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Air Mail

February 27, 1974

Mr. W. L. Kurtz
Southwestern Division
Tucson Office

Arizona
Alluvium Geochemistry at Sacaton

Dear Mr. Kurtz:

Referring to Mr. James' memorandum of February 15, I note that detrital dispersion patterns of ore metals appear to occur in indurated alluvium at Sacaton. Although it is uncertain how far laterally this dispersion halo might extend, it seems logical that it should provide a larger target than the ore itself, and if satisfactory procedures for sampling rotary cuttings could be worked out, an additional and inexpensive parameter might be offered for interpretation of pediment drill holes.

In most cases of course, the geological data obtained from the bedrock penetration will provide the same information regarding proximity to mineralization as might be expected from the alluvium, probably with more precision and confidence, but it is also easy to imagine special cases where the geochemical data might be of particular value - e.g. in a faulted area a wildcat bedrock penetration might be totally negative geologically, yet not far from adjacent hidden mineralization, in which case positive geochemical information from the alluvium might encourage more penetrations in the face of the apparently negative bed rock data. Please pursue this further with Mr. James, and if it is practical to sample rotary cuttings close to bedrock on a routine basis, then the technique should become standard practice.

Very truly yours,

ORIGINAL SIGNED BY
T. C. OSBORNE

T. C. Osborne

cc: √JHCourtright
LDJames
MPBarnes

GEOPHYSICAL DIVISION B.C.M.

3422 SOUTH 700 WEST
SALT LAKE CITY, UTAH 84119

J. H. C. FEB 10 1971

February 10, 1971

FEB 12 1971 Received

file

FEB 11 1971

EXPLORATION DEPT.

MEMORANDUM to R. J. LACY:

GEOCHEMICAL ORIENTATION SOIL AND GREASEWOOD STUDY, SACATON PROSPECT, PINAL COUNTY, ARIZONA

Introduction:

Whilst carrying out an orientation study of Hg in soil gas over the Sacaton orebodies (my memorandum of February 9, 1971) Mr. K. H. Nation of the Geophysical Division also systematically sampled soils and greasewood bushes. (Figs. 1 and 2). Although it was realized that the local overburden is transported and derived from elsewhere it was considered worthwhile to determine whether the trace element content of these particular surface sampling media in any way reflect the presence of the underlying mineralization. The possibility of aqueous dispersion, in the case of Cu, Pb, Zn, Mo and Hg, and gaseous dispersion in the case of Hg, from the underlying mineralization being reflected by anomalous metal concentrations in the soils and greasewood could not be disregarded.

Conclusions:

Neither the variations in Cu, Pb, Zn, Mo and Hg concentrations in soil nor Cu and Mo concentrations in greasewood display any apparent relationship to the presence of the Sacaton orebodies.

Soil Samples:

Surface and depth soil samples were collected. Surface samples comprised a composite of material from 1 - 2 inches depth collected at the corners of a square of side 25 feet centered on each sampling station. Depth samples consisted of soil auger cuttings collected from a depth of 3 - 4 feet below each station.

The minus 80 mesh fraction of all soil samples were analyzed for Cu, Pb, Zn, Mo and Hg. (Figs. 3 through 12). The resultant data shows no apparent relationship to the presence of the orebodies.

Greasewood Samples:

Composite greasewood samples of most recent stem and leaf growth (last 3 inches) were collected along the circumference of a circle of radius 50 feet centered on the sample station. The plant samples were dry ashed and analyzed for Cu and Mo. The resultant data display no apparent relationship to the presence of the underlying mineralization. (Figs.13 and 14).

L. D. James.

L. D. JAMES

LDJ:db
Encls.
cc:J.J.Collins w/encl.
J.H.Courtright "
W.E.Saegart "

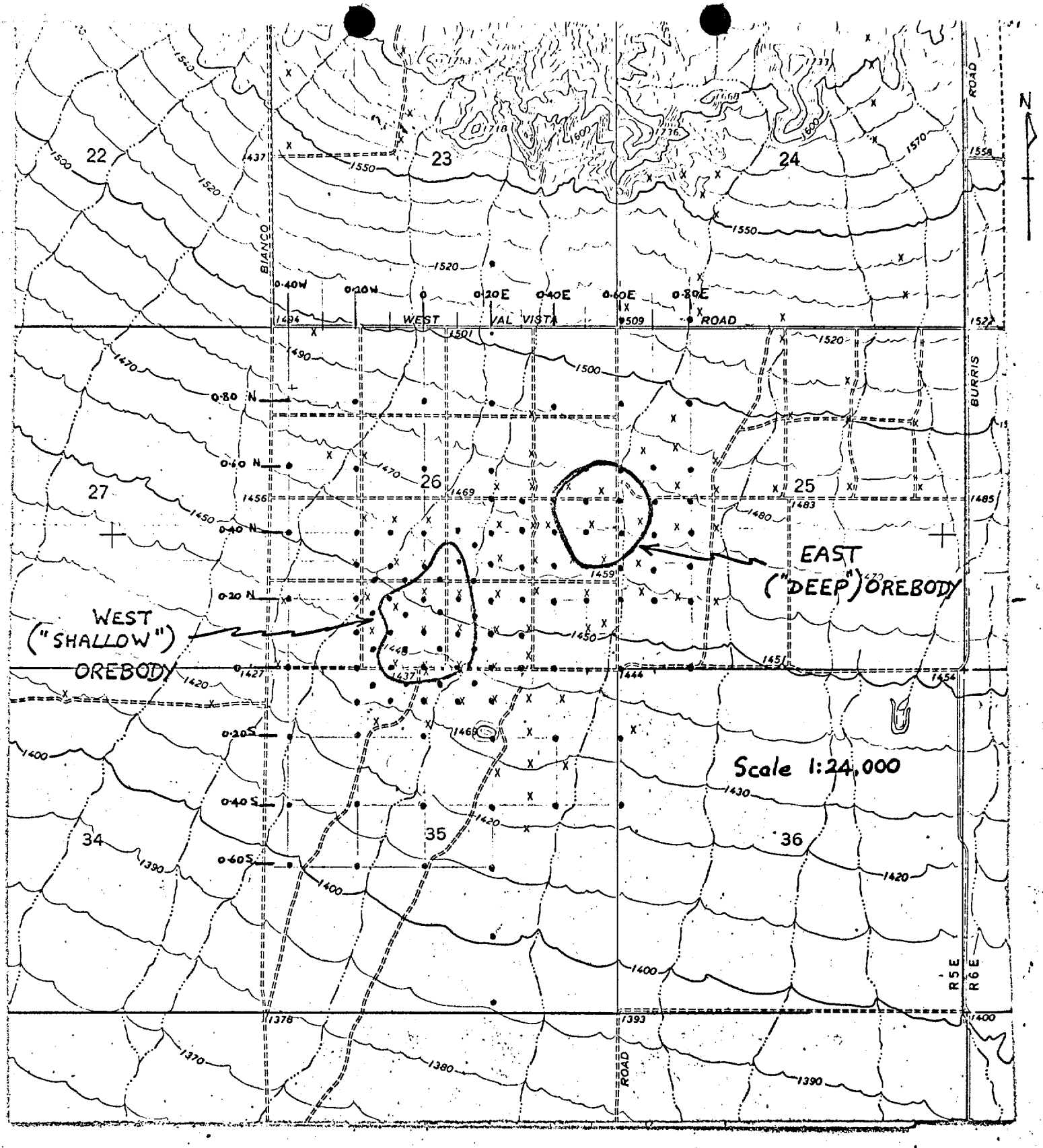
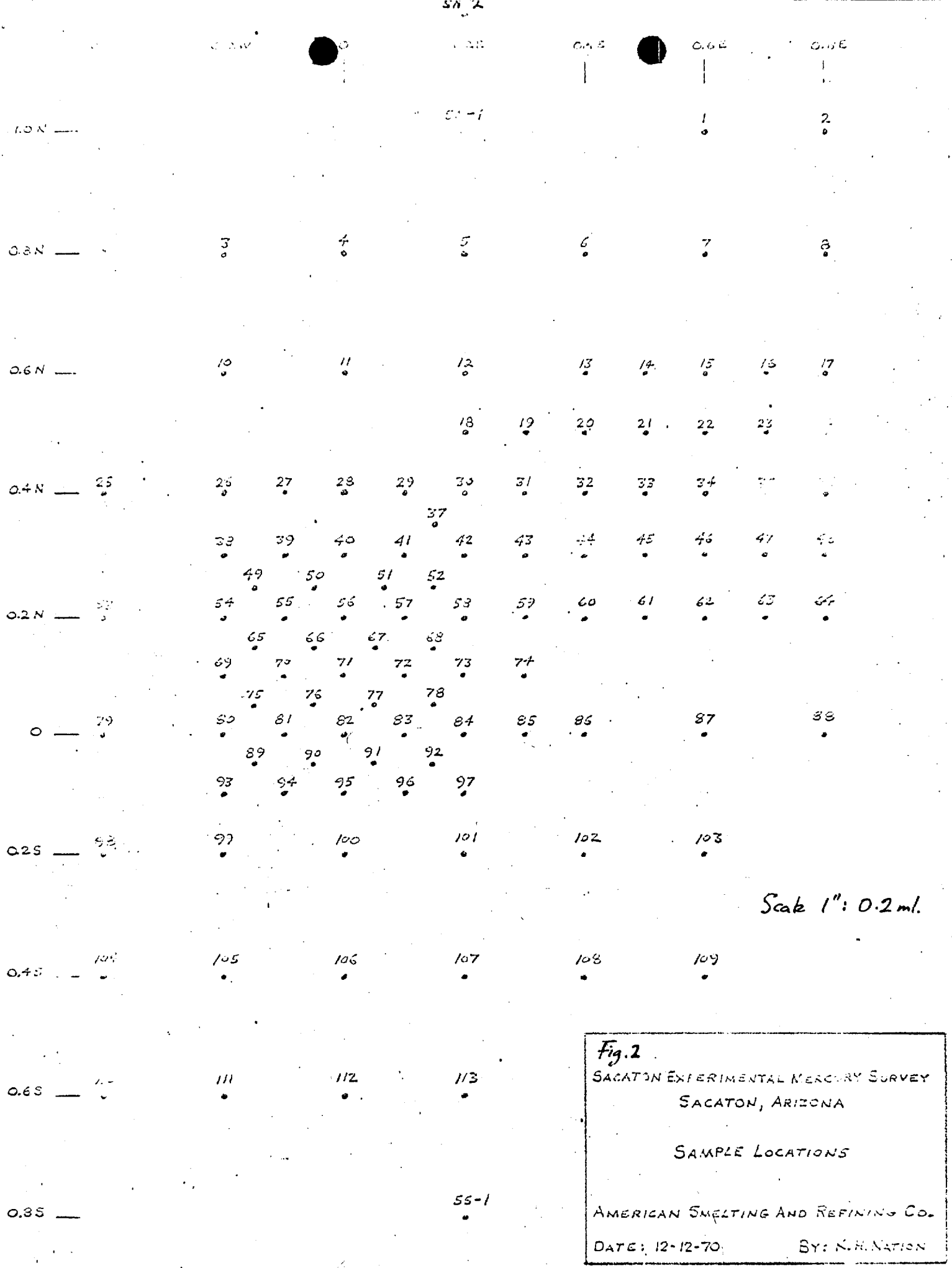


Fig. 1 - Sacaton Prospect, Arizona
Soil and Greasewood Study -
Location of Samples.



