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J. H. C

JAN 25 1968

New York, January 23, 1968

W.E.S.

MAR 7 1968

MEMORANDUM FOR: Mr. John J. Collins

Virgin River Narrows Magnetic Anomaly - Mohave County, Arizona

I have read with considerable interest the geological report of August 10, 1967, by Messrs. Watson and Briscoe, also Parker Gay's resume dated December 6th, all in connection with investigations over the past year or so covering the Virgin River Narrows magnetic anomaly. The geologic report is comprehensive and lucid. The authors are to be commended on the excellent presentation. Mr. Gay's summary of factual data serves to focus attention on the salient features and important facts to be considered in an evaluation of the prospect.

This study impresses me favorably as an outstanding example of the way exploration programs should be approached. It was intelligently conceived and the investigation was efficiently executed in a highly professional manner. I would like to see more projects of this kind based on original and imaginative thinking. Investigations of this type should be encouraged. Unfortunately, the testing of probable targets in this case at depths of 5,000 to 6,000 feet is impractical. I agree with Mr. Lacy that testing at the depths suggested will have to be deferred until more effective geophysical techniques have been developed.

C. P. Pollock

CC-EMcLTittmann
RJLacy
SParker Gay, Jr.
JHCourtright
BNWatson
JABriscoe

6-8-67

May 8, 1967

MEMORANDUM TO R. J. LACY:

VIRGIN NARROWS ANOMALY
MOHAVE COUNTY, ARIZONA
APPENDIX TO MEMORANDUM
OF MARCH 29, 1967

The results of geochemical determinations for rock samples taken from fractures in the Virgin River Narrows area in March are tabulated on the following sheets with a brief description of each fracture. The values have been plotted on a geochemical overlay map which matches the completed photogeology map enclosed with this report.

It will be noted that the sample interval is both wide and irregular. Nevertheless, every fracture which appeared to be strong enough to extend even through the exposed rocks was sampled in the gorges we were able to traverse in the time allotted. Two copper highs are noteworthy in the center of the area; numbers 27 and 29 which confirm some of Parker Gay's samples. Other high copper values are shown in relation to the sandstone copper deposit staked in Purgatory Canyon (samples 46-49), and some shallow prospect pits to the east of the area (samples 101-103). Several high zinc values with accompanying mercury and silver can be noted, especially up Purgatory Canyon along strong fracture zones that I was able to map from the air. These fractures show significant weathering effect and are conduits for surface water.

Beyond these brief observations there appears at this stage to be no consistent geochemical pattern of such a nature as to assist in the evaluation of the anomalous area. I would conclude the geochemical sampling as being nondiagnostic of any significant underlying mineralization.

MPB:ao
Enc.

MARVIN P. BARNES

cc: S. P. [illegible], w/enc.
C. K. Moss "
B. C. Morrison "

March 29, 1967

MEMORANDUM TO R. J. LACY:

VIRGIN NARROWS ANOMALY
MOHAVE COUNTY, ARIZONA

During the month of February, I completed a photogeologic map of the Virgin Narrows area from color photographs flown by J. B. Lindsay. The good resolution of the nearly horizontal stratigraphic horizons of typical plateau sediments made it possible to compile a reliable and accurate geologic map of the area except for the necessary field checks for lithology and detail structural dips.

The color photographs, viewed stereoscopically, also made it possible to scan the entire area for evidence of igneous activity, alteration, or any other anomalous surface features that might result from a possible Tertiary intrusion at depth, as postulated by Parker Gay in his December report on the subject area.

No visual evidence of such a phenomena could be noted, except some isolated hills three or four miles from the center of the anomaly that appeared to be of extrusive origin; either remanents of flow rock or dark plugs, with some reddish alteration. Subsequent field checking recently completed in the area in conjunction with geochemical sampling of fractures, proved these hills to be erosional remanents of a recently cemented conglomerate containing boulders and fragments of basalt and other flow rock mixed with sedimentary fragments unconformably overlying some very thin red shale immediately above the Kaibab limestone. This accounted for the reddish "alteration" halo around part of the hills.

Further field checking in the process of sampling and examination failed to reveal any evidence of deep seated intrusion in the form of bleaching, alteration, silicification, chloritization, recrystallization, brecciation, dikes, or any of the phenomena usually associated with known intrusive bodies. In traversing the Narrows a good section of the upper Callville limestone was exposed which I could not distinguish on the aerial photos due to almost identical surface coloring with the overlying sandstones and because of exposure only at the bottom of the gorge. These carbonate rocks appeared to be typical finely crystalline, gray limestones with some thin lenses of chert nodules, but which failed to effervesce very actively with acid and are probably dolomitic. There is no evidence of recrystallization.

A great deal of effort was expended in sampling the near vertical fractures in the sediments at the bottom of the gorge along the river and up Purgatory Canyon for some miles on each side of the magnetic high. It was found

that such fractures which appeared to be strong enough to extend even through the exposed rocks were relatively few in number and of doubtful persistence in depth. However, a very conscientious effort was made to sample each of these as carefully as possible in the time available. Access to the canyon bottoms could be gained only on foot and the river bottoms by wading. The strongest fractures and jointing systems are in the immediate area of the magnetic high, but this also coincides with the top of the gentle dome structure.

