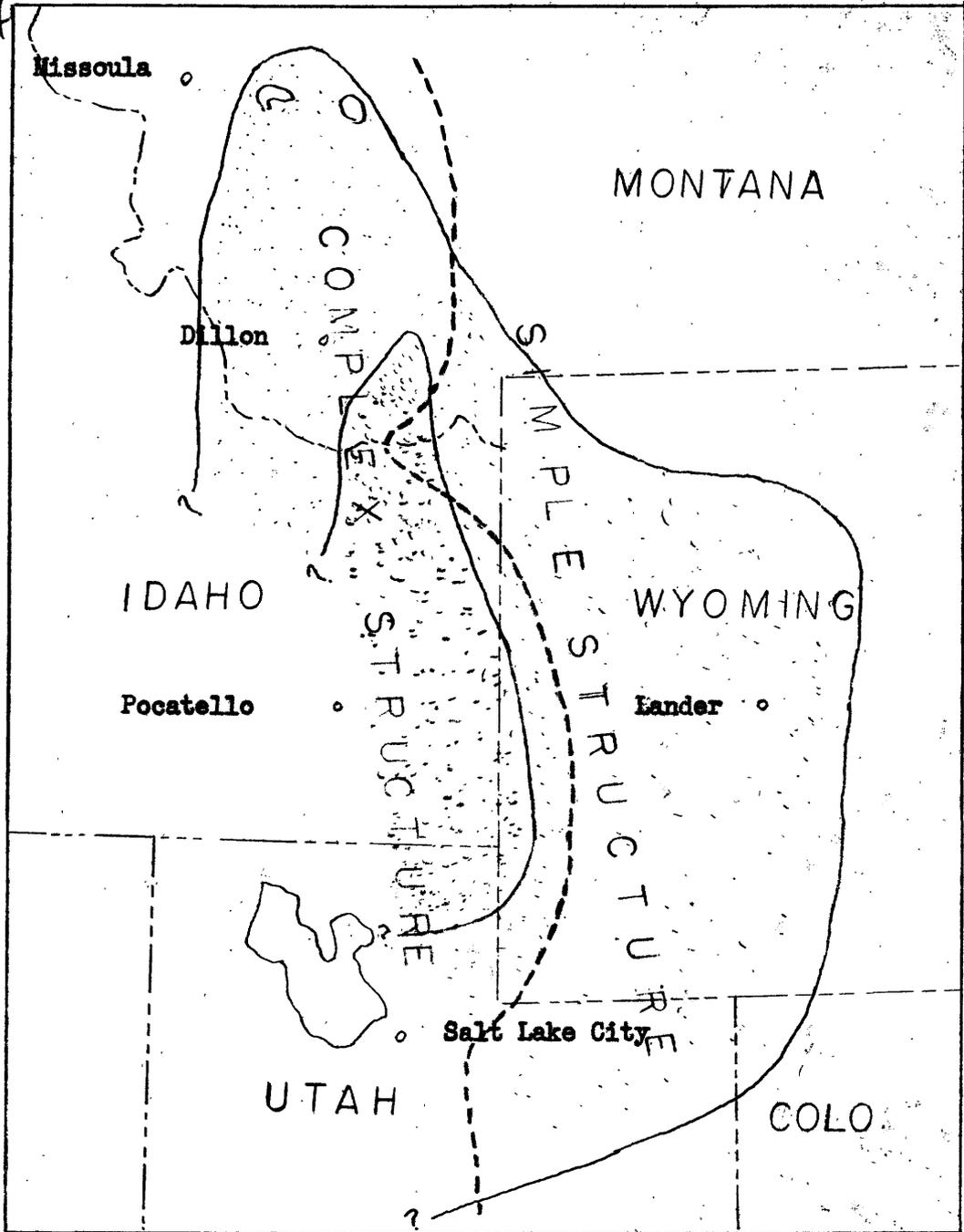


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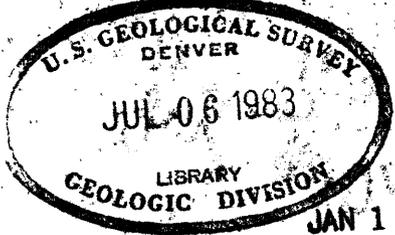
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THE WESTERN PHOSPHATE FIELD

Phosphate in the Phosphoria formation and close stratigraphic equivalents extends over stippled area. Movable deposits containing more than 31 per cent P₂O₅ are limited to heavily stippled area. Boundary between areas of simple and complex structure shown by heavy dashed line.

