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PROGRESS REPORT II. ASSAYS AND ANALYSES OF PYRITIC CORE FROM WADI WASSAT GOSSAN, SAUDI ARABIA

BY W. C. OVERSTREET, SAYYAD MATOUQ BAHIJRA,
MOHAMMED A. FOURATI, AND LOUIS GONZALES

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5. Progress Report II: Assays and analyses of pyritic core from Wadi Wassat gossan, Saudi Arabia, by W. C. Overstreet, Sayyed Matouq Bahijra, Mohammed A. Fourati, and Louis Gonzales. 9 p., including 2 tables.

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PROGRESS REPORT II. ASSAYS AND ANALYSES OF PYRITIC CORE FROM WADI WASSAT GOSSAN, SAUDI ARABIA

by

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Abstract

Assays of 31 samples of pyritic core from diamond drill holes under gossan at Wadi Wassat, Saudi Arabia, disclosed 0.02 oz/ton gold in five samples, and from 0.11 to 1.68 oz/ton silver in 23 samples: The tenors are too low to constitute ores of either metal. Further work is required to learn if the tenor in silver varies with depth below the ground surface, with geologic unit, or both. No apparent relation exists between the estimated amount of pyrite in the core and the amount of silver disclosed by the assays.

Introduction

A continuing series of reports are defining the geology and chemical composition of the large gossan and underlying pyritic bodies exposed west of Wadi Wassat some 20 km south of Bi'r Idimah (18°30'N.x 44°10'E.) in the eastern Asir region, Saudi Arabia (Overstreet, 1965; 1966a; 1966b; Overstreet, Gonzalez, Thompson, Fourati, Sharah, and Sumbul, 1966). Results of fire assays for silver and gold, completed June 4, 1966, by Sayyad Matouq Bahijri, and additional determinations of silica in the core, made by Mohammed A. Fourati, are given herewith. The assays and analyses were performed in the Jiddah Laboratory of the Directorate General for Mineral Resources on core obtained by Louis Gonzalez, U. S. Geological Survey. All work was undertaken as part of the cooperative agreement for mineral exploration reached in September 1963 between officials of the Ministry of Petroleum and Mineral Resources, Kingdom of Saudi Arabia, and the United States Geological Survey. The writers wish to express their appreciation to the Ministry for the facilities and encouragement to do the work.

Gold and Silver

The amount of gold and silver in 31 samples of pyritic core from diamond drill hole number 1 and the upper part of hole number 3 is shown in table 1, which lists the results of assays made by Sayyad Matouq Bahijri, Director of the Chemical Laboratory, Directorate General for Mineral Resources, Jiddah. These assays confirm earlier reports that the pyritic material underlying the gossan at Wadi Wassat is essentially

barren of gold (Overstreet, 1965, p.5; 1966a, p.34, 40; Overstreet and others, 1966, p.3) and contains only minor quantities of silver (Overstreet, 1966a, p.33, 35, 37, 40-41; 1966b, p.13; Overstreet and others, 1966, p. 5, 7). The quantities of silver shown by assay, although not large, are greater than the amounts determined by semi-quantitative spectrographic methods and previously reported. In the spectrographic analyses all samples except one have less than 1 ppm (part per million) silver. A tenor of about 40 ppm silver is equivalent to 1 Troy ounce per ton in assay.

Despite the small quantities of silver and gold found in the samples of pyritic core, the assays establish a pattern in increasing depth of the hole, but this pattern may relate to a pyritic body instead of vertical position. Of the seven assays showing 0.8 oz/ton silver or more, six are from the interval 260 feet to 371 feet. Only one is from the interval 98 feet to 141 feet. Of the five samples reported to have 0.02 oz/ton gold, one is from the interval 98 to 141 feet, and four are from the interval 255 feet 4 inches to 371 feet. Three of these are between 325 and 347 feet 4 inches. The shallow part of hole number 1 to a depth of 141 feet is the intercept of the hole with the pyritic body beneath the westernmost of the three zones of gossan exposed at the surface (Overstreet, 1966a, table 7). The deep part of hole number 1 from an inclined depth of 250 feet to 371 feet is the intercept, of the hole with bodies of massive and disseminated pyrite under the central zone of the three zones of gossan exposed at the surface (Overstreet, 1966a, table 7).