The samples are now in the process of being analyzed for copper, lead, zinc, silver and mercury by our Geochemical Department. About 50 fissures and/or shear zones were sampled, including resampling of the ones mentioned in Parker Gay's report. Strikes and dips were determined, and a brief description of the relative strength of the fracture was noted i.e., width, persistence, breath of shear zone, etc. These findings will be appended to this memorandum when analysis is complete.

In summary it can be said that as a result of careful photo scanning and mapping, and from five days of field checking and ground reconnaissance of the subject area, there is no apparent geologic evidence as yet discovered to support the hypothesis of a Tertiary intrusion at depth. The structural dome with very gentle dips can be the result of various geologic processes besides that of intrusion and thus is completely inconclusive. It is doubtful if further surface geologic work will provide much additional significant criteria for evaluating the nature and origin of the magnetic and gravity high which exists in this area.

MPB:ao

MARVIN P. BARNES

April 3, 1967

MEMORANDUM TO M. P. BARNES:

ST. GEORGE GEOCHEMISTRY

Dear Marv:

Enclosed are the copper, lead, and zinc analyses that you have requested for your St. George samples. All of the data is reported in parts-per-million (ppm) and is derived from the atomic absorption instrument (including lead). Check samples analyzed concurrently with the regular run have shown good duplication.

In the future, I would suggest that the sample bags you used should be filled about one-third full (7x9 bags) and clearly labeled. This procedure will aid our sample preparation and also provide more representative values.

Yours truly,

Kenneth H. Nation

K. H. NATION

KHN:ao
Enc.

cc: RJLacy, w/enc.

GEOCHEMICAL SAMPLES
FRACTURES AND JOINTS
VIRGIN NARROWS ANOMALY AREA

No.	Description	Lith.	Bearing	Dip	Cu	Pb	Zn	Hg	Ag
1	Tight shear	Rd SS	N05E	65°E	-------	Missing	-------		
2	1' shear zone	"	N02E	70°E	-------	Missing	-------		
3	2" shear	"	N15W	65°E	-------	Missing	-------		
4	1' shear	"	N	70°E	-------	Missing	-------		
5	4' shear zone	"	S20E	80°E	3	2	22	5	0.63
6	Strong 2' shear	"	N	85°E	3	4	8	3	0.65
7	2" joint	Yel SS	S25E	65°E	2	1	4	3	0.37
8	2" shear in 6' zone	"	N25W	±90°	4	7	13	5	0.67
9	Strong 8" shear	"	N15W	80°E	15	10	1	6	0.36
10	Tight 2" shear	"	S05W	80°E	3	4	8	17	0.23
11	Strong "Att" fracture in 10' zone	"	S45E	90°	2	2	1	5	0.17
12	Sharp 1' shear	"	S25E	80°E	3	2	9	12	0.23
13	Tight shear zone	"	N15E	65°E	3	4	12	2	0.70
14	Weathered vaggy SS (no fracture)	"			3	11	8	4	1.34
15	" " " "	"			4	5	3	7	0.60
16	Tight 2" shear	"	S35E	75°E	4	9	9	3	1.10
17	Tight shear	"	S30E	±90°	8	9	13	64	1.02
18	Fairly strong 1" shear	"	N35E	85°E	7	2	18	10	0.50
19	Tight fracture	Gy Dol	S35E	85°	9	1	12	1	0.67
20	Sharp fracture	"	S30E	±90°	7	10	8	4	0.24
21	Sharp fracture	"	N35W	±90°	12	14	19	11	1.68
*22	Fairly strong shear	Yel SS	S25E	75°E	8	0	48	19	0.12
23	Strong shear zone 20' wd.	"	N20W	±90°	1	2	5	4	0.38
24	" " "	"	N25W	±90°	2	4	15		0.40
25	Tight fracture	"	N15W	65°E	3	4	8	8	0.39
26	Strong shear zone	"	N15W	60°E	3	1	8	2	0.23
27	Small tight fracture	"	S10E	65°E	232	0	37	13	1.06
**28	Strong shear zone	"	N10W	80°E	8	0	3	5	0.39
"29	" " "	"	Due N	70°E	970	12	117	22	1.00
"30	" " "	"	"	"	37	0	14	10	0.38
31	Fracture in 20' shear zone	"	S50E	±90°	38	4	12	3	0.41
32	Tight shear	"	N45W	±90°	23	5	8	24	0.40
33	Strong 8' fracture zone	14a lms	N50W	90°	11	12	200	61	1.87
34	Strong fractures	"	N45W	90°	12	16	470	42	1.56
35	" " "AH"	"	"	"	5	9	107	38	0.71
36	" "	"	"	90°	13	14	150	77	1.57
37	Sharp fracture	Yel SS base	N40W	90°	11	6	42	10	0.61
38	Strong fracture	14a lms	N35W	85°E	3	7	6	36	0.42
39	" "	"	"	90°	8	9	145	10	1.35
40	" "	"	S50E	90°	9	15	735	33	2.70