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Utah, but their total thickness is not as great as in southeastern Idaho. The minable phosphate zones in most of the western part of the field contain about 0.007 to 0.02 percent uranium. The most uraniferous beds yet found are those of the upper phosphate zone along the Wyoming border; they contain 0.015 to 0.035 percent uranium.

Reserves

Plainly the reserves of highly uraniferous and phosphatic rocks are restricted to the western part of the field. Because of the tight folds, steep dips, and numerous faults many of the deposits are not suitable for mining, however, and of those that are minable most must be mined by underground methods.

Reliable estimates of minable reserves cannot be made in advance of detailed geologic mapping and, in some places, detailed sampling. This is not because the grade and thickness is difficult to establish, but because in many places it is generally a moot question as to whether or not the phosphatic beds are faulted out, or so mashed by folding as to be unminable. The following estimates are therefore no more than an indication of the general order of magnitude of reserves.

Preliminary and incomplete estimate of reserves of phosphate rock suitable for mining in Permian rocks of the Western Field 1/ (millions of short tons)

Suitable for open-cut mining		Suitable only for underground mining (above entry level)	
+ 31% P ₂ O ₅	24-31% P ₂ O ₅	+ 31% P ₂ O ₅	24-31% P ₂ O ₅
25-50	75-250	350-1,000	1,100-4,000

1/ The estimates are of rock in the ground; no allowance is made for loss due to dilution or unfavorable structural conditions beyond those that can be judged from surface outcrops. Minimum mining width is assumed to be 3 feet in both open-cut and underground mining. The minimum figure stated for each class is based upon estimates of deposits

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with which the Geological Survey is familiar; the maximum figure is a guess as to the total reserves, including those that may exist in areas as yet largely unappraised even in preliminary fashion.

It is not possible to estimate the uranium content of these reserves accurately, but it is safe to assume that the bulk of the phosphate rock contains at least 0.008 percent and probably 0.01 percent uranium.

Status of the Geological Survey's investigations
of the western phosphate field

The Geological Survey has aimed at an appraisal of the resources of the Phosphoria formation of a type that will enable government to evaluate its resource-potential, not only as regards uranium, but phosphate, vanadium and other minor elements as well; that will allow industry to make a preliminary selection of deposits suitable for mining; and that will encourage the companies to recover elements of possible by-product value.* Although our purposes are thus much broader than those of the Atomic Energy Commission, which has paid about a third of the cost of the investigation since it was renewed in 1947, the field work required to achieve the goals of both agencies is about the same. In other words, the deposits must be mapped and sampled, no matter whether the search is for one element or twenty.

We originally planned to map (on a scale of 1:62,500) every quadrangle in the western field known to contain phosphate; to re-map (on a scale of 1:12,000) those areas containing the most valuable deposits; and to sample the phosphatic shale member of the Phosphoria formation

*Information acquired will not serve as a basis for measuring reserves or for planning specific mining operations. The detailed mapping, drilling, and sampling necessary for that must be done by industry, not government.

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at intervals of 3 to 6 miles over the field. It appears now that all of the quadrangle mapping and sampling originally planned will not be needed to achieve the broad objectives stated above, for, as previously described, the significant deposits appear to lie only in the western part of the field. Therefore, we intend to continue the original sampling program only in the Bear River region and western Montana, though we will sample a few additional sections at widely spaced intervals in the eastern part of the field (in Wyoming and northern Utah) to place our preliminary conclusions as to the merits of the deposits there on a firmer footing. After the close of the 1949 or 1950 season, when the five quadrangles now in progress are completed, we will continue quadrangle mapping at the rate of about one party a season (i.e., one quadrangle every two or three years).

Of the total estimated cost of the project, approximately 60 percent will have been paid for at the close of fiscal '50. All of the sampling will be completed by the close of the 1951 season, and all of the 1:12,000 mapping (contemplated only in the Aspen Range-Dry Ridge area in the Bear River region and in the Centennial Range in Montana) likely will be completed at the end of the 1953 season. Much more time, possibly two years, will be required to complete all the reports that will be required, but it is likely that a final appraisal of the uranium reserves can be completed in the winter of fiscal 1954.

June 17, 1949

Montpelier, Idaho

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