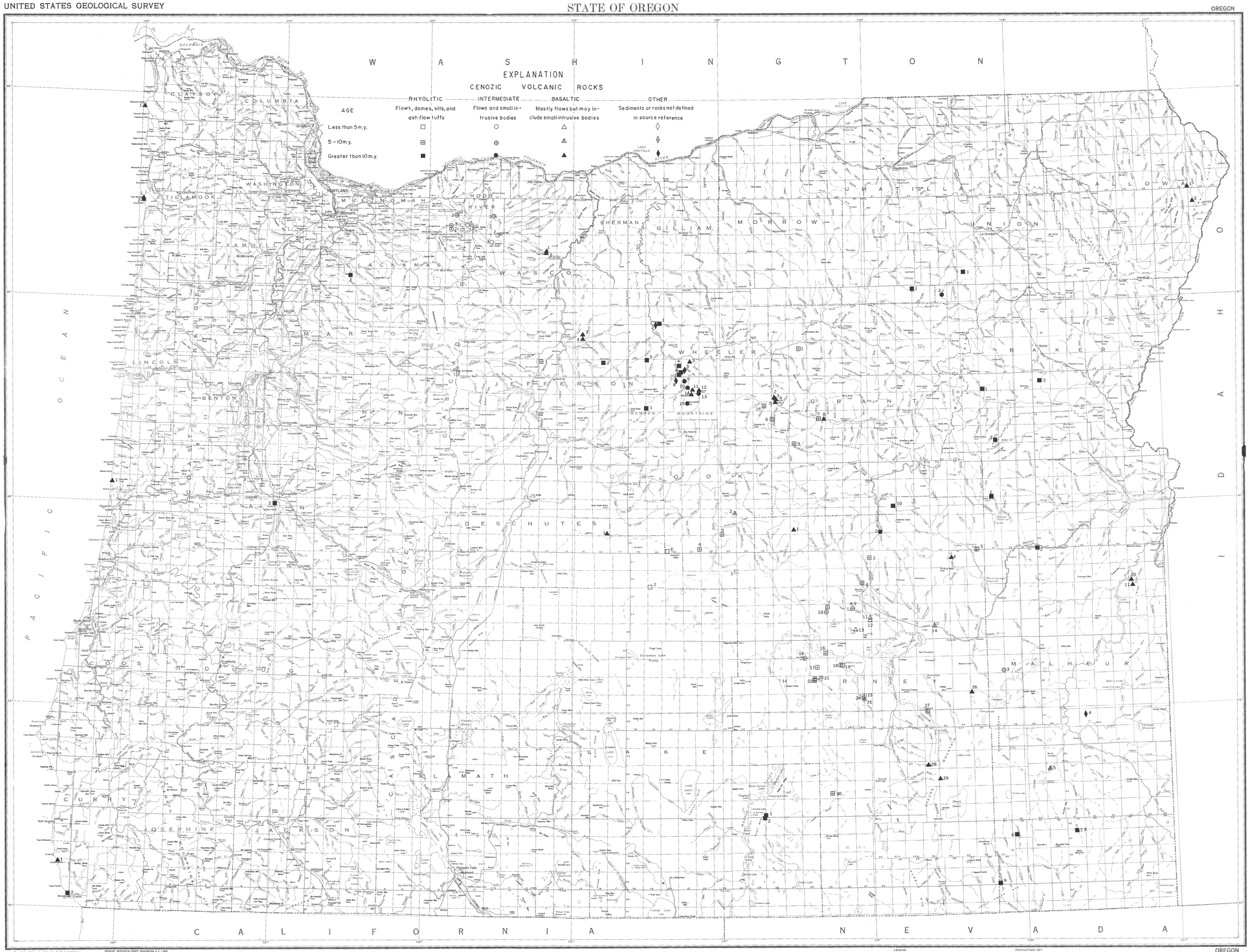
STATE OF OREGON

OREGON

EXPLANATION

CENOZIC VOLCANIC ROCKS

AGE	RHYOLITIC Flows, domes, sills, and ash flow tuffs	INTERMEDIATE Flows and small intrusive bodies	BASALTIC Mostly flows but may include small intrusive bodies	OTHER Sediments or rocks not defined in source reference
Less than 5 m.y.	□	○	△	◇
5 - 10 m.y.	⊞	⊕	◬	
Greater than 10 m.y.	■	●	▲	