Scale 1": 0.2 mi.

Fig. 2

SACATON EXPERIMENTAL MERCURY SURVEY

SACATON, ARIZONA

SAMPLE LOCATIONS

AMERICAN SMELTING AND REFINING CO.

DATE: 12-12-70 BY: K. H. NATION

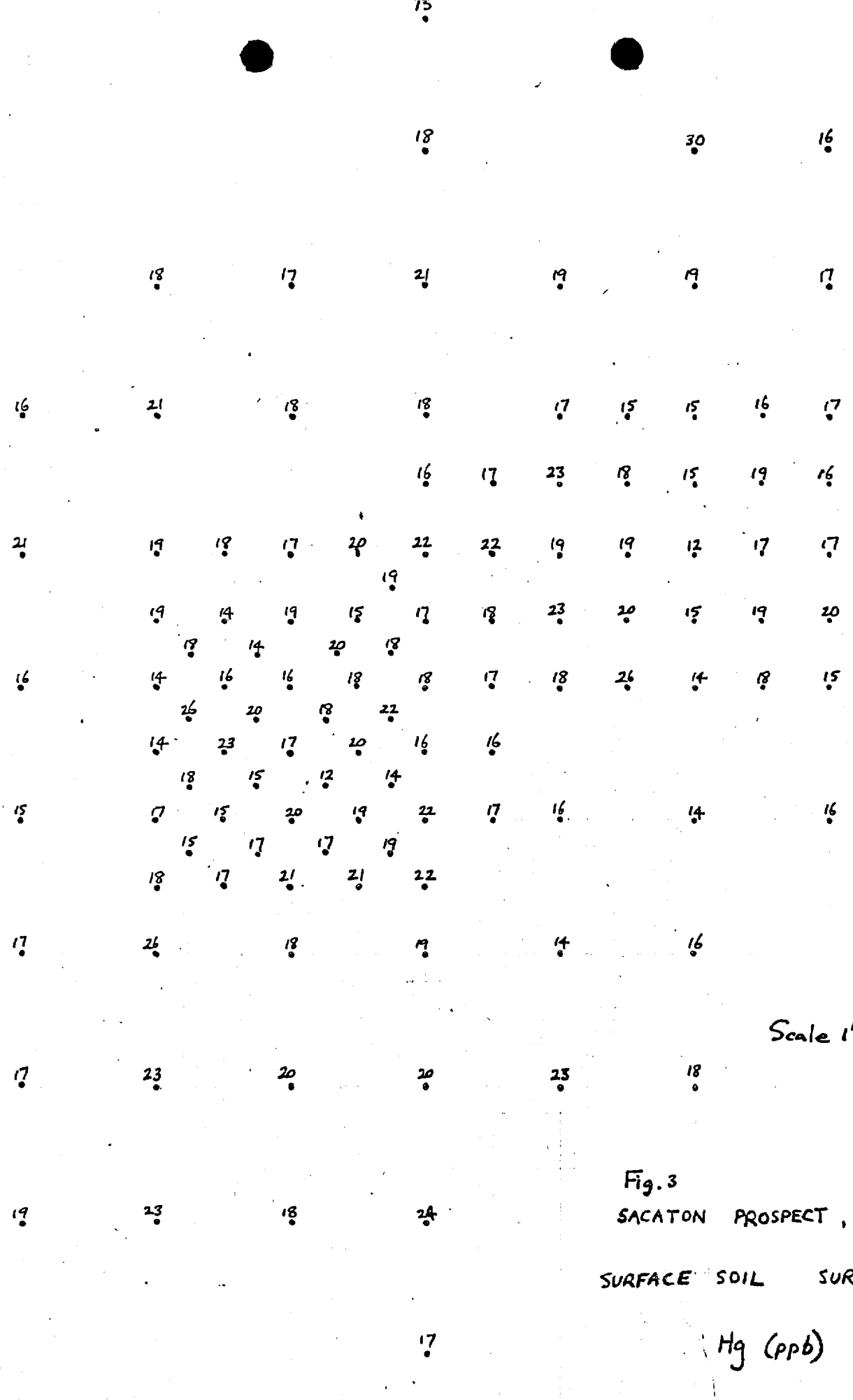


Fig. 3

SACATON PROSPECT, ARIZONA

SURFACE SOIL SURVEY

Hg (ppb)

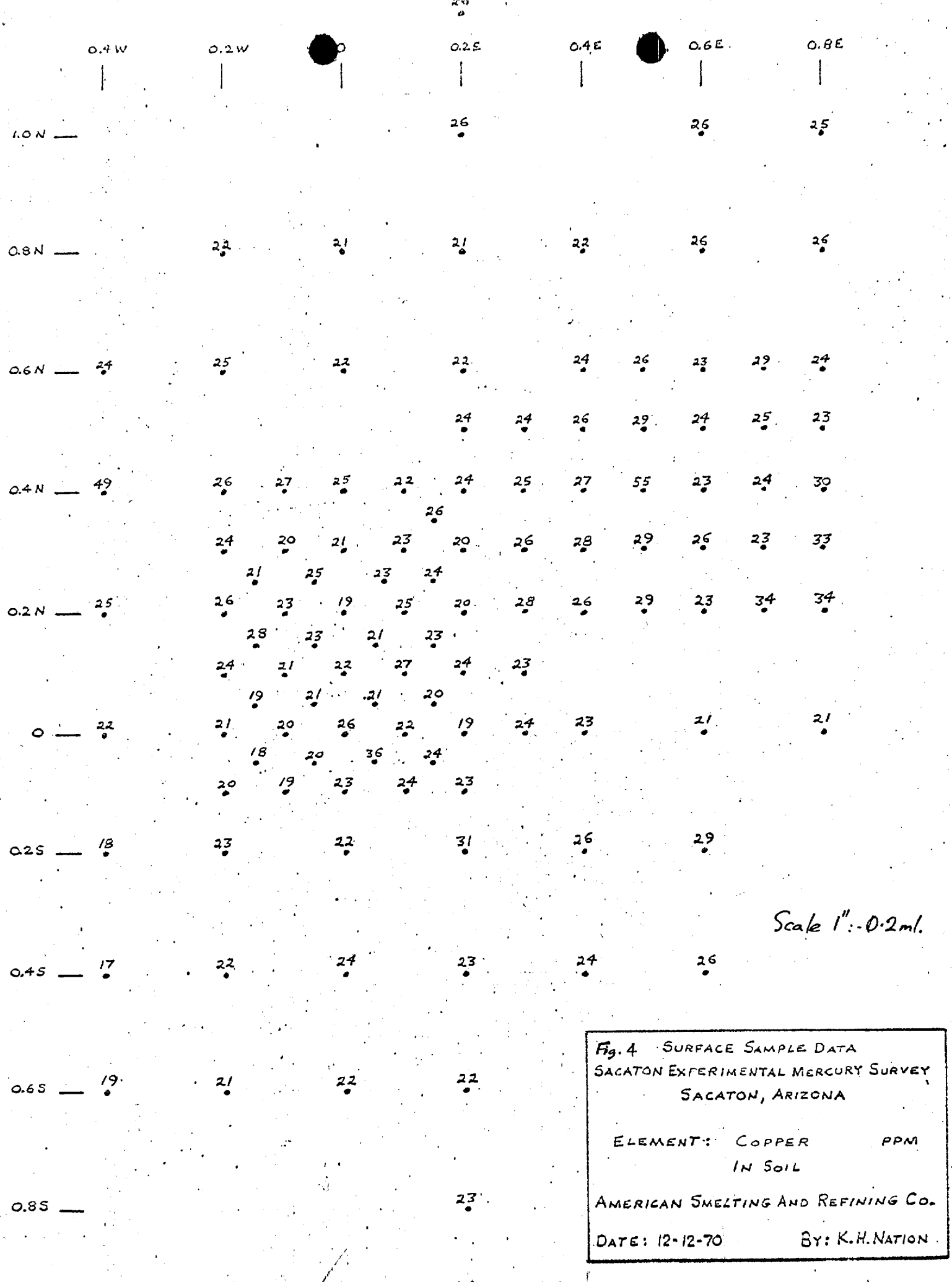


Fig. 4 SURFACE SAMPLE DATA
SACATON EXPERIMENTAL MERCURY SURVEY
SACATON, ARIZONA

ELEMENT: COPPER PPM
IN SOIL

AMERICAN SMELTING AND REFINING CO.

