

Structure and Orogenic History of the Southwestern Part of the John Day Uplift, Oregon

By H. J. Buddenhagen*

Predominantly marine sediments ranging in age from Devonian to Cretaceous, unmetamorphosed, and not intruded by large igneous bodies, are exposed in the John Day Uplift** of central Oregon (figure 1). Detailed mapping of these beds and their structural features in the southwestern part of the uplift has provided important clues to the pre-Tertiary geological history of the vast lava-covered plateau region east of the Cascade Mountains. It is expected that the results of this work will be published as a bulletin of the State of Oregon Department of Geology and Mineral Industries within the next 12 to 18 months. In the meantime, the following is offered as a brief preview and summary of the more important findings and implications.

The distribution and structural relationships of the major stratigraphic units are shown on the accompanying generalized maps (figures 1 and 2). These units are listed and briefly described in the following paragraphs. For more detailed description of the stratigraphy of this area, reference may be had to the reports listed at the end of this paper.

Stratigraphy

Paleozoic

Devonian: fossiliferous limestone with a little gray shale; depositional relationships to older and younger formations unknown.

Mississippian: fossiliferous limestone, marl, and sandstone.

Pennsylvanian: clastic sediments, mostly of non-marine origin, consisting of greenish mud-siltstones containing sparse fossil plants; feldspathic sandstones with occasional laminae and lenses of magnetite grains; and coarse, rounded porphyry boulder conglomerates.

* Consulting geologist, Grants Pass, Oregon.

** The term "John Day Uplift," as used herein, refers to the inlier of pre-Tertiary formations which are exposed largely within the triangle formed by lines joining the settlements of Burns, John Day, and Paulina in east-central Oregon. The uplift is bordered on the north by the John Day River and it is drained principally by tributaries of this river. The town of John Day is located on the north edge of the uplift 12 miles west of its northeast corner.

Permian (early): limestones containing fusulinids and other fossils with interbedded green and maroon cherts, siltstones, and sandstones. Trilobite fragments were found in an isolated fault block of Permian limestone--the only known trilobite occurrence in Oregon*.

Mesozoic-Paleozoic?

Birdsong beds: interbedded fine-grained sandstones, siltstones, chert fragment grits and conglomerates, bedded chert and massive, chert-like, felsitic andesite; unfossiliferous; stratigraphic position and age uncertain. The principal occurrence is in the hills 1½ to 3 miles west of the Weberg and H. Robertson ranch buildings.

Mesozoic

Triassic: an unfossiliferous lower section several thousand feet thick, consisting of chert fragment and volcanic wacke grits and sandstones with lenticular conglomerates, overlain unconformably by a section of marine origin containing fossils of Late Triassic age**. The latter has a limestone boulder conglomerate at the base which is overlain by thinly interbedded black organic shale, siltstone, fine-grained graded sandstone, sandy limestone, and calcareous sandstone with occasional zones of rubbly limestone and thin, agate-pebble conglomerates.

Jurassic: many thousand feet thick, predominantly thinly interbedded, sparsely fossiliferous (ammonites) tuffaceous siltstone, black shales, and volcanoclastic sandstones with a relatively thin (200- to 300-foot) basal section composed of highly fossiliferous sandy limestone and calcareous sandstone with interbedded organic black shales. The fauna of the basal beds, except the Hettangian, referred to later, includes the unique Plicatostylus and abundant pelecypods and brachiopods, as well as distinctive ammonites.

Upper Cretaceous: fossiliferous sandstone with minor interbedded siltstone and conglomerate.

Tertiary

Miocene and Pliocene: Tertiary lavas surround the uplift. In the southwest part, with which this article is concerned, these are mostly basalts, and mostly post-Columbia River Group in age. Younger ridge-capping pumiceous tuffs and rhyolitic lavas occur both within and outside the inlier in the same area. Underlying both, although not everywhere present, is a thin, widespread zone of bentonitic clay and tuffaceous sand associated with uncemented conglomerate composed of well-rounded quartzite pebbles and boulders. This zone probably correlates with the Mascall Formation of the John Day Valley. Pre-Miocene Tertiary volcanic rocks and sediments have not been recognized in the area under discussion.

* Identification by D. A. Bostwick.

** Fossil determinations and correlation by N. J. Silberling.

Structure and Tectonic History

Because of the complex structure, the apparent discontinuity of the beds, and scarcity of outcroppings, the geology of the Paleozoic area is very obscure. It is known from fossil evidence that formations of Devonian to Permian age are present, but it has not been possible to establish a proper lithologic-stratigraphic column for the Paleozoic section based on observed superposition of beds; and the basement on which the oldest Paleozoic sediments were deposited is unknown. Consequently, deciphering the geology of the Paleozoic area is akin to working a jigsaw puzzle with many of the pieces missing. It is clearly evident, however, that these beds have been extremely compressed and much faulted.

Paleozoic-Triassic episodes

Although specific unconformities in the Paleozoic section, indicative of diastrophic episodes, cannot be detected with assurance because of the complex and obscure structure, it cannot be doubted that tectonic activity has occurred during the late Paleozoic-Early Triassic interval, perhaps repeatedly.

The non-marine origin of much of the Pennsylvanian section, with its coarse conglomerates, in contrast with the fossiliferous limestones and sandstones of the Mississippian, indicates an intervening period of uplift and diastrophism.

The absence of Late Permian deposits suggests that the area was either above sea level during this time interval, with consequent non-deposition, or that sediments which may have been deposited during this period were uplifted and eroded during Early or Middle Triassic time. The latter possibility is supported by the reported occurrence of a Late Permian fusulinid in a limestone boulder from an Upper Triassic conglomerate (Bostwick and Nestell, 1965).