Compiled, edited, and published by the Geological Survey
1927 North American datum
Datum is mean sea level

SOURCE DATA:
U. S. Dept. of the Interior Geological Survey topographic maps
U. S. Dept. of the Army Corps of Engineers topographic maps

TOPOGRAPHY—GEOLOGICAL SURVEY, Washington, D. C.—1966

Lambert conformal conic projection
Standard parallels 33° and 45°

0 20 40 60 80 100 Miles
0 20 40 60 80 100 Kilometers

LEGEND
- State capital
- County seat
- City, town, or village
- Selected service airport
- Built-up area shown for towns over 10,000 population

POPULATION KEY
- PORTLAND ..... more than 100,000
- SALEM ..... 25,000 to 100,000
- Astoria ..... 5,000 to 25,000
- Tillamook ..... 1,000 to 5,000
- Canyon City ..... less than 1,000

Population indicated by size of letters

Public Lands administered by the Bureau of Land Management

COMPILED IN 1964-1966
EDITION OF 1966

OREGON
BASE MAP

Base by U.S. Geological Survey, 1966

INDEX TO POTASSIUM-ARGON AGES OF CENOZOIC VOLCANIC ROCKS OF OREGON

By

George W. Walker, G. Brent Dalrymple and Marvin A. Lanphere, 1974

COMPILATION OF POTASSIUM-ARGON AGES OF CENOZOIC VOLCANIC ROCKS OF OREGON

Introduction

Recent studies by the U.S. Geological Survey on natural geothermal systems have created an urgent need for a compilation of the available potassium-argon age measurements on volcanic rocks in Oregon. Because most known areas of potential geothermal energy are closely associated with young volcanic centers, this compilation has been restricted to Cenozoic volcanic and volcaniclastic rocks. Included in the table are the available data from the literature as well as unpublished age and analytical data of the U.S. Geological Survey. The compilation includes all data known to us as of November 1, 1973. Many of the dated samples were collected during reconnaissance mapping done in preparation of the geologic map of Oregon, others were collected in support of paleomagnetic, petrochemical, and regional stratigraphic studies, and several were collected during investigations of areas of late Cenozoic volcanism that seem favorable for potential geothermal energy resources. References to the reports of these studies and to the source of the data are given in the table.

Source references used in this compilation are of several types and include: (1) geologic maps with expanded explanations that contain K-Ar ages but lack supporting analytical data; (2) reports presenting principally K-Ar ages and complete supporting analytical data as well as sample locations; and (3) geologic and geophysical reports that incorporate K-Ar ages both with and without analytical data. In instances (references types 1 and 3) where ages measured by the U.S. Geological Survey have been reported in the literature without supporting analytical data, such data have been included in the table and referenced accordingly.

The index map is intended to show the geographic distribution of the available data as well as the general rock type and approximate calculated age of the dated unit. The age class intervals (<5 m.y., 5-10 m.y., and >10 m.y.) were selected because of the relative importance of young volcanic centers to geothermal energy studies. The map is at a scale of 1:1,000,000 and has the same base as the Geologic Map of Oregon west of the 121st Meridian (Wells and Peck, 1961), and the recently published Preliminary Geologic Map of Eastern Oregon (Walker, 1973) so that the user of this compilation can easily locate the dated units on these geologic maps.

This compilation is intended only to show the general distribution and type of available age data on Cenozoic volcanic rocks in Oregon. We have made every attempt to avoid errors, but urge the user of this compilation to carefully check the source references before referring to individual data contained herein.