DATE: 12-12-70 BY: K.H. NATION

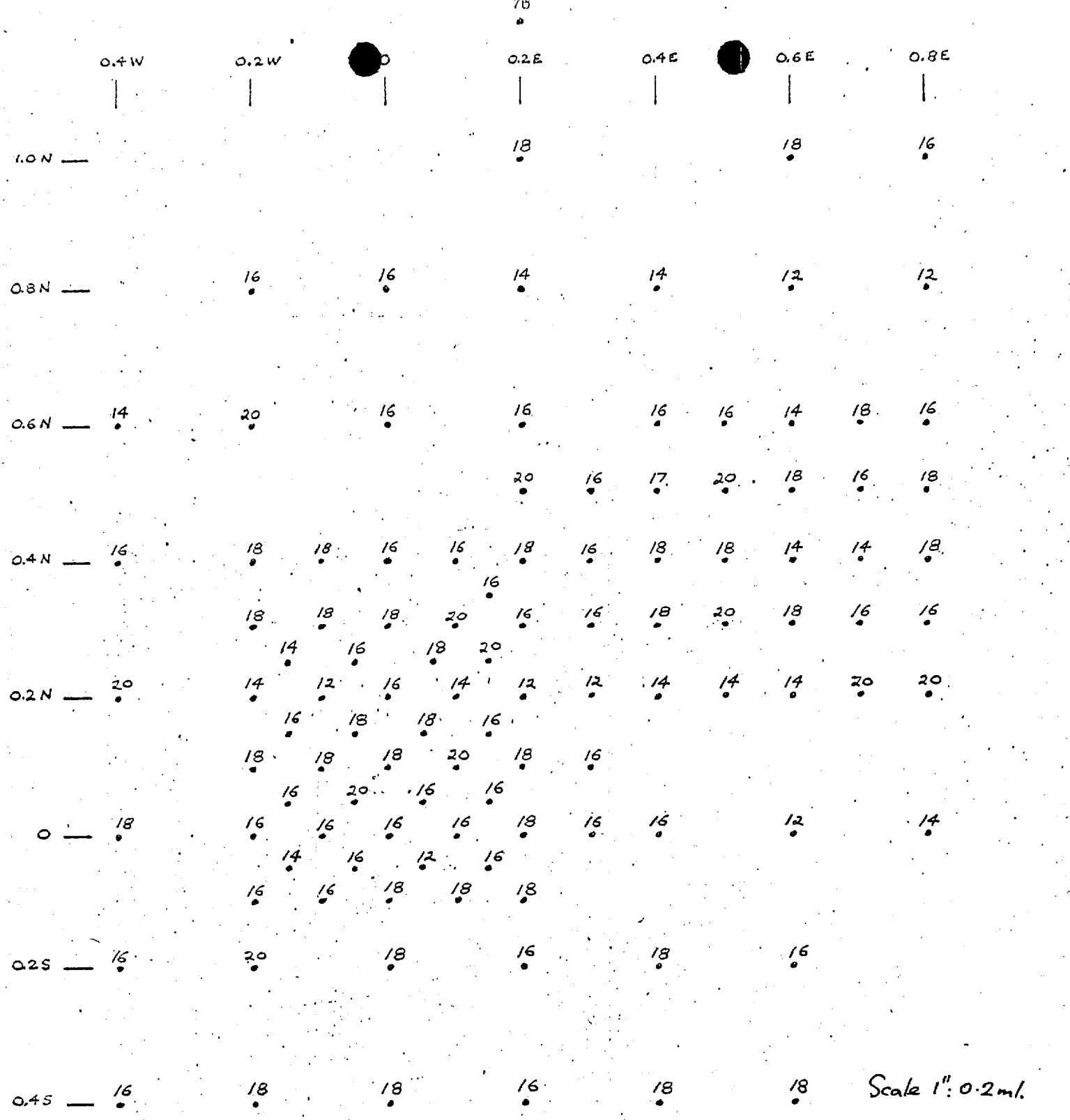
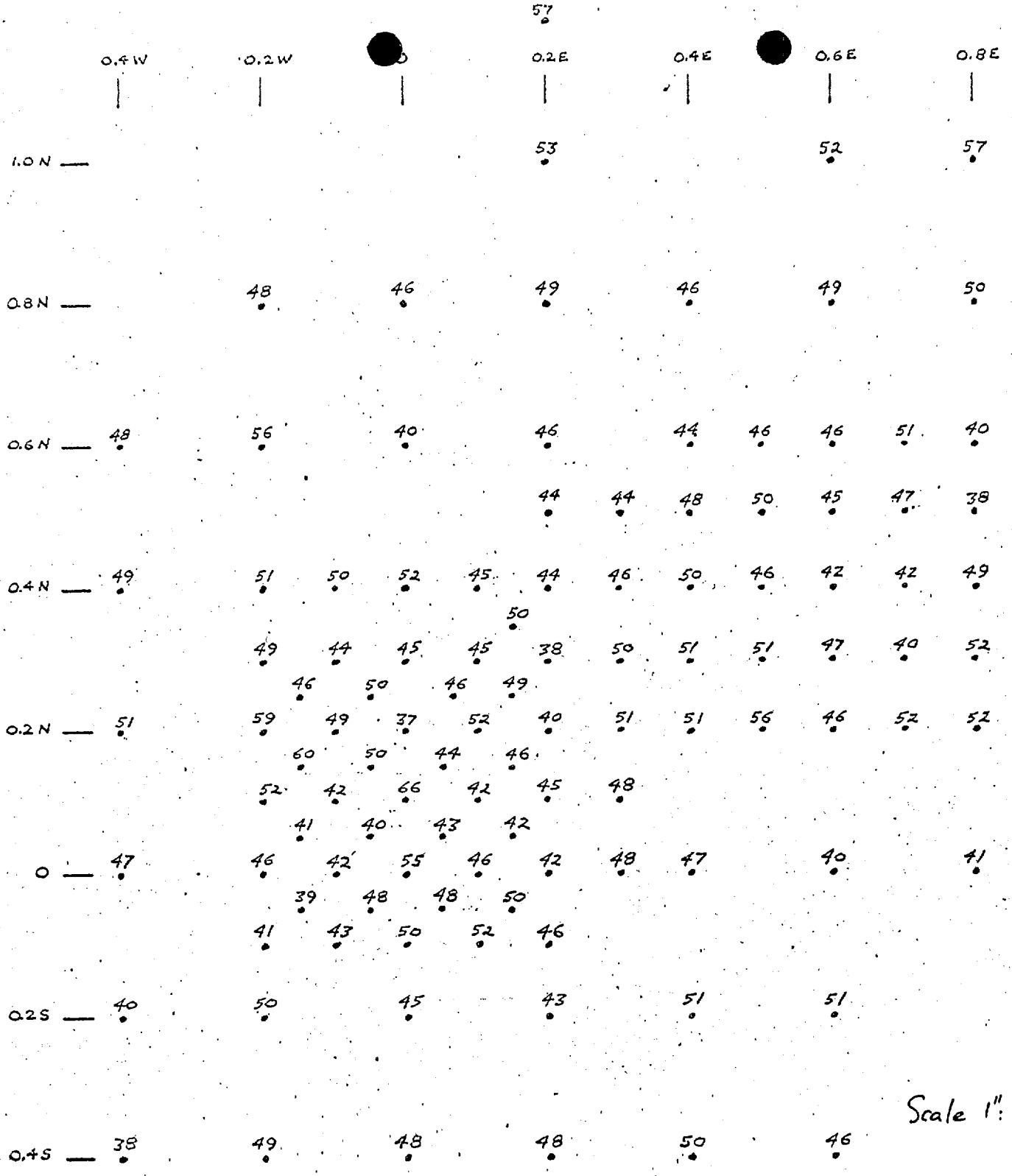


Fig. 5 Surface Sample Data
Sacaton Experimental Mercury Survey
Sacaton, Arizona

Element: Lead ppm
In Soil

American Smelting And Refining Co.

Date: 12-12-70 By: K. H. Nation



Scale 1": 0.2 ml.

Fig. 6 SURFACE SAMPLE DATA
SACATON EXPERIMENTAL MERCURY SURVEY
SACATON, ARIZONA

ELEMENT:: ZINC PPM
IN SOIL

AMERICAN SMELTING AND REFINING CO.

DATE: 12-12-70 BY: K.H. NATION

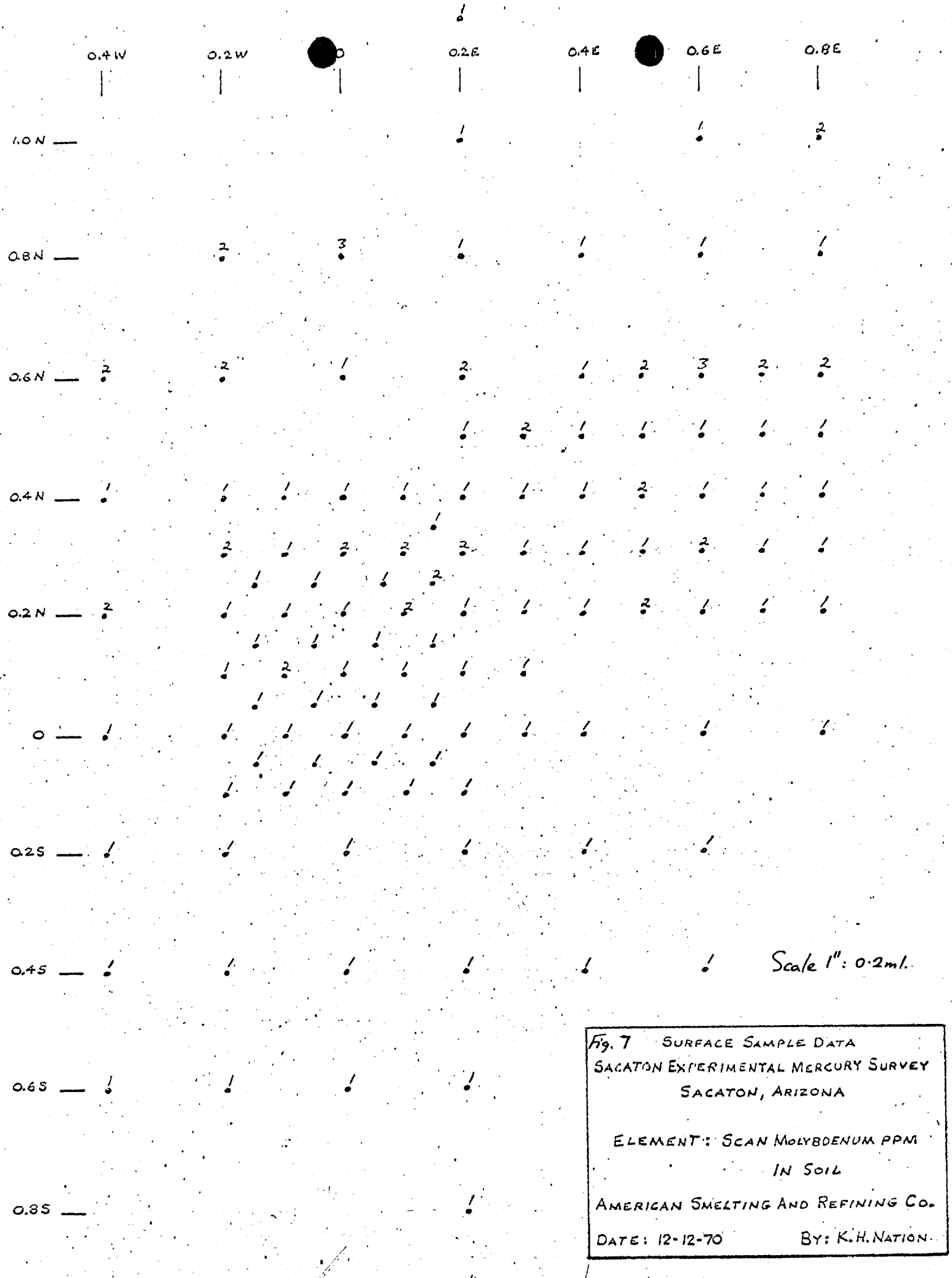


Fig. 7 Surface Sample Data
Sacaton Experimental Mercury Survey
Sacaton, Arizona

Element: Scan Molybdenum ppm
In Soil

American Smelting And Refining Co.

Date: 12-12-70 By: K.H. Nation.