These data show that the drilled part of the pyrite under the central gossan is richer in gold and silver than the drilled part under the western gossan. From these assays it is not possible to determine if the central pyritic bodies are intrinsically richer in silver and gold than the pyritic bodies under the western gossan, or if the tenor in silver and gold increases with depth irrespective of source. Further holes will be needed to establish vertical zoning in contrast to specific pyritic bodies as a factor in the distribution of precious metals in the pyrite.

The three assays of massive pyrite from the upper part of hole number 3 show that a very small amount of silver is in the easternmost parts of the pyritic bodies

Table 1. Gold and silver in pyritic core from diamond drill hole number 1 and the upper part of hole number 3, Wadi Wassat area, Saudi Arabia, in Troy ounces per ton (assays by Sayyad Matouq Bahijri, Directorate General for Mineral Resources). Contd.

Sample	Description	Gold	Silver
31010	Massive pyrite, D.D.H.1, 98' to 100'	tr	0.26
31011	Do., 105' to 111'6"	tr	0.49
31028	Do., 116' to 117'10"	0.02	nil
31012	Do., 117'10" to 124'	tr	1.68
31029	Disseminated pyrite, D.D.H.1 126'8" to 127'3"	tr	0.12
31013	Massive pyrite, D.D.H.1 130' to 131'	tr	0.38
31030	Disseminated pyrite, D.D.M.1 134'1" to 135'1"	nil	0.14
31014	Massive pyrite, D.D.H.1 140' to 141'	nil	0.52
31015	Do., 250' to 251'	nil	0.16
31031	Disseminated pyrite, D.D.H.1 255'4" to 256'4"	0.02	nil
31016	Do., 260' to 261'	tr	0.8
31017	Do., 270' to 271'	nil	nil
31018	Do., 280' to 281'	nil	1.04
31032	Massive pyrite, D.D.H.1 285'3" to 286'3"	tr	nil
31019	Disseminated pyrite, D.D.M.1 290' to 291'	nil	1.52
31033	Massive pyrite, D.D.H.1 295' to 296'	tr	nil
31020	Do., 299' to 300'	nil	0.12
31034	Disseminated pyrite, D.D.H.1 305' to 306'	tr	nil
31021	Massive pyrite, D.D.H.1 310' to 311'	tr	0.46
31035	Do., 315' to 316'	tr	nil
31022	Do., 320' to 321'	nil	0.35
31036	Disseminated pyrite, D.D.H.1 325' to 326'	0.02	nil
31032	Massive pyrite, D.D.H.1 330' to 331'	nil	0.54
31024	Do., 345'4" to 346'4"	0.02	0.6

tr = trace, less than 0.01 Troy ounce

nil = not detected

Table 1. Gold and silver in pyritic core from diamond drill hole number 1 and the upper part of hole number 3, Wadi Wassat area, Saudi Arabia, in Troy ounces per ton (assays by Sayyad Matouq Bahijri, Directorate General for Mineral Resources).

Sample	Description	Gold	Silver
31037	Massive pyrite, D.D.H.1 346'4" to 347'4"	0.02	0.12
31025	Do., 350' to 351'	nil	0.92
31026	Disseminated pyrite, D.D.H.1 360' to 361'	nil	0.82
31027	Do., 370' to 371'	nil	0.88
31038	Massive pyrite, D.D.H.3, 159'9" to 162'3"	tr	0.12
31039	Do., 174' to 176'8"	tr	0.11
31040	Do., 184' to 192'4"	tr	0.23

tr = trace, less than 0.01 Troy ounce
nil - not detected

underlying the gossan (Overstreet, 1966b, fig. 1), but the work is as yet inadequate to establish any relation between the amount of silver in the eastern part of the gossan, and the amounts in the central and western parts of the gossan. Also, the results are inadequate to establish any relation of quantity of silver to depth in a given body of pyrite.

In the above discussion of the possible distribution of silver with zone in the gossan or depth below the land surface, sight must not be lost of the fact that splits of the same samples showed no measurable variation in silver by spectrographic methods.