Location

The data are tabulated in numerical order by counties, which are listed alphabetically. Where possible, the locations are given by latitude and longitude to the nearest 0.1'. For most samples, the location is probably accurate to ± 0.1' but for some the accuracy is probably no better than ± 0.2-0.3', largely because base maps for some areas are too generalized or are of too small a scale for accurate plotting. Where authors of published references have given descriptive sample localities, the localities were plotted on the appropriate topographic map of largest scale and the locations translated into latitude and longitude. For those few samples where the localities were too vaguely described to be plotted, we have included an abbreviated verbal locality description, e.g., township and range, in place of the latitude and longitude. Such samples are not plotted on the index map and have not been given a map number; the reader should check the source reference for additional location information.

Geologic units and subdivision of rock types

The dated samples represent a number of different geologic or formational units and a diversity of compositions, textures, and structures, as well as different intrusive, eruptive, or depositional histories. In order to simplify plotting on the index map, we have arbitrarily categorized these diverse rock types into four groups: (1) basaltic rocks, dominated by diktytaxitic, olivine-bearing basalts in southern Oregon and by tholeiitic basalts in northeast Oregon; (2) rhyolitic rocks, dominated by rhyolite, soda rhyolite, and rhyodacite, in the form of ash-flow tuffs, flows, domes, and a few intrusive bodies; (3) intermediate rocks, mostly represented by pyroxene andesite or hornblende-pyroxene andesite flows; and (4) other rock types, including tuffaceous sediments and air-fall tuffs.

The geologic or formational unit listed in Table 1 is that given in the reference or that designated on existing geologic maps. It should be noted, however, that some individual units--particularly widespread ash-flow tuffs and some basalts--have been given several different formational names and that formational units separated in one place represent undifferentiated parts of other named units in adjacent areas. For example, several of the large volume ash-flow tuffs of the Harney Basin that were incorporated in the Danforth Formation by Piper, Robinson, and Park (1939) have been variously designated as the Rattlesnake Formation or Rattlesnake welded tuff, part of the Drewsey Formation, and silicic marginal facies of the Columbia River Group in adjoining areas. Also recent work in the Harney Basin (Greene, Walker, and Corcoran, 1972) has separated some of the ash-flow tuffs from what was originally called Danforth Formation; an early widespread crystal-rich ash-flow tuff has been informally designated as welded tuff of Devine Canyon and a late pumiceous ash-flow tuff as welded tuff of Double O Ranch. We have attempted, where possible, to cross-reference sample data to help resolve this duplication of formational names. No entry has been made in the geologic unit column of Table 1 for samples from unnamed geologic units.

Potassium-argon age data

We have made no attempt to evaluate any of these data but have tabulated them as presented in the source references. To make the data more easily comparable, however, we have presented the analytical data as weight percent potassium oxide and moles per gram of radiogenic argon-40, recalculating those data published in other units. The analytical uncertainties generally are those quoted by the authors. Where 2-sigma errors or 95-percent confidence levels were specified, we have recalculated the uncertainties to the 1-sigma level. Where authors did not state the confidence level of their plus-or-minus figures, we have assumed that they are standard deviations, but have no certainty that this is so. The errors given for all U.S. Geological Survey age measurements are estimated standard deviations of analytical precision. Where uncertainties are not tabulated, none were given in the source reference. Many authors present duplicate potassium and/or argon analyses. For these data, we have listed means and indicated in parentheses the number of measurements (n) reported in the source reference.

References

Greene, R. C., Walker, G. W., and Corcoran, R. E., 1972, Geologic map of the Burns quadrangle, Oregon: U.S. Geol. Survey Misc. Geol. Inv. Map I-680, scale 1:250,000.

Piper, A. M., Robinson, T. W., and Park, C. F., 1939, Geology and ground-water resources of the Harney Basin, Oregon: U.S. Geol. Survey Water-Supply Paper 841, 189 p.

Walker, G. W., 1973, Preliminary geologic and tectonic maps of Oregon east of the 121st meridian: U.S. Geol. Survey Misc. Field Studies Map MF-495, 2 sheets, scales 1:500,000 and 1:1,000,000.

Wells, F. G., and Peck, D. L., 1961, Geologic map of Oregon west of the 121st meridian: U.S. Geol. Survey Misc. Geol. Inv. Map I-325, scale 1:500,000.

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