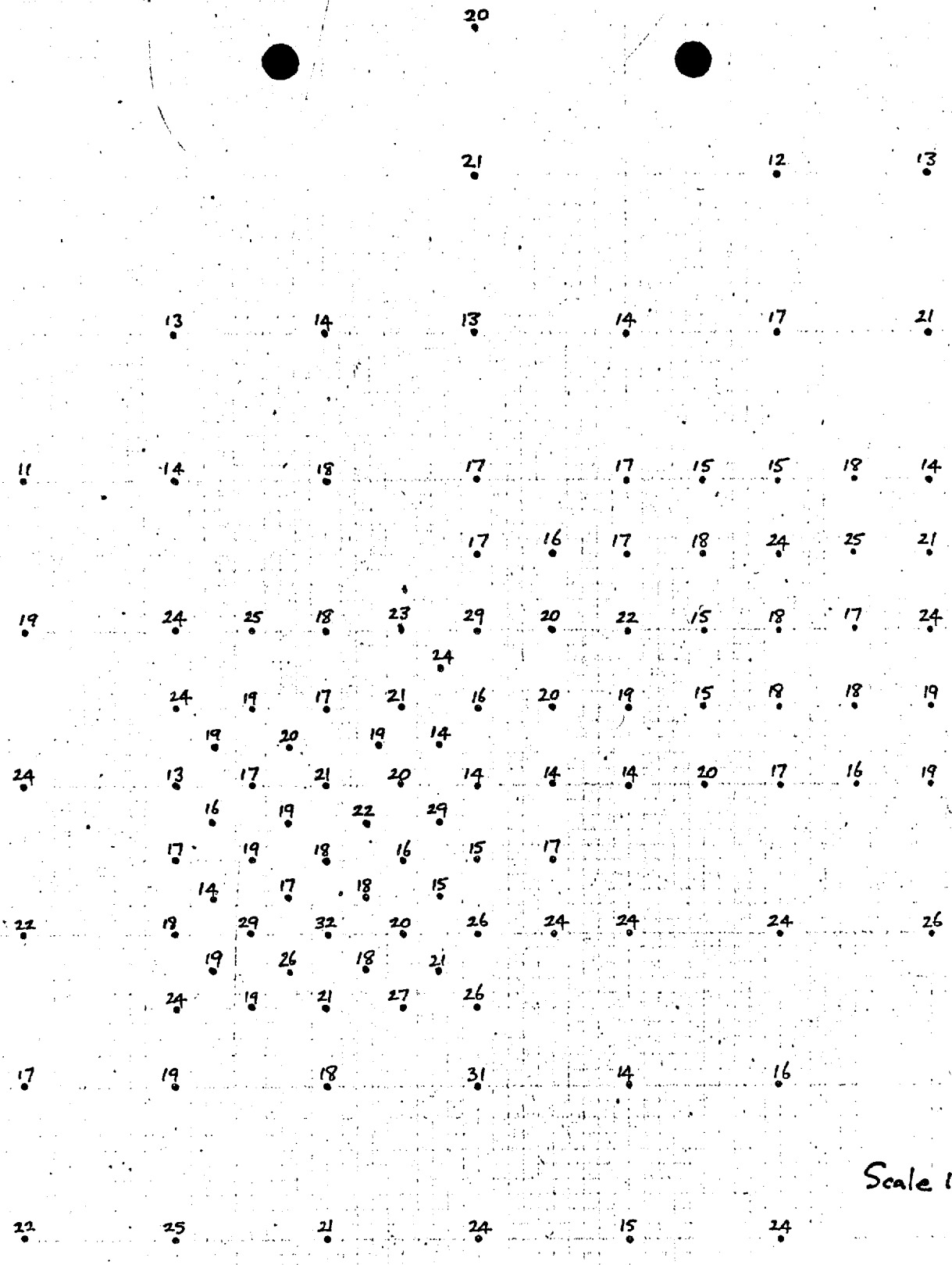


Fig. 8

SACATON PROSPECT, ARIZONA

DEPTH SOIL SURVEY

Hg (ppb)

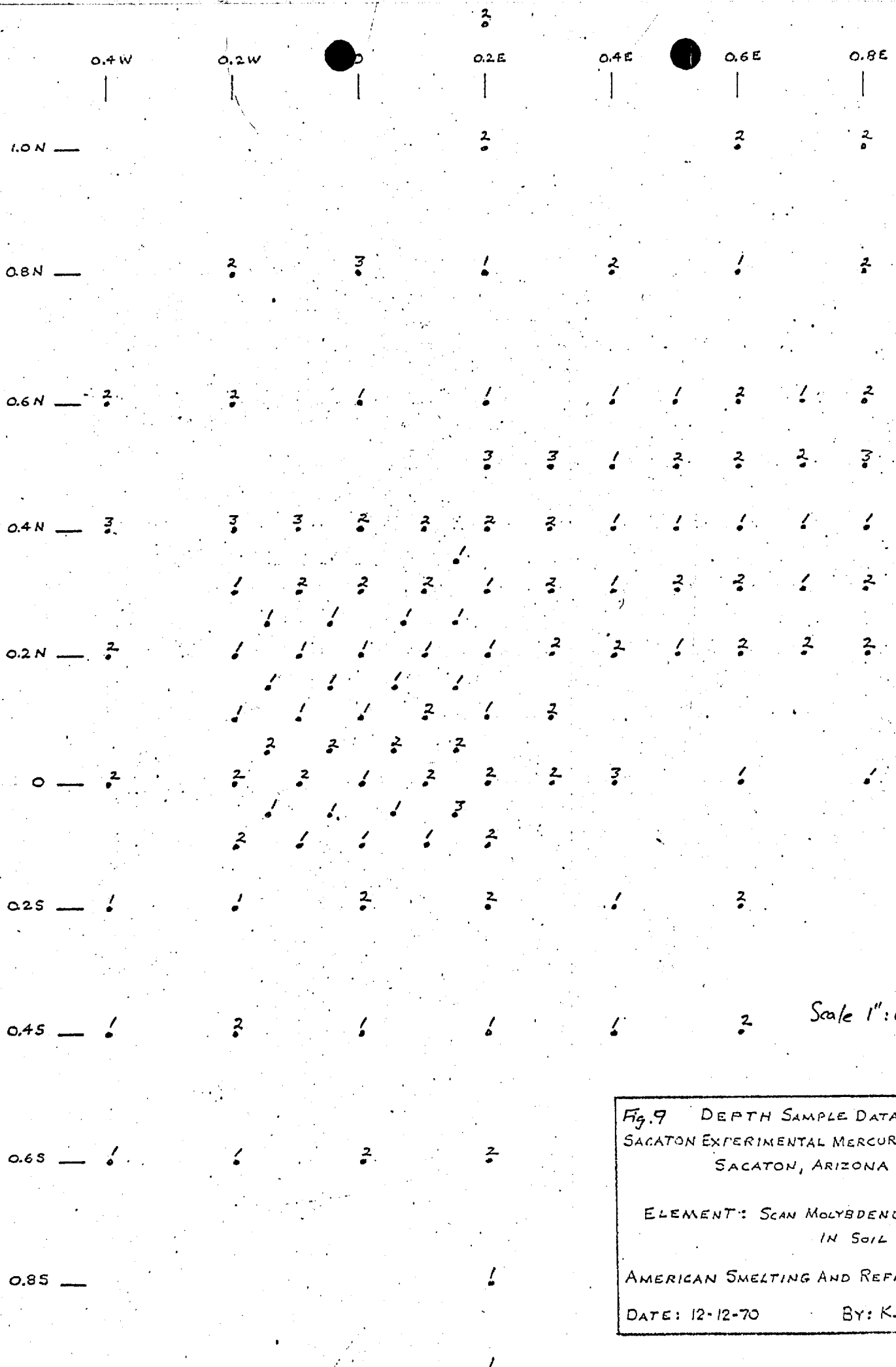


Fig. 9 DEPTH SAMPLE DATA
SACATON EXPERIMENTAL MERCURY SURVEY
SACATON, ARIZONA

ELEMENT: SCAN MOLYBDENUM PPM IN SOIL

AMERICAN SMELTING AND REFINING CO.

DATE: 12-12-70 BY: K.H. NATION

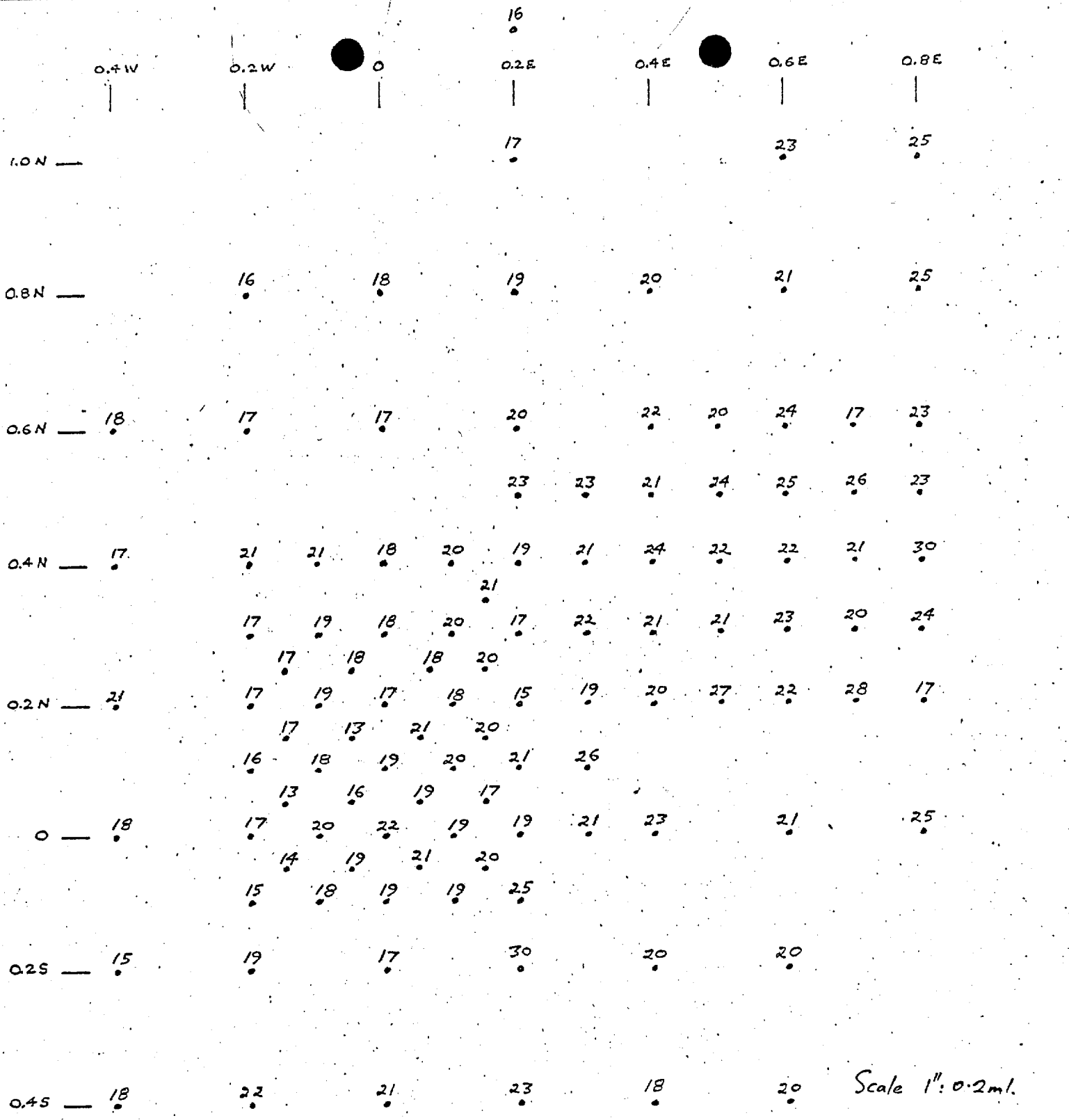
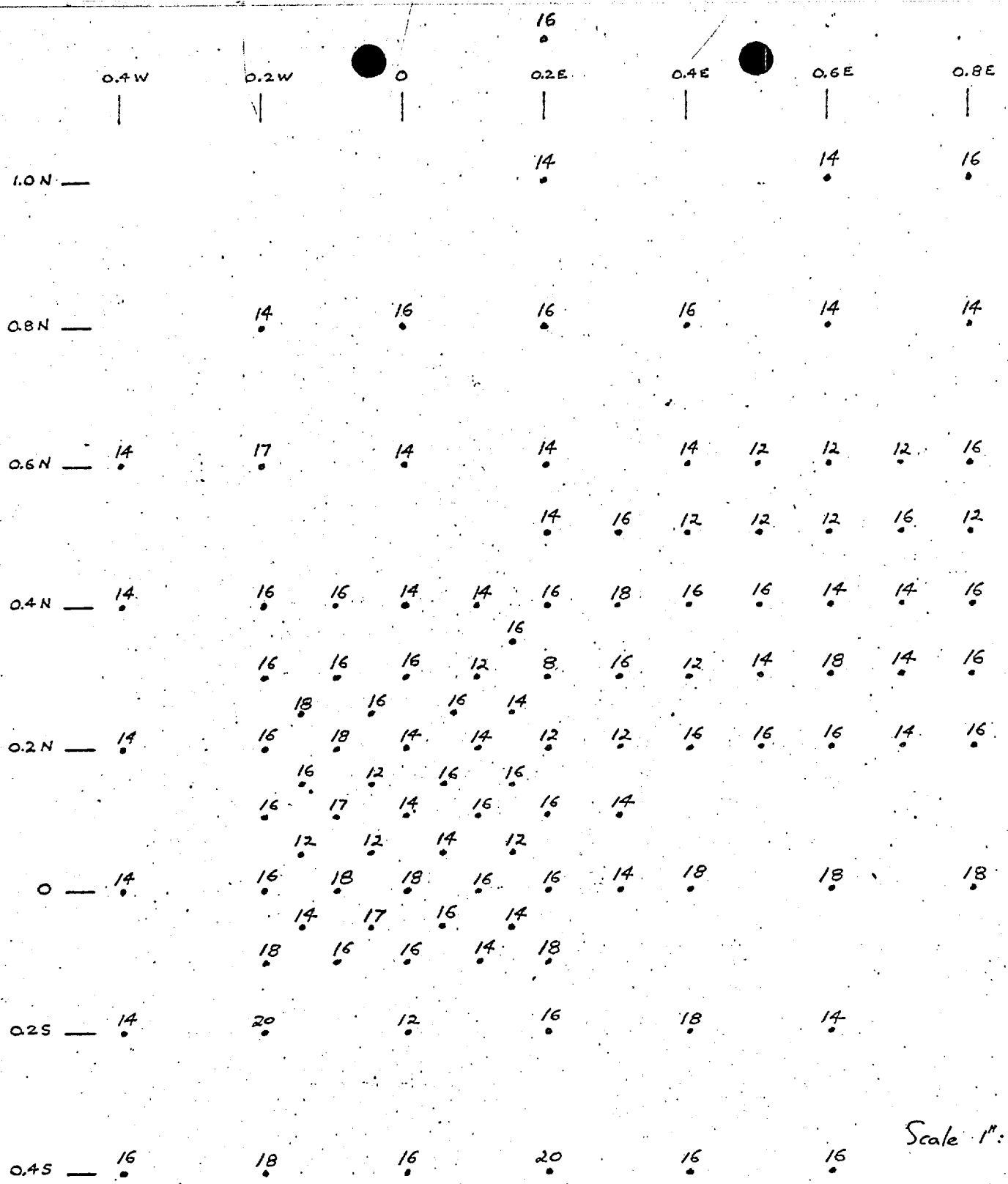