Additional evidence of diastrophism in the Late Permian-Early to Middle Triassic interval is present in the area between Williams Reservoir and Grindstone Creek (to the north), where there is a strong angular unconformity between Early Permian beds and overlying limestone boulder-bearing conglomerates of probable Upper Triassic age.

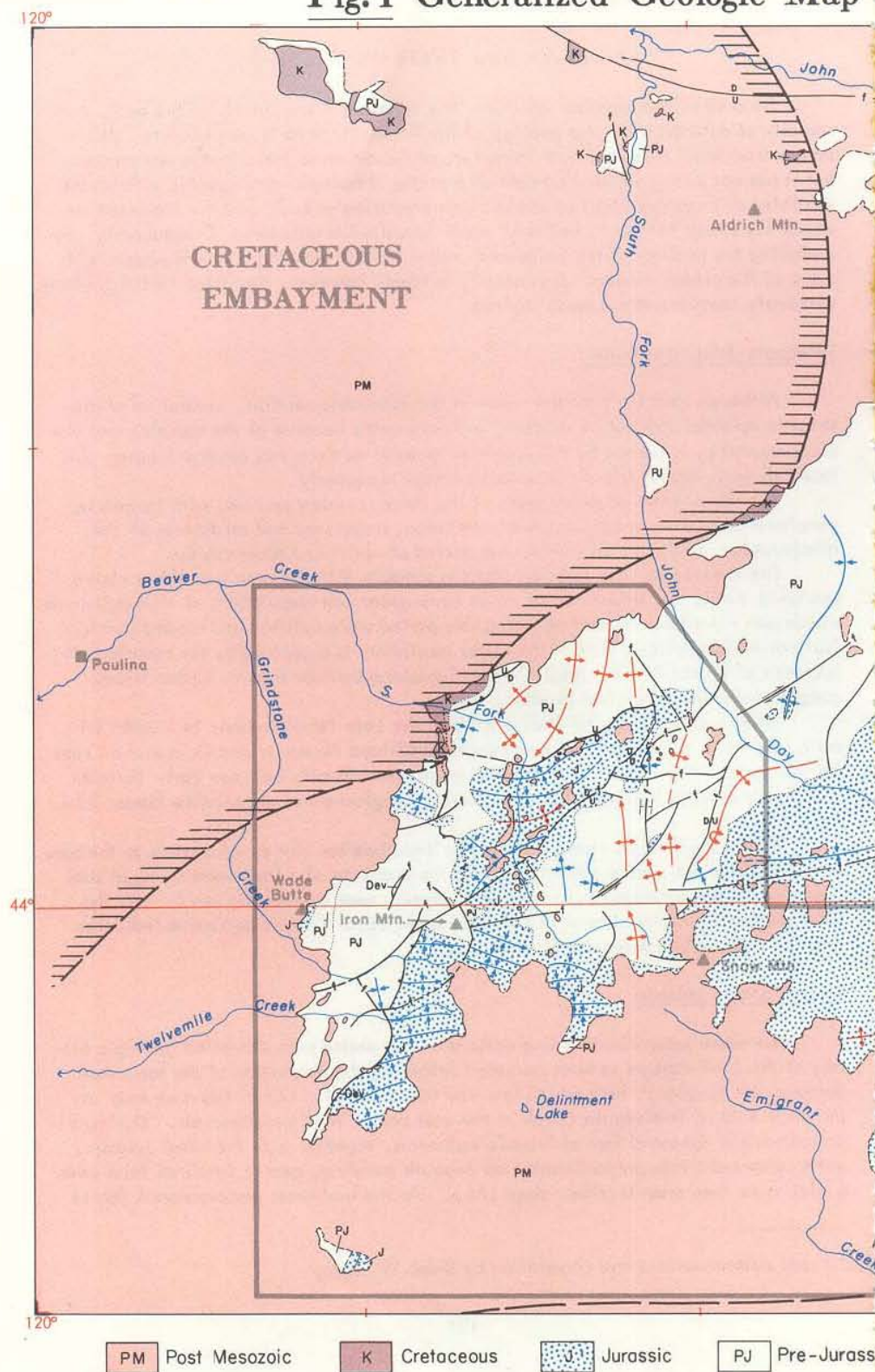
Within the Triassic itself, Paleozoic limestone boulder conglomerate at the base of the fossiliferous marine section suggests the presence of a land mass rising at that time and exposing Paleozoic limestones to erosion near a subsiding basin; but the fine-grained character of most of the subsequent Upper Triassic sediments indicates that the deformation was probably not great.