No.	Description	Lith.	Bearing	Dip	Cu	Pb	Zn	Hg	Ag
41	Strong fracture	14a lms base	S80E	90°	9	16	2500	15	2.27
42	" "	"	"	90°	15	11	170	780	1.66
43	" "	"	S65E	90°	15	14	435	33	1.77
44	" "	"	S60E	90°	19	9	123	34	1.32
45	" "	"	"	"	27	9	180	12	2.05
46	Picked sample Cu SS		----Not run		High grade ------				
47	Adit face in Cu SS				50	40	39	15	0.63
48	Alt. 6" Cu Stn SS				3330	9	1580	44	1.41
49	Picked Sample Cu SS		----Not run		High grade -------				
50	Fair fracture	Rd SS	S30E	80°E	12	5	11	6	0.56
51	Tight single shear	"	S45E	90°	1	2	1	29	0.39
52	" " "	"	S40E	90°	5	1	9	4	0.40
53	Strong shears and fracture	Yel SS	N15W	90°	3	2	3	11	0.59
54	" " " "	Red SS	S45E	85°W	5	16	6	5	0.25
55	Strong fracture (fault?)	"	S60E	70°W				3	0.49
56	" "	"	N60W	80°E	1	0	0	8	0.29
57	Sharp 2-3" fracture	Yel SS	S35E	80°E	5	2	330	5	0.48
58	" 6" fracture	"	S35E	80°E	7	4	232	6	0.65
100	("Altered" (?) zone red and yellow)				75	14	141	27	1.44
101	(on hills south of SS bridges -)				197	5	79		0.41
102	((prospect pits))				164	13	45	73	1.30

*Parker Gay's #4

**Parker Gay's Location

PHOTO GEOLOGY MAP
VIRGIN RIVER NARROWS
MOHAVE CO – ARIZONA & WASHINGTON CO – UTAH

1 IN = 1320 FT

MAPPED FEB 1967 M.P.B.
FIELD CHECKED MAR 1967 M.P.B.

LEGEND

—F— faults.
—f— fractures.
—sh— shears or joints.
– – – inferred contacts on photos.

QUATERNARY unconsolidated

- Qsg — stream gravels.
- Qbg — bench gravels.
- Qfg — coarse fan gravels & rubble.

TERTIARY

- A-Tc — dk coarse, cemented cong. with volcanic & sedimentary boulders, lying uncomformably upon a thin remnant of red shly SS & coarse gritty SS (Moenkopi Fm.)

PERMIAN

Kaibab Lm:

- B-Pk — massive, med gy, dense lms. (cliff former unit)
- C-Pk — wht to lt gy, interbedd gypsum & thin gr lms. (slope former unit).
- C–Pk — massive, lgt to med gy, finely xln lms (lower cliff former, not always differentiated)

Coconino SS:

- D-Pk — massive, lgt buff cross bedded, soft SS-cherty & calc immediately below C, unit.
- F-Pc — red & lgt buff, banded, cross bedded SS (middle unit, different only in color).
- G-Pc — massive, yellow, cross bedded, soft SS (lower unit)

PENN-PERM Callville Lm

- H-PPc — thin bedded, med gy, dense, finely xln. dolomite with scattered lenses of chert nodules near top.

GEOPHYSICAL DIVISION
3422 South 700 West
Salt Lake City, Utah

W.E.S. FEB 13 1967 J H.C.

FEB 8 1967

February 7, 1967

MR. WES
READ AND RETURN
PREPARE ANSWERS ____ HANDLE ____
FILE ✓ INITIALS ____

Mr. J. H. Courtright
Tucson Office

EVALUATION OF THE VIRGIN NARROWS ANOMALY, MOHAVE COUNTY, ARIZONA

Dear Sir:

This is to confirm brief discussions concerning the subject report during the Exploration Conference. Copies of Parker Gay's report of December 1966 were distributed to you, Mr. Pollock, and Mr. Wojcik at the conference. A copy will be forwarded to Bill Kurtz with a copy of this letter.

Mr. Pollock generally favored the proposals in this report. I told him that no appropriation request would be submitted until we reached a stage wherein property acquisition and drilling may be recommended. In the meantime, we shall conduct the recommended aeromagnetic survey enroute to projects in Arizona. Specifications of this survey would be 6,000 feet elevation with a one mile flight line spacing controlled by 35 mm spotting photography. We shall then probably assign Jerry Haselton and Ken Nation to the geochemical highgrading technique of sampling material in fissures and fractures. Our evaluation and recommendations, based on this work, shall then be presented for considerations of geologic evaluation and field investigations, property acquisition, drilling and follow-up E.M. drill hole/surface surveys.

Very truly yours,

R. J. Lacy

R. J. LACY

RJL:ao

cc: CPPollock & KERichard
WLKurtz, w/enc.
SPGay