Fig. 10 DEPTH SAMPLE DATA
SACATON EXPERIMENTAL MERCURY SURVEY
SACATON, ARIZONA

ELEMENT: COPPER .PPM
IN SOIL

AMERICAN SMELTING AND REFINING CO.

DATE: 12-12-70 BY: K.H. NATION



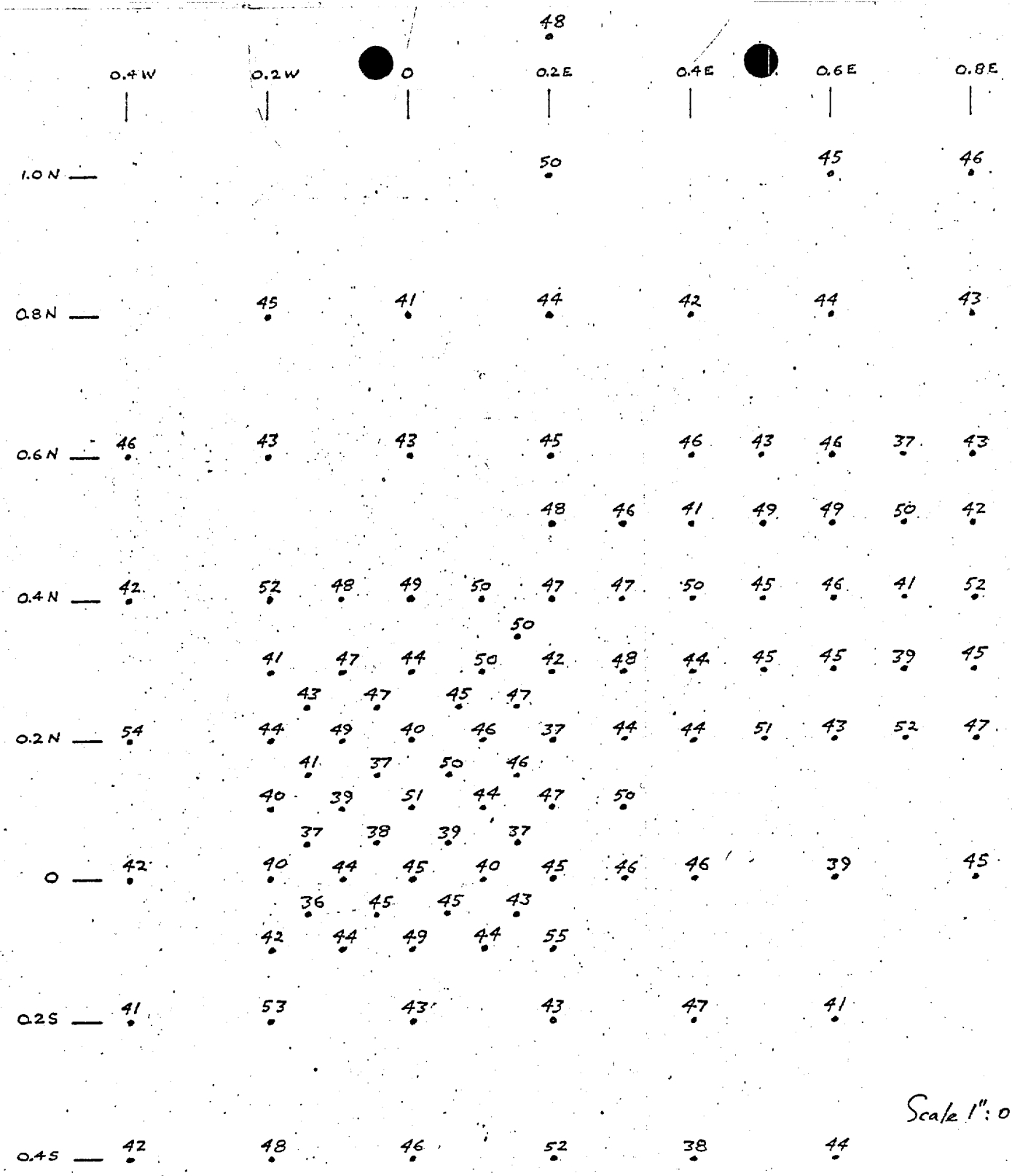
Scale 1": 0.2mi.

Fig. 11 DEPTH SAMPLE DATA
SACATON EXPERIMENTAL MERCURY SURVEY
SACATON, ARIZONA

ELEMENT: LEAD IN SOIL PPM

AMERICAN SMELTING AND REFINING CO.

DATE: 12-12-70 BY: K. H. NATION



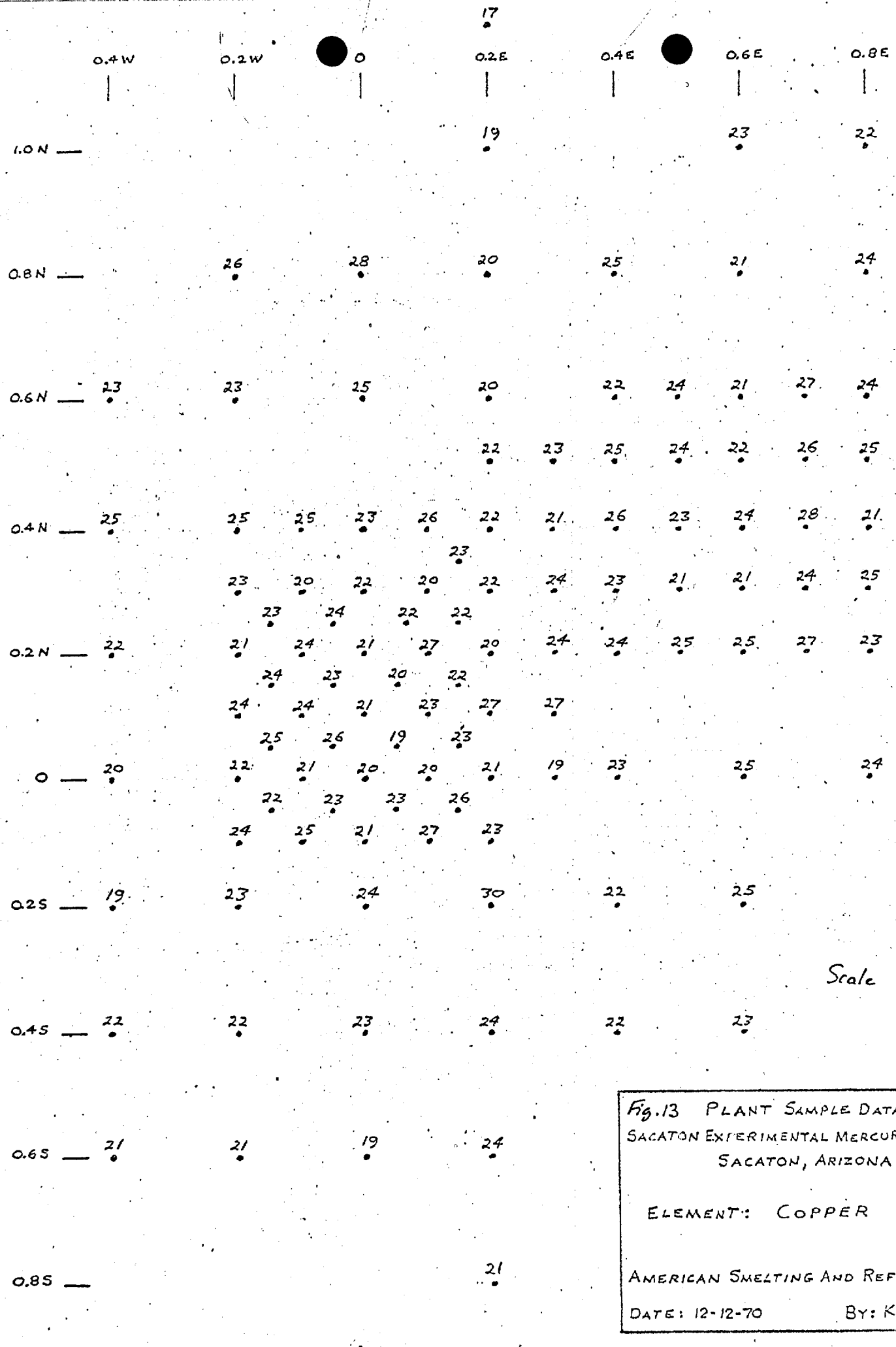
Scale 1": 0.2 mi.