Lower Jurassic episode

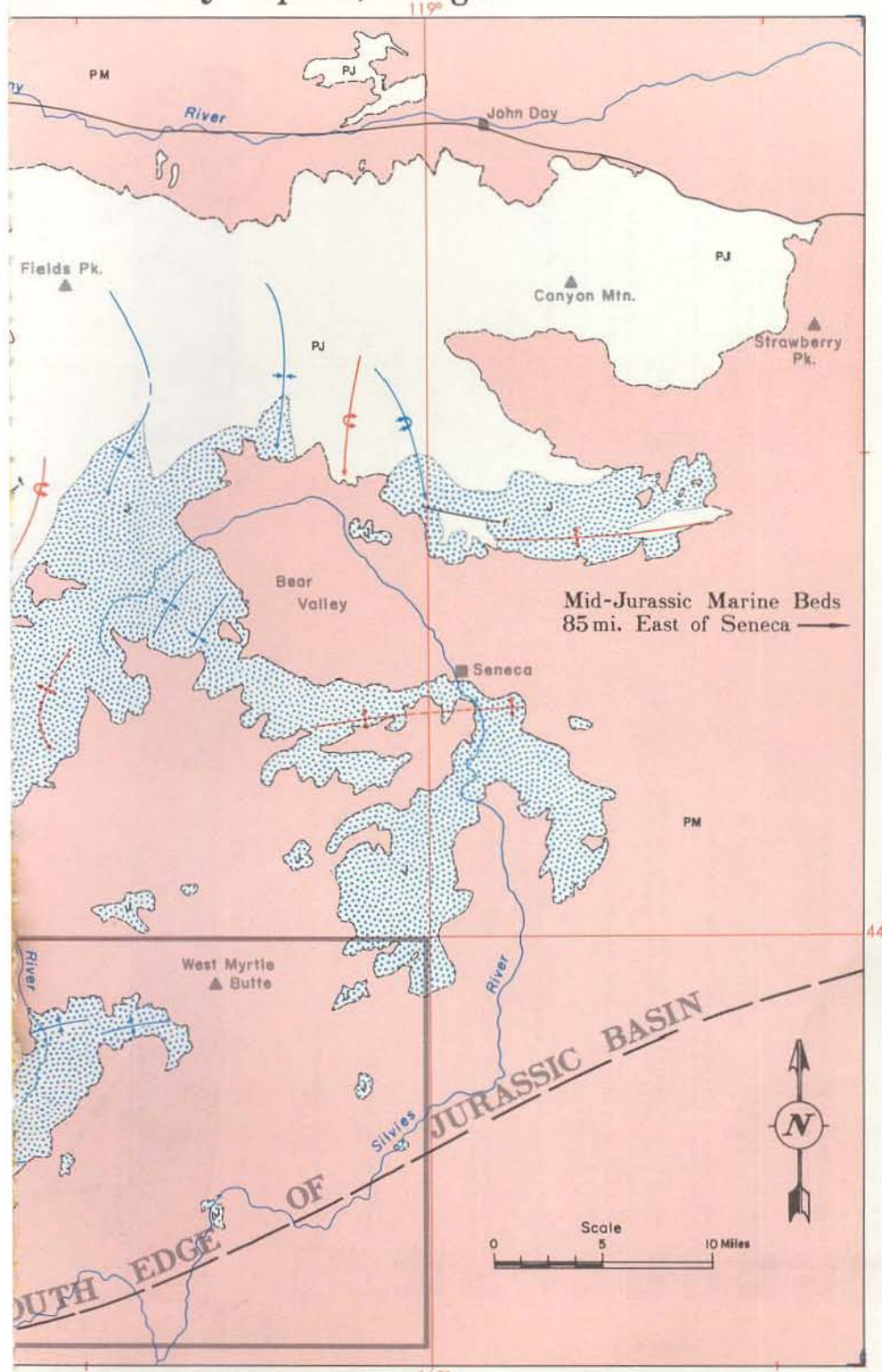
The major mountain-building episode in the entire post-Devonian geologic history of the area appears to have occurred following the deposition of the lowermost Jurassic (Hettangian)* beds which are now found cropping out in this area only on the north side of Twelvemile Creek at the east end of Williams Reservoir. During this period several thousand feet of Triassic sediments, together with the basal Jurassic, were compressed into predominantly north-south trending, nearly isoclinal folds over a wide area (see cross section, page 134). As the east-west compressional forces

* Fossil determinations and correlation by Ralph W. Imlay.

Fig.1 Generalized Geologic Map

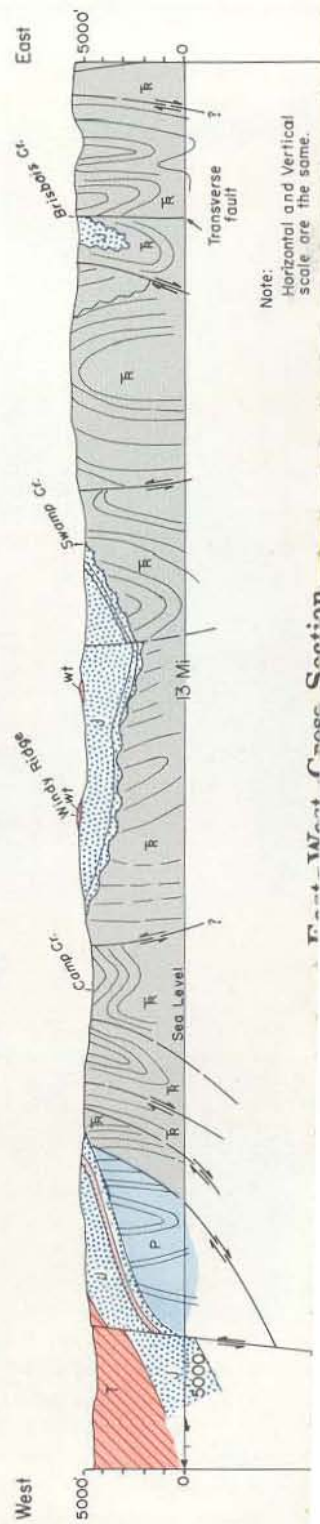


John Day Uplift, Oregon



Area mapped by the author. Geology outside this area adopted from maps by C.E. Brown-T.P. Thayer & W.R. Dickinson-L.W. Vigorss

Explanation



continued to be active, low-angle, westerly-dipping thrust faults developed on which Paleozoic and Birdsong beds overrode the Triassic to the east. The large limestone blocks at the northeast end of the Paleozoic area and the steeply dipping bedded chert capping the three hills directly south of the Williams Reservoir are considered to owe their position to this faulting. They now remain as outliers, or klippe, as a result of subsequent erosion of the surrounding area (figure 2).