Silica

Additional data on the distribution of silica in pyritic material from core at Wadi Wassat are provided by 18 new analyses completed June 4, 1966, by Mohammed A. Fourati, Directorate General for Mineral Resources. The results of these analyses are given in table 2. They extend the information on major elements previously given (Overstreet, Gonzalez, Thompson, Fourati, Sharah, and Sumbul, 1966, p.9), and confirm the earlier estimate that the amount of silica reflects closely the changes from massive to disseminated pyrite (Overstreet and others, 1966, p.17). Core with an estimated 74 to 90 percent of pyrite contains an average of 3.03 percent silica, whilst that with an estimated 50 to 67 percent of pyrite and 16 to 43 percent pyrite contains respectively averages of 6.86 and 38.72 percent of silica. No relation can be seen between the gold-bearing samples and amount of silica except that they are neither the leanest nor the richest in silica. No correlation was observed between the distribution of silica and silver in the samples, nor was a correlation found between the estimated amount of pyrite in the core and the amount of silver shown by assay.

Conclusion

The small amounts of silver and the negligible quantity of gold reported in the analyses show that the sampled pyritic material under the Wadi Wassat gossan is not an ore of these precious metals. Studies to date do not establish if there is a trend toward more silver with depth or toward more silver in specific pyritic bodies regardless of depth. No relation was found between the estimated abundances of pyrite in the core and the amount of silver reported in the assays. Further work must be

Table 2. Silica in core from diamond drill hole number 1, Wadi Wassat area, Saudi Arabia, in percent (M. A. Fourati, analyst).

Sample number	Description	SiO_2	Estimated pyrite in core (a)	Silver (c) (Troy oz/ton)
31010	Massive pyrite, 98' to 100'	1.92	90 (b)	0.26
31011	Do., 105' to 111'6"	1.94	84	0.49
31012	Do., 117'10" to 124'	2.2	74	1.68
31013	Do., 130' to 131'	21.47	50	.38
31014	Do., 140' to 141'	6.05	78	.52
31015	Do., 250' to 251'	37.66	32	.16
31016	Disseminated pyrite, 260' to 261'	49.47	17	.80
31017	Do., 270' to 271'	50.92	17 (b)	nil
31018	Do., 280' to 281'	38.55	23	1.04
31019	Do., 290' to 291'	38.64	20	1.52
31020	Massive pyrite, 299' to 300'	10.41	54	0.12
31021	Do., 310' to 311'	3.84	67	0.46
31022	Do., 320' to 321'	3.35	64	0.35
31023	Do., 330' to 331'	1.16	59	0.54
31024	Do., 345'4" to 346'4"	5.26	60	0.60
31025	Do., 350' to 351'	2.53	51	0.92
31026	Disseminated pyrite, 360' to 361'	22.72	43 (b)	0.82
31027	Do., 370' to 371'	32.38	16 (b)	0.88

(a) Overstreet and others, 1966, table 7

(b) " " " " " 3.

(c) From table 1, this report.

done to learn if the tenor in gold and silver improves elsewhere under the gossan.

References cited

Overstreet, W. C., 1965, Mineral investigations between Khamis Mushayt and Bi'r Idimah. Saudi Arabia: U. S. Geol. Survey open-file report, 15 p.

Overstreet, W. C., 1966a, Preliminary results of a trip October 30 - December 21, 1965, to the area between Sha'ya and Jabal Bani Bisqan, Saudi Arabia, together with a synopsis of mineral reconnaissance in the Asir quadrangle: U. S. Geol. Survey open-file report, 48 p.

Overstreet, W. C., 1966b, Summary of results from a trip February 6 - March 5, 1966, to Bi'r Idimah, Jabal Ashirah. and As Sarat mountains, Saudi Arabia: U. S. Geol. Survey open-file report, 47 p.

Overstreet, W. C., Gonzalez, Louis, Thompson, C. E., Fourati, M. A., Sharah, Ali, and Sumbul, Jamal, 1966, Progress report on analyses of pyritic core from diamond drill holes under gossan at Wadi Wassat, Saudi Arabia: U. S. Geol. Survey open-file report, 17 p.