Fig. 12 DEPTH SAMPLE DATA
SACATON EXPERIMENTAL MERCURY SURVEY
SACATON, ARIZONA

ELEMENT: ZINC PPM
IN SOIL

AMERICAN SMELTING AND REFINING CO.

DATE: 12-12-70 BY: K.H. NATION



Scale 1": 0.2 mi.

Fig. 13 PLANT SAMPLE DATA
SACATON EXPERIMENTAL MERCURY SURVEY
SACATON, ARIZONA

ELEMENT: COPPER PPM

AMERICAN SMELTING AND REFINING CO.

DATE: 12-12-70 BY: K. H. NATION

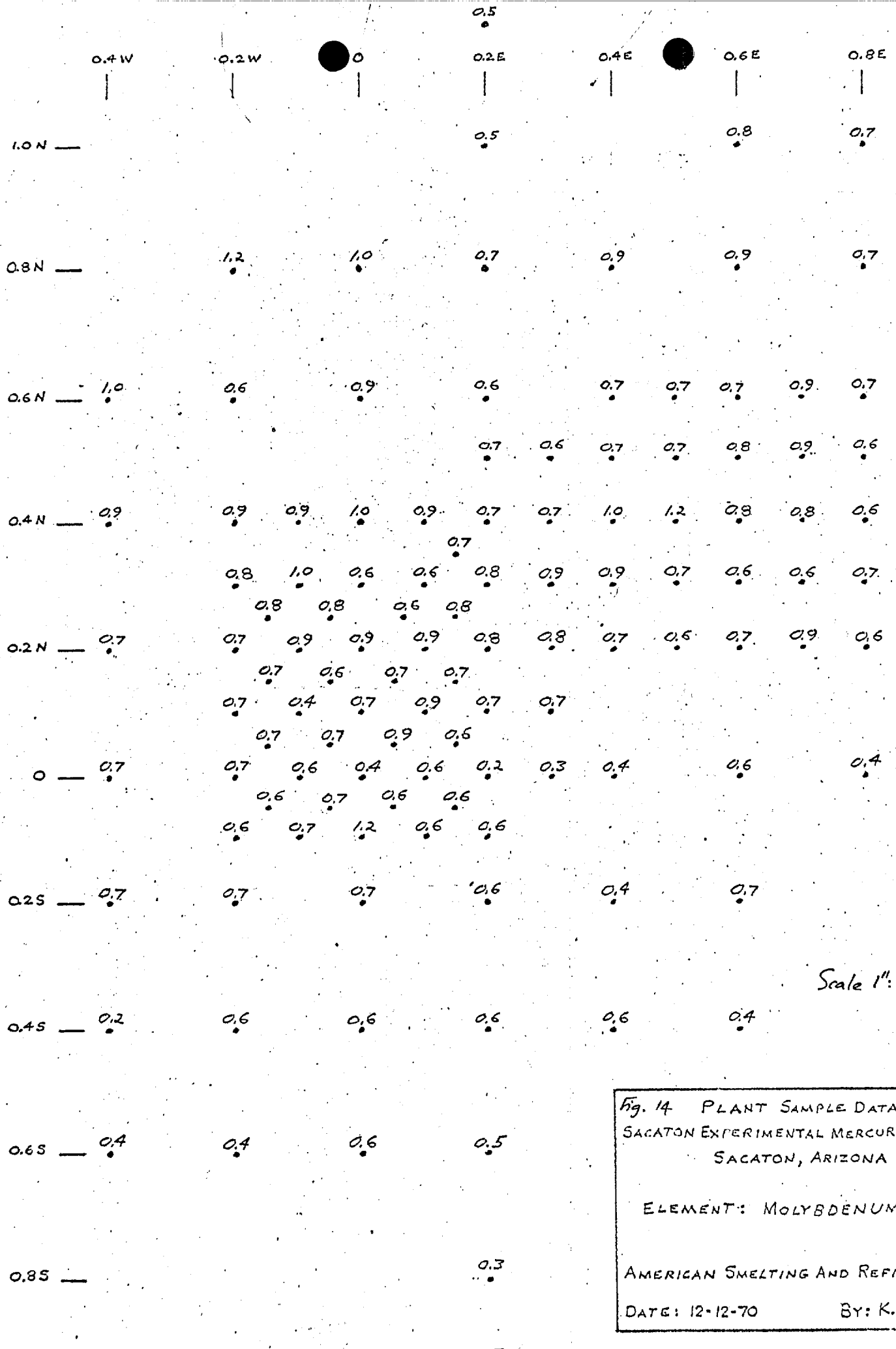


Fig. 14 PLANT SAMPLE DATA
SACATON EXPERIMENTAL MERCURY SURVEY
SACATON, ARIZONA

ELEMENT: MOLYBDENUM PPM

AMERICAN SMELTING AND REFINING CO.

DATE: 12-12-70 BY: K. H. NATION

J.H.Courtright

GEOPHYSICAL DIVISION

3422 South 700 West
SALT LAKE CITY, UTAH 84119

B.C.M.

FEB 9 1971

J. H. C.

February 9, 1971

FEB 12 1971

file

MEMORANDUM to R. J. LACY:

Hg in SOIL GAS
ORIENTATION STUDY OVER THE
SACATON OREBODIES,
PINAL COUNTY, ARIZONA

Introduction:

In October 1970 Mr. K. H. Nation of the Geophysical Division carried out detailed Hg in soil gas studies over and around the Sacaton orebodies, Pinal County, Arizona. This work was undertaken as initial reconnaissance studies in April 1970 provided evidence, albeit inconclusive, that the orebodies might be locally reflected by anomalous Hg concentrations in soil gas (my memorandum of June 25, 1970).

Conclusions and Recommendations:

1. Soil gas studies over the Sacaton orebodies failed to detect any anomalous Hg concentrations which could be definitely related to the presence of ore.

2. It is uncertain whether these results are related to lack of anomalous Hg concentrations in soil gas over the orebodies or the inadequacies of our field and analytical procedures.

3. The study has been of value in so far as it has provided evidence that gross, readily detectable Hg in soil gas anomalies are not to be expected in the vicinity of "blind" porphyry mineralization.

4. It now appears likely that any successful demonstration of Hg in soil gas studies in this environment would require more sophisticated equipment than we have at present. Probably equipment capable of making direct measurements in the field would be the most satisfactory as it would thereby be possible to carry out exhaustive orientation studies under varied climatic conditions at the site. Potential problems inherent in the handling, storage and analysis of the Hg collectors would be avoided. We could obviously attempt to develop such equipment ourselves but at this stage it would probably be advisable (taking into account both cost and speed) to consider use of previously developed equipment. A proposal for a possible joint research project with Barringer Research along these lines will be discussed in a separate memorandum.

Field Techniques

General

The field study extended over an area of approximately one and one half square miles. The E. and W. Sacaton orebodies lie within the central part of this area. The orebodies are obscured by "alluvium" and conglomerates and ore is nowhere less than 200' - 300' from surface.

Sampling was carried out on a grid system with highest sampling density (i.e. around 250 ft. separation) over the orebodies and lowest (i.e. around 1000 ft. separation) in the outlying areas (Fig. 1). The grid was laid out by driving a vehicle along compass bearings and utilizing indicated mileometer measurements. Drill-hole locations provided adequate control for the layout of this grid system.

Hg was collected from soil gas at each of these stations by both static and pumping systems. In addition soil and greasewood samples were also collected (resultant data discussed in a separate report).

Hg in Soil-Gas -- Pumping Method

Gas samples (100 cu.ft.) were extracted from soils by a gasoline motor powered vacuum pump system identical to that used in our British Columbia field studies (September 1970). The gas samples were passed through 2½ inch diameter 80 mesh silver screen "Hg collectors". After use each collector was individually packed in a sealed plastic container and shipped back to the Geochemical Laboratory where they were analyzed for Hg by our atomic absorption technique.

Holes for soil-gas extraction were dug with a hand auger to a depth of around 4 ft. Soil-gas was pumped at a rate of 10 c.f.m. for 10 minutes from these holes via a probe sealed in the hole by an inflatable sleeve.

Hg in Soil Gas -- Static Method

When the field work for the pumping study had been completed, open ended plastic tubes, each containing a "Hg Collector" screen, similar to those used in the pumping tests, were inserted in the test holes. Plastic rain shields were placed over the top of these tubes. After 48 hours the "Hg Collectors" were picked up and placed in sealed plastic containers for transmittal to the Geochemical Laboratory. This system, which was previously used in our test studies in E. and W. Canada in 1970, is designed to enable measurement of Hg gas emanations from the soils. Presumably it is also influenced by Hg concentrations in the atmosphere.

Hg in Soil Gas Data

Hg concentrations in soil-gas display apparent variation when measured by both static and pumping systems (i.e. < 5 - 17.5 nanograms and 5.5 - 21.0

nanograms respectively) but there is little or no correlation between the respective distribution patterns (Figs. 2 and 3). Neither do these patterns display any apparent relationship to the mineralization. Close examination of the data in fact indicates that most of the more distinctive concentration variations can be closely correlated with particular analytical batches. This suggests that these variations are related more to analytical error than any other factor.