The irregular lobate contact between Paleozoic-Triassic rocks on the west and the Triassic-Jurassic beds on the east, which bears about N. 20° E. from the vicinity of the Burger Ranch in the southwest corner of the map to near the north edge of the map (figure 2) marks the outcrop area of this thrust-fault zone. The overthrust mass appears to have broken into several blocks, probably separated by nearly vertical transverse faults, which have moved eastward differentially, some moving farther than others, and at different times.

Upper Jurassic-Lower Cretaceous episode

Relatively soon after this mountain-building episode, a major easterly-trending trough, as much as 30 miles wide and more than 100 miles long, developed, in which thousands of feet of marine Jurassic sediments accumulated. There is no record of uppermost Jurassic or Lower Cretaceous sedimentation in this trough, so it is concluded that the sea had withdrawn prior to this time, probably because of regional uplift. It was during this depositional hiatus that north-south compressional forces became dominant, resulting in folds in the Jurassic with generally easterly-westerly trends, as shown on the accompanying maps. The thrust-fault contact between the Triassic and Jurassic, extending easterly from near the Colpitts Ranch, and between the Jurassic and older formations in the Burger Ranch-Iron Mountain area, also probably occurred during this period of tectonic activity.

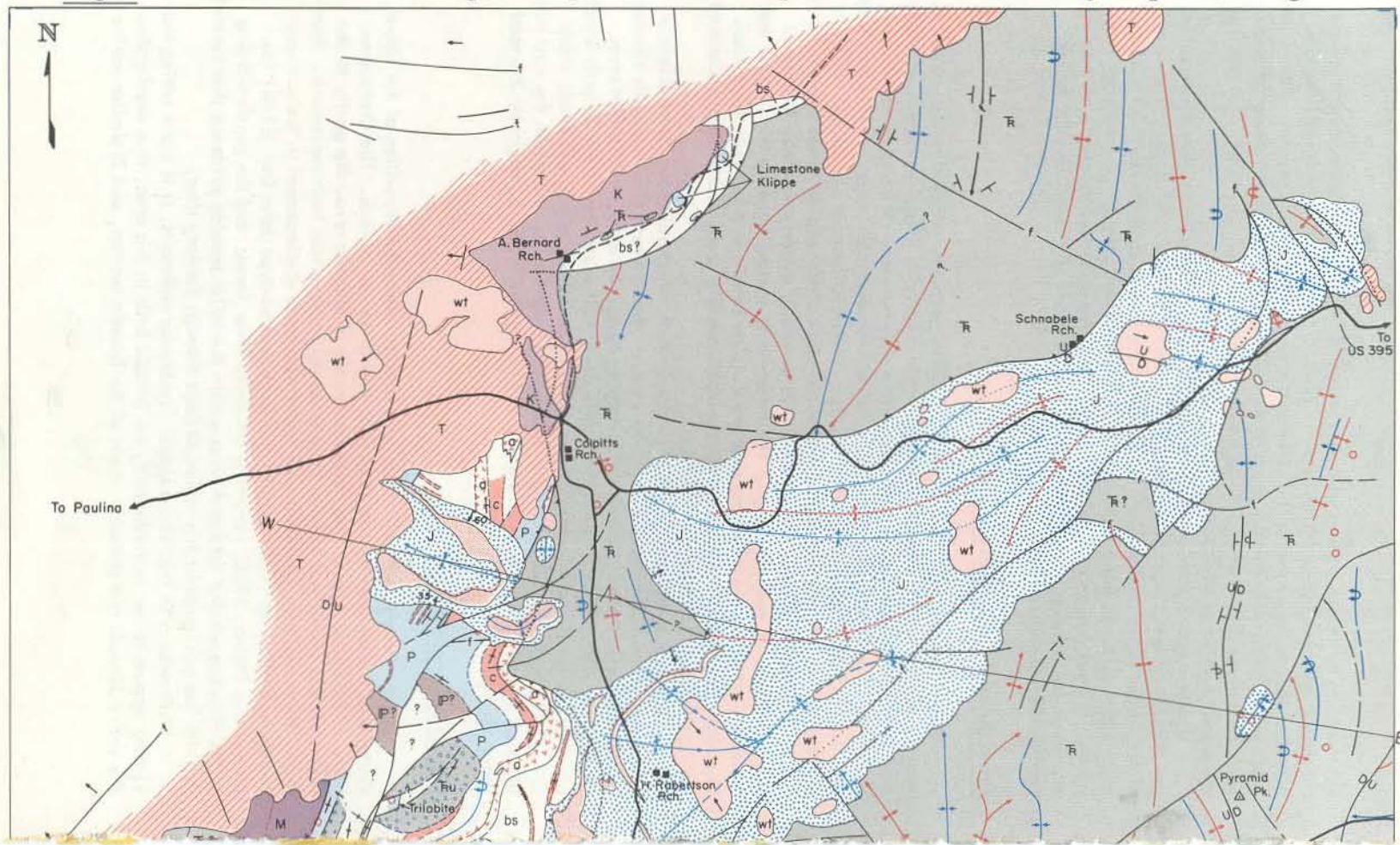
The pre-Jurassic rocks, with their north-south structural grain, were affected by this north-south compression in various ways: development of 1) markedly sinuous trends of structural axes and vertically dipping beds; 2) deep, saddle-like cross folding, for example, the one about a mile and a half southwest of the Colpitts Ranch, which preserves Jurassic beds in a west-plunging syncline; and 3) extremely steep anticlinal plunge dips terminating in thrust-type cross-faults, present on the west side of lower Brisbois Creek south of the east end of the Paulina-U.S. Highway 395 road shown on figure 2.