L. D. James.

L. D. JAMES

LDJ:db
Encls.

cc:J.J.Collins w/encl.
J.H.Courtright "
W.E.Saegart "

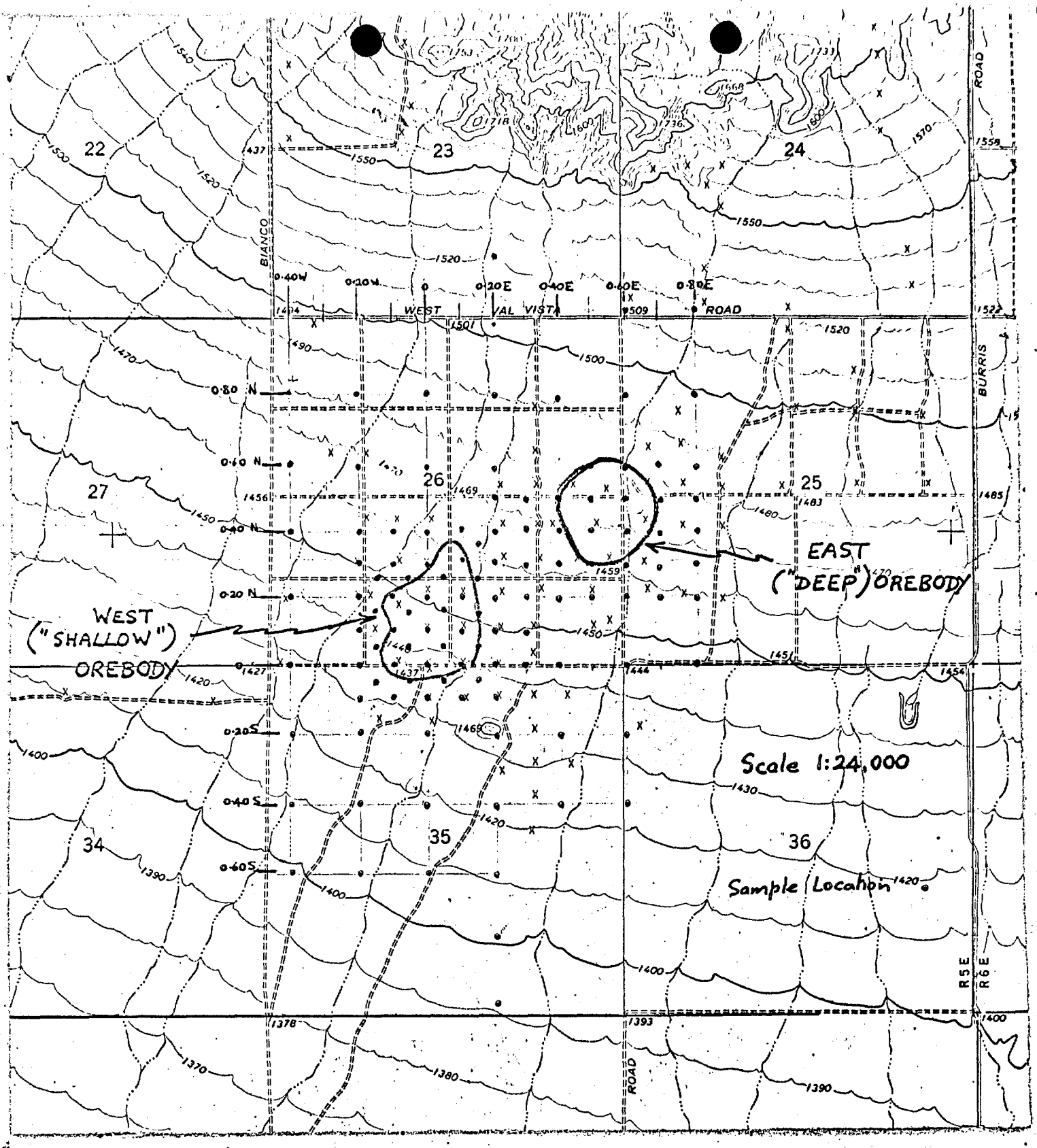


Fig. 1 - Sacaton Prospect, Arizona.
Hg in soil gas study -
Location of samples.

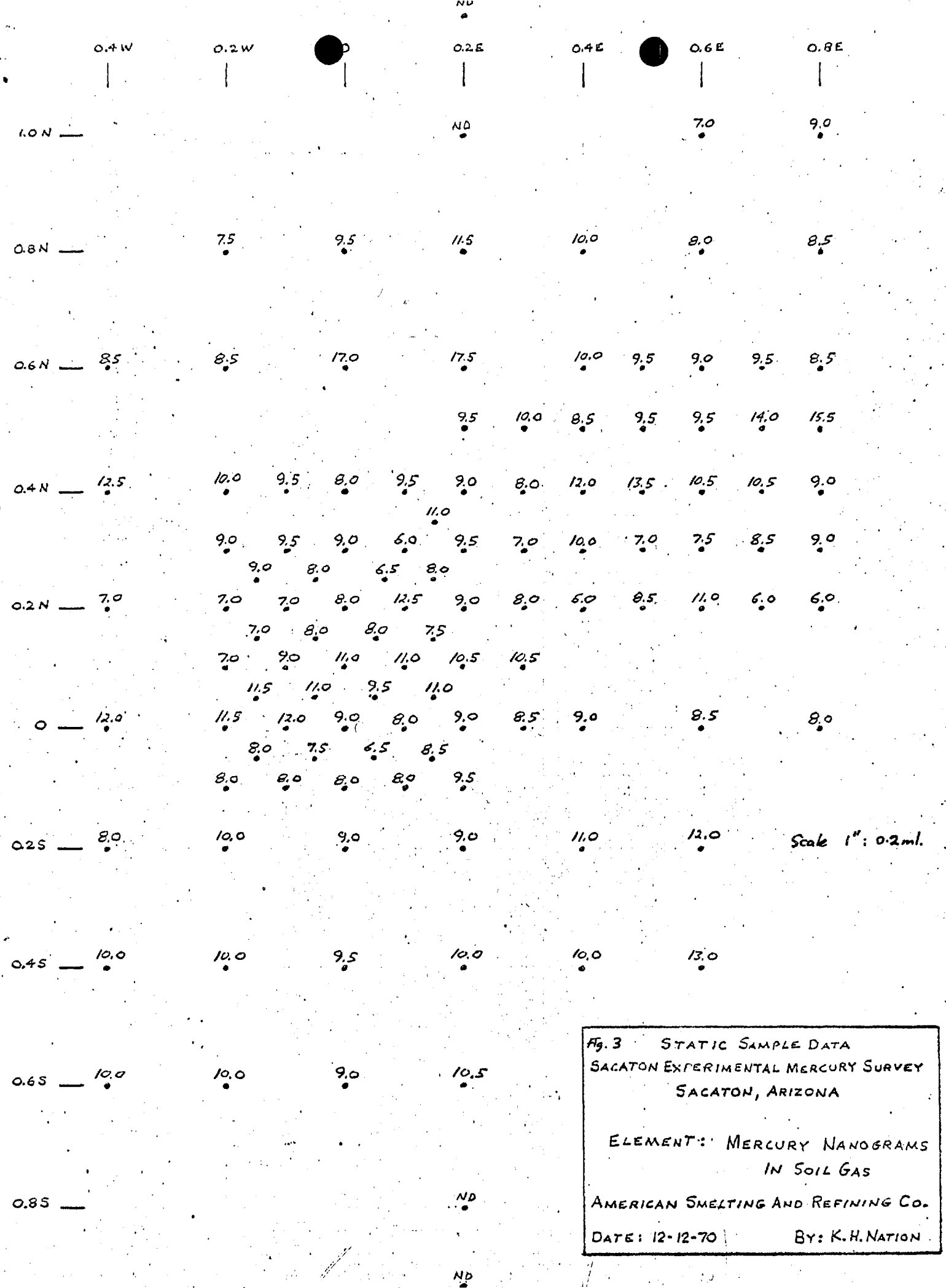


Fig. 3 STATIC SAMPLE DATA
SACATON EXPERIMENTAL MERCURY SURVEY
SACATON, ARIZONA

ELEMENT: MERCURY NANOGRAMS IN SOIL GAS

AMERICAN SMELTING AND REFINING CO.

DATE: 12-12-70 BY: K. H. NATION

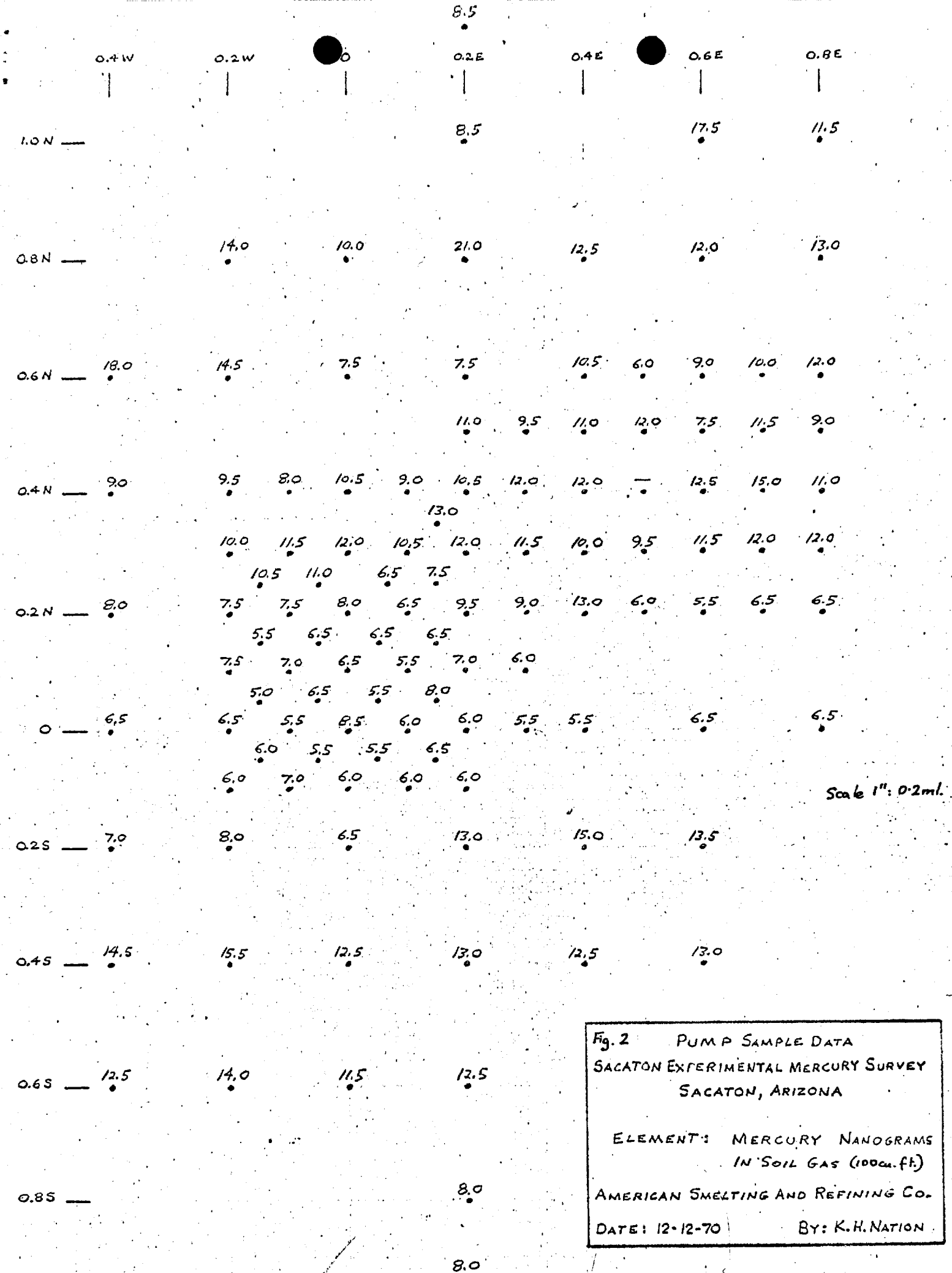


Fig. 2 PUMP SAMPLE DATA
SACATON EXPERIMENTAL MERCURY SURVEY
SACATON, ARIZONA

ELEMENT: MERCURY NANOGRAMS IN SOIL GAS (100cu. ft.)

AMERICAN SMELTING AND REFINING CO.