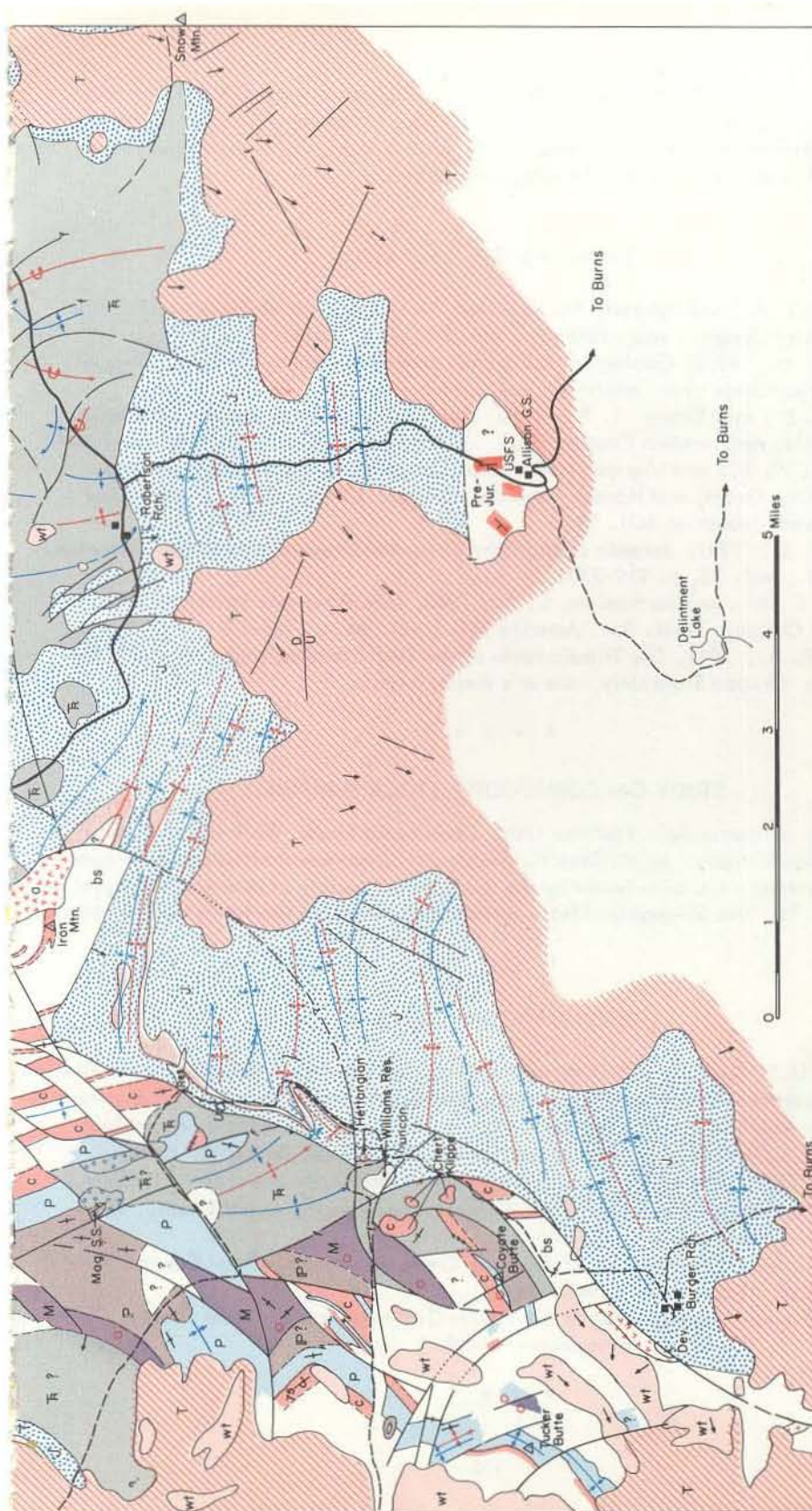
Post-Cretaceous activity

Except for regional uplift, tectonic activity since the deposition of the Upper Cretaceous has been minor compared with that of earlier periods. The Cretaceous beds, cropping out only in the northwest corner of the map area, dip gently to the northwest and appear not to have been involved in important fault movements. However, the prevalence of normal type faults with small displacement in the surrounding upper Tertiary volcanic terrain, the large reverse-type John Day (River) fault (Brown and Thayer, 1966) involving Columbia River lavas; and the gentle warping of the Pliocene welded tuffs and lavas within the inlier provide evidence that tectonic activity has continued in this region at least through Tertiary time.

With respect to the marine Upper Cretaceous sediments, it is worth noting that: 1) they appear to rest unconformably on Triassic beds in this area, thus overlapping the entire Jurassic and probably much of the Triassic section, and 2) similar marine

Fig.2 Generalized Geologic Map of the S.W. part of the John Day Uplift, Oregon





Upper Cretaceous deposits occur in north-central and northwestern Washington and in southwestern Oregon. The implication is that much of the terra incognita below the Tertiary lavas westerly from this area is underlain by unmetamorphosed Cretaceous, and probably also Jurassic and Triassic, marine beds.

Selected Bibliography

- Bostwick, D. A., and Nestell, M. K., 1965, A new species of Polydiexodina from central Oregon: Jour. Paleont., vol. 39, p. 611-614.
- Brogan, J. H., 1952, Geology of the Suplee area, Dayville quadrangle, Oregon: Oregon State Univ. master's thesis, unpub.
- Brown, C. E., and Thayer, T. P., 1966, Geologic map of the Canyon City quadrangle, northeastern Oregon: U.S. Geol. Survey Misc. Geol. Inv. Map 1-447.
- Dickinson, W. R., and Vigrass, L.W., 1965, Geology of the Suplee-Izee area, Crook, Grant, and Harney Counties, Oregon: Oregon Dept. Geology and Mineral Industries Bull. 58.
- Lupher, R. L., 1941, Jurassic stratigraphy of central Oregon: Geol. Soc. America Bull., vol. 52, p. 219-270.
- Merriam, C. W., and Berthiaume, S. A., 1943, Late Paleozoic formations of central Oregon: Geol. Soc. America Bull., vol. 54, p. 145-171.
- Nesbitt, R. A., 1951, The Triassic rocks of the Dayville quadrangle, central Oregon: Oregon State Univ. master's thesis, unpub.

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STUDY ON CORNUCOPIA STOCK PUBLISHED

"Petrology of Cornucopia Tonalite Unit, Cornucopia Stock, Wallowa Mountains, Northeastern Oregon," by William H. Taubeneck, Department of Geology, Oregon State University, has been issued by the Geological Society of America as Special Paper No. 91. The 56-page booklet is a study of the nature and origin of the tonalite.

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USGS MAPS ON OPEN FILE

The three U.S. Geological Survey maps listed below have been placed on open file in the Department's Portland office, where they are available for consultation. Material from which copies of these maps may be made at private expense is available from the U.S. Geol. Survey, 830 N.E. Holladay St., (P.O. Box 3202) Portland, Oregon. 97208. Maps are accompanied by explanation, and the scale is 1:62500.

Preliminary geologic map of the Courtrock quadrangle, Grant County, Oregon, by T. P. Thayer and C. Ervin Brown.

Preliminary geologic map of the Long Creek quadrangle, Grant County, Oregon, by T. P. Thayer and C. Ervin Brown.

Preliminary geologic map of the Prairie City quadrangle, Grant County, Oregon, by T. P. Thayer, C. Ervin Brown, and R. L. Hay.

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THE OUTLOOK CONCERNING A RISE IN THE PRICE OF GOLD

Broadcast talk by Dr. J. E. Holloway
South African Broadcasting Co., May 18, 1967

On April 21, 1967, the Northwest Metals and Minerals Conference presented an all-day session discussing the problems and relations of gold and money. This was the third Gold and Money Session to be held in Portland since 1960. As usual, the speakers were authorities in the fields of mining, economics, and banking. The titles of the papers and their authors were as follows:

- (1) Have 6,000 years of gold mining exhausted the world's gold reserves?
Dr. Paul M. Kavanagh (Vice President - Exploration, Kerr Addison Mines, Ltd., Toronto, Ontario, Canada).
- (2) Gold or authoritarian money - Dr. John E. Holloway (Director, Barclays Bank, Johannesburg, South Africa).
- (3) Is gold as good as the dollar? - Dr. Lorie Tarshis (Professor of Economics, Stanford University, Stanford, Cal.).
- (4) Gold as an economic fever thermometer - C. Austin Barker (Partner-Economist, Hornblower & Weeks - Hemphill Noyes, New York City).

A panel discussion was held during the afternoon of the session, at which time the above-noted authors of papers discussed differences of opinions on gold and money. Dr. Donald H. McLaughlin (Chairman of the Board, Homestake Mining Co., San Francisco, Cal.) and Mr. Angus C. Collie (Secretary-General, Gold Study Committee, Chamber of Mines of South Africa, Johannesburg, S.A.) moderated and participated in the discussion.

The papers presented at the session, the verbatim transcript of the testimony, papers by Dr. McLaughlin and Mr. Pierre R. Hines (Co-Chairman of the session), and the June, 1967 statement of the Hon. Joseph W. Barr, Undersecretary of the Treasury, before the House Internal and Insular Affairs Committee, will be available through the State of Oregon Department of Geology and Mineral Industries, 1069 State Office Building, Portland, Oregon 97201. Publication of the "Proceedings of the Third Gold and Money Session" will be completed by August 1, 1967.

Following his return to South Africa, Dr. John E. Holloway was interviewed by the South African Broadcasting Co. The text of the interview is given below. Dr. Holloway is one of South Africa's most distinguished citizens. A few of his many positions in his long career include: Professor of Economics, Pretoria 1922-1925; Director of the Office of Census and Statistics 1925-1933; Secretary for Finance 1937-1950; Ambassador of South Africa to the United States 1954-1956; High Commissioner for the Union of South Africa in London 1956-1958. He is the author of a number of publications including "The International Monetary Fund" and "The Debacle of Money."

- Q. I imagine I am not far from the point if I guess that in your recent overseas trip you gave some attention to the price of gold.
- A. You guess right. Since Mr. Havenga initiated the discussion on the revaluation of gold in 1949, I have kept a close watch on all the operative forces which could affect the price of gold. I am, therefore, sensitive to changes in the climate.

- Q. Did you notice any changes abroad in the sentiment about the price of gold?
A. I will have to divide my answer to that question into three parts:

Firstly, there is no change in the attitude of the American Government. They say the price is \$35 an ounce, and there it shall remain. This is, however, not of any importance. Even if they decided to change their policy, it would be extremely foolish to say anything about it until they could act.

Secondly, I noticed that an increasing number of Americans both in business and in academic circles now protest that America is selling her gold too cheaply.

Thirdly, and this is the most important because it is concerned with fundamental operative forces, the question arises how the stern realities are influencing the future of the price of gold.

- Q. Would you enlarge on these points?
A. Yes, particularly about the last two.

- Q. The second is whether America is selling her gold too cheaply.
A. Yes. The United States accumulated her large stocks of gold particularly in the years 1945 to 1949. Prices were then much lower than they are now. In other words, they gave more commodities in exchange for an ounce of gold than they now receive for it. When they bought their gold it was relatively dear. As a result of their policy of pegging the price of gold during a period when commodities were steadily becoming dearer, they now receive fewer commodities for gold. When they must pay with gold today their decision to keep gold cheap operates against them.

- Q. That is clear enough. Don't they understand it?
A. Some of them certainly understand it and say that the U.S.A. should not sell its gold so cheaply. The American Treasury surely understands it too, because they are no fools. They, however, accept it because up to the present it has been their opinion that other considerations outweigh this disadvantage. To understand how the present position has arisen it is necessary to know its history. In the last 15 years the U.S.A. has lived in debt. In other words in every one of these years, except one, she has spent more abroad than she has earned abroad. She has, therefore, incurred a continuing deficit in her balance of payments. The difference has been partly settled in gold, but only partly. The rest has been settled with dollars which came partly from the printing press and partly from bank loans, that is to say, with money which for the time being costs them nothing.

In view of the fact, firstly that the United States is the richest country on earth, and secondly that the dollar is a so-called key currency, she could settle her deficits with created money, that is, with I.O.U.'s or promises to pay. As long as this process can continue the price of gold is not really important to her. As Jacques Rueff often says, if one falls from a fiftieth storey one cannot really be hurt as long as one keeps on falling. It is now becoming evident, however, that the process of paying with I.O.U.'s is running out. The reason why it paid America to keep gold cheap, namely, that she could pay with promises and not with gold, has lost such validity as it might have held. The American Treasury just does not seem to have found this out.

- . How large is the accumulated debt?
Every dollar outside the U.S.A., whether in circulation or in Central or other banks, is a debt of the U.S.A. The short-term liabilities of the U.S.A. to the rest of the world have accumulated to the vast sum of more than \$26 billion, that is, \$26 thousand million. In addition she owed \$5 billion to international organisations. The debt has become so large partly because America has had to pay inflated prices. In the meantime she has pegged gold at the old price of \$35. She has, therefore, not enough gold to cover the deficit at \$35 per ounce. Against the \$26 billion short-term liabilities she owns slightly more than \$13 billion in gold.
- . Then, surely, it would be in the interests of the U.S.A. to increase the price of gold.
One would think so, especially as long as she still possesses a large gold stock and can benefit from the price increase. But this is not the view of the American Treasury.
- . If they continue with their present policy how can it affect the price of gold?
This brings us to the third and more fundamental aspect of the matter. As I have already said, America has for years had deficits in her balance of payments, that is to say she has accumulated debts to foreigners. It looks now as if the easy way of financing it is running out. Various possibilities emerge from this situation. The most far-reaching one depends on her persuading the rest of the world to create a new artificial international method of payment. This would defer the payment of her debt for an indefinite period. If this should happen, the question of the price of gold would fade into the background. If she does not succeed in this she must either:
 - (a) Reduce her foreign expenditure to the level of her foreign earnings, or
 - (b) Persuade foreign central banks to continue adding more dollars to their reserves, or
 - (c) Pay in gold.
- . What progress is there in the international conferences in this field?
One cannot really speak of progress in the direction which America desires. The discussions have been going on for about four years. In the middle of March the American Minister of Finance, Henry Fowler, warned that time is running out. On April 16th the Finance Ministers of the Common Market countries met in Munich. According to press reports, Germany and also some of the others moved nearer to the French standpoint, which wants to restore gold to the place of honour. Press reports described this as a serious setback for America. Early this month there was a joint meeting in Washington of the International Monetary Fund and the Group of Ten. According to press reports and to what I myself could ascertain in Washington, progress was confined to certain technical matters. The crucial issues of substance were not really tackled although they were discussed.
- . It rather looks as if the finding of a long-term solution has become a long-term problem?
- . It looks like that to me, and therefore we should confine our attention to the immediate problem.

Q. That is the question whether the United States can avoid a payments deficit this year. What is the expectation?

A. In America there is a terse answer. No. Rather is it anticipated that the deficit will increase, some say to as much as \$2 billion.

Q. The question, therefore, arises how it is to be financed.

A. Yes. But it is becoming more and more difficult to secure acceptance of her promises to pay abroad. It looks as if everywhere there is a surfeit of dollars and holders would prefer to get rid of them. In 1965 France bluntly said that she did not want surplus dollars, and she has exchanged them for gold to the tune of between \$1 and \$2 billion. It is alleged that some Central Banks have clandestinely bought gold on the London Market, because they do not wish the U.S. to know that they are divesting themselves of dollars. Private buyers of gold take as much as they can lay their hands on, thus moving out of dollars. Last year all the newly-mined gold went into private ownership and, in addition, Central Banks had to pour in between eighty and one hundred million dollars worth of gold in order to keep the price down at \$35. The East turns dollars derived from oil, from the clandestine trade in opium, and from American disbursements for the Viet Nam War into gold as fast as they can. It has become necessary for America to allow a large amount of gold to flow into Viet Nam to keep inflation in check.

Q. The U.S.A. is therefore faced with a real and massive problem of financing.

A. Yes. It is clear that she will use all her vast political influence to barricade her remaining gold reserves. But if she fails to get more short-term financing abroad, and again has a payments deficit, it is obvious that she will lose gold. She still has a vast store, more than \$13 billion. But there is no sense in watching idly while her gold flows away. If the drain is not stopped in time it stands to reason that the price of gold will rise. But of what use will it be to her if the price rises when she has little of it left? Sooner or later she will have to call a halt by increasing the price on her own.

Q. When can this be regarded as practical politics?

A. Last year a large gold dealer told me that he thought this would happen if the stock approaches the \$10 billion mark. This year I heard the same figure from quite another source. I recently read in a trade paper: "Washington is thought to regard \$10 billion as the safety minimum." But if anyone wishes to speculate, he will have to make his own guess.

Q. According to press reports, the question of the relationship of the dollar to gold recently evoked lively discussions in America. Can you say anything about this?

A. Yes. It is certainly a remarkable incident. The two largest banks in America published astonishing statements in connection with the dwindling gold hoard of the U.S.A. The Chase Manhattan Bank mentioned the well-known fact that as the total liquid liabilities of U.S. banks to foreigners is more than two times the amount of the U.S. gold stock, a run on that stock could not possibly be satisfied. To that they added the following: "If it is made unmistakably clear that in the event of a crisis the U.S. would simply terminate the privilege now given to foreign central banks of buying gold freely, then the burden of decision regarding the defense of the dollar would be shifted even more than now from the U.S.

to the shoulders of European and other central banks." The words and the meaning are clear, but it is difficult to believe that an American bank could have seen fit to publish them.

Shortly afterwards the President of the Bank of America, the largest bank in the U.S.A., said the following: "In the event a cumulative gold drain becomes intolerable, we will have no choice but to react with more massive retaliatory measures. These measures, which will inevitably include the abandonment of our gold selling policy, it must be made clear, are the efforts of last resort, to be taken only when it is abundantly evident that other major countries are not prepared to function under the only feasible international monetary system--that is to say, the dollar standard."

The discussion in America about these two astounding declarations took the form of conjecturing whether they presaged a change in the American gold policy. It was even suggested that the American Treasury inspired these declarations to serve as a trial balloon to gauge public reaction to a possible change in the gold policy. Naturally, the Treasury denied this.

To me, the most remarkable aspect of the matter is that two obvious conclusions arising from the suggestion that America must refuse to sell gold were overlooked by all but a few commentators. These were the following:

- (1) That the greatest capitalistic country and withal in the world is asked to declare that it will, under certain circumstances, repudiate its debts.
- (2) That it is proposed that the dollar should become inconvertible.

Bankers never favour repudiation of debts by people who are able to pay. Making the dollar inconvertible is simply an acknowledgment that the authoritarian monetary system has totally failed. The words quoted have, however, been employed by the bankers not casually but in considered printed declarations. That any banker can say that it is a privilege to have one's debts paid, leaves me speechless. The only alternative to an authoritarian monetary system is a system of money of real value, that is, gold.

This incident, which shows the disarray in the ranks of the defenders of the authoritarian monetary system, has inspired in me much confidence in the future of gold as the only sound money.

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GROUND-WATER STUDY OF BAKER VALLEY PUBLISHED

"Ground water of Baker Valley, Baker County, Oregon," by D. J. Lystrom, W. L. Nees, and E. R. Hampton, has been issued as Hydrologic Investigations Atlas HA-242 by the U.S. Geological Survey. The atlas consists of one sheet measuring 27 by 45 inches, folded in an envelope. The information on it includes: 1) a generalized geologic map showing gravel distribution and altitude of ground water; 2) a second map showing degrees of salinity of the ground water and other pertinent data; and 3) a text describing the ground-water resources and their suitability for irrigation. Atlas HA-242 is for sale by the U.S. Geological Survey, Denver Center, Denver, Colo. 80225. Price is 75 cents.

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STATE FAIR INVITES ROCKHOUND DISPLAYS

For the first time in its history, the Oregon State Fair is establishing a display hall for exhibits from gem and mineral societies and individuals. According to an announcement by J. A. "Tony" Nunn, Superintendent of the Crafts, Hobbies, and Mineralogy Department, "This initial year will be devoted exclusively to those of you who bear the worthwhile distinction of 'Rockhound.' It is hoped that by so doing we will bring to the attention of the more than 350 thousand people who annually attend the State Fair, as well as all other Oregon residents, the importance, the satisfaction, and the service to our state that is performed by rockhounds and rockhounding."

The show will be noncompetitive and each entry will be awarded a special blue ribbon for excellence. In addition, demonstrations in cutting, lapping, and faceting are being requested by the State Fair Manager. Twenty-four-hour security will be maintained for the exhibitors and a limited number of display cases will be available.

All exhibits will be received at the Crafts, Hobbies, and Mineralogy Building on the State Fairgrounds on any of the following days: Saturday (August 19) 9 a.m. to 5 p.m.; Sunday (August 20) noon through 5 p.m.; Thursday (August 24) 1 p.m. through 9 p.m.; Friday (August 25) 9 a.m. through 9 p.m. All exhibits must be in place and ready for fair opening at 11 a.m., Saturday (August 26). Exhibits will be released after 9 p.m. on Monday (September 4).

Entry forms may be obtained by writing the Mineralogy Department, Oregon State Fair, Salem, Oregon 97310. A \$1.00 handling fee must accompany each entry form submitted.

The Department of Geology and Mineral Industries urges rock hobbyists to display at the fair in order to call attention to the wide interest in rockhounding, and to show more people in our state how diversified and beautiful the Oregon rocks are.

The State Fair for this year runs from August 26 through September 4. Robert L. Stevens is the State Fair Manager.

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GRANTS PASS FIELD OFFICE MOVES

The Department's field office in Grants Pass has moved to new quarters on 521 N.E. "E" Street. The move, which was made on July 1, puts the office only a few blocks from its former location on "H" Street, where it had been situated for 17 years. The new quarters provide much-needed space for office and laboratory equipment and for the eventual establishment of a mineral museum. The telephone number is the same --476-2496.

Operating the Grants Pass office are: Len Ramp, Resident Geologist, whose present field work is in the upper Chetco area; Norman Peterson, District Geologist, who is evaluating the geothermal possibilities of south-central Oregon; and Arline Jacques, who has been Secretary and Receptionist at the Grants Pass office for the past 16 years. Working out of the office this summer are Joseph Wise, graduate student at Idaho State University, and Gerald Shearer, student at Portland State College. Both are participating in the Department's geochemical stream-sampling program under Department Geologist Richard Bowen, Portland office.

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