DATE: 12-12-70 BY: K. H. NATION

File "Geochemistry, Ariz / Silver Bell Sacaton ✓ D. H. Courtright

GEOPHYSICAL DIVISION

3422 SOUTH 700 WEST
SALT LAKE CITY, UTAH 84119

January 27, 1971

J. H. C. JAN 28 1971

RECEIVED JAN 28 1971 EXPLORATION DEPT.

MEMORANDUM to R. J. LACY:

VISIT TO THE TUCSON OFFICE AND SACATON AREA - JANUARY 20-21, 1971

January 20, 1971, was spent in the Tucson Office briefly discussing geochemical aspects of several projects with Messrs. W. Farley, J. King and N. Whaley. January 21 Mr. Whaley visited the Sacaton district with Mr. K. H. Nation and myself.

Proposed Geochemical Orientation Study of Groundwater, Sacaton Area:

Information obtained by Mr. Whaley from the Agricultural Department, University of Arizona, indicates that the proposed geochemical study of groundwater in the Sacaton--Casa Grande area cannot be attempted until Spring or Summer when irrigation becomes widespread. I plan to initiate the study as soon as the conditions are satisfactory.

The morning of January 21, Mr. Whaley visited the Sacaton area with Mr. Nation and myself in order to instruct us in the general nature of the irrigation pumps, etc., so that we might be better aware of the nature of the water samples we propose to collect.

Mesquite Study, Sacaton Area:

Mr. Nation has begun a one week to ten day mesquite sampling program over the Sacaton--Casa Grande area. This study is designed to determine the extent to which trace element, in particular Mo, concentrations in Mesquite reflect the presence of anomalous groundwater and, indirectly the presence of the Sacaton orebody. This factor is particularly important in other parts of this district (e.g. parts of Stanfield anomaly area) where little or no sampling access to groundwater is available.

Mercury Study, Sacaton Orebody:

As part of our continuing program of investigation of Hg distribution in and around porphyry deposits the afternoon of January 21 was spent obtaining representative samples or core from drill holes along the 550 N. section line across the Sacaton deposit.

Mercury Study, Silver Bell:

Mr. J. King, who was recently engaged in a geological study of the Silver Bell area, was interested to learn of the anomalous Hg concentrations detected in two un-mineralized rock samples recently collected by myself from locations some distance from the known orebodies and analyzed

in our study of Hg distribution in and around this and other deposits. This anomalous situation appears to provide supporting evidence for certain hypotheses he has developed of local ore distribution. It could conceivably be indicative of primary dispersion halos related to mineralization at depth.

As there is a slight possibility that my original samples, which were taken from the vicinity of the mine haulage road, could have been contaminated, Mr. King has agreed to collect a few additional samples from the same general locality. If these new samples prove to carry anomalous Hg concentrations a systematic rock or soil sampling program in the vicinity of the Silver Bell orebodies will probably be warranted.

Picacho Area Groundwater Data:

Mr. W. Farley has previously sampled groundwater from wells in the vicinity of Picacho, Pinal County, Arizona, in an attempt to evaluate the large magnetic anomaly occurring in the area. On the basis of data obtained elsewhere in the region the Mo content of the samples would be provisionally classified as possibly or probably anomalous. However, this apparently anomalous groundwater could conceivably be related to known mineralization (i.e. Silver Bell--some 10 - 15 miles distant). Of possibly greater significance is the local occurrence, particularly in the immediate vicinity of the magnetic anomaly, of apparently anomalous Cu concentrations. These certainly merit additional attention as the Cu would not be expected to have moved far from source (be it in bedrock or in the valley fill) because of prevailing groundwater conditions. It is planned to undertake further work in this area when the next irrigating season begins. Apart from resampling of groundwater, pH measurements will be made. The presence of acidic groundwater in the immediate vicinity of the magnetic anomaly could be indicative of proximity to weathering sulphides.

L. D. James.

L. D. JAMES

LDJ:db

cc:J.J.Collins
J.H.Courtright
W.E.Saegart

J. H. Courtright

GEOPHYSICAL DIVISION

3422 South 700 West

SALT LAKE CITY, UTAH 84119

R. J. L.
JUN 30 1970

June 25, 1970

J. H. C.
JUL 7 1970

Memorandum to R. J. Lacy:

RE Hg CONTENT SOIL-GAS
SACATON PROSPECT, ARIZONA

In view of the potential value of Hg concentrations in soil-gas as an indicator of significant blind sulphide mineralisation, the Geochemical Section has recently developed apparatus for the collection and measurement of Hg in soil-gas. Instead of depending upon the slow natural transpiration of soil gases into the atmosphere, as have the U.S.G.S., the new apparatus is capable of extracting measured volumes of air from sealed, auger drilled holes (around 3" diameter). The extraction is made by a small gasoline motor driven air pump and the Hg in the soil-gas collected on gold or silver wire mesh. The Hg can then be determined in the laboratory using a newly constructed attachment to a standard atomic absorption spectrophotometer.

Mr. E. H. Phillips spent April 20 and 21 at the Sacaton Prospect, Arizona, carrying out the preliminary field experiments over the known blind Cu orebody, which lies beneath a minimum of 100 feet of alluvium and Tertiary conglomerate. Mr. Wayne Farley of the Tucson Office spent April 20 with Mr. Phillips, advising on location of the mineralised zone, etc.

On April 20, Hg was extracted from 100 cu. ft. soil-gas samples collected at 200 ft. intervals along an approximately NNW - SSE trending traverse whose central section overlay the eastern portion of the "shallow" West Orebody (Fig. 1). The next day similar samples were collected from an E - W traverse along the 1100 N line. This traverse overlies the northern portion of the West Orebody and extends for over 1500 ft to the east, over the deeply buried (i.e. 1000 - 2000 ft.) East Orebody.

The majority of the Hg in soil-gas values are less than or equal to 2.5 ng/100 cu. ft., but a few somewhat higher concentrations are locally present, particularly over the western portion of the West Orebody (Fig. 1). Although the sample traverses are not sufficiently extensive for definite conclusions to be reached, the available data does suggest that the buried orebody could be locally reflected by anomalous Hg concentrations in soil-gas. The reason for the "anomalous" value at the east end of the E - W traverse in uncertain. The possibility of contamination from drill cuttings obviously should not be overlooked,

but the Hg concentrations in the soils (Fig. 2) do not appear to display any obvious features which could be related to this factor.

Further experimental field studies are definitely warranted at Sacaton as well as other suitable locations in the S.W. It is proposed to carry these out as soon as the present schedule (including Hg in soil-gas test in E. Canada) allows, but, in any case, no later than early Fall. High prevailing temperatures in the S.W. this time of the year would, in any case, likely produce severe instrumental problems.

L. D. James

L. D. JAMES

LDJ:bm

cc: JJCollins
JHCourtright
WESaegart

Project 295

ASARCO
GEOCHEMICAL DATA

Page

Area SACATON, Arizona

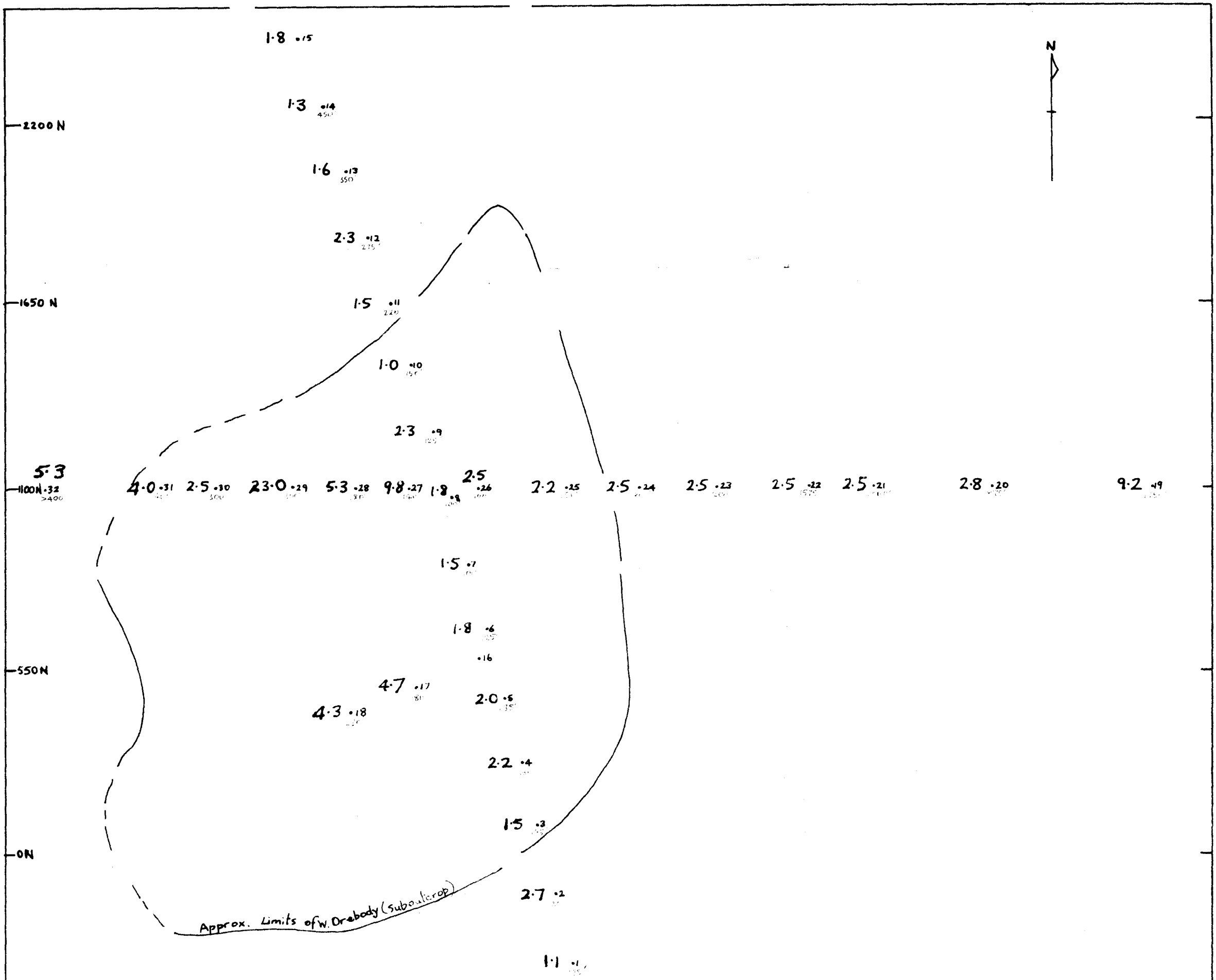
Date 5/4/70

Requested By L. D. James

No. Samples

-80# fraction soil

SAMPLE NUMBER		Cu ppm	Pb ppm	Zn ppm	Hg ppb	Hg ppb/100'³ soil gas				
Hole #1		33	20	50	19	1.1				
2		20	14	45	24	2.7				
3		17	20	44	19	1.5				
4		19	14	47	26	2.2				
5		21	20	54	26	2.0				
6		20	22	47	23	1.8				
7		20	16	45	19	1.5				
8		17	20	47	18	1.8				
9		21	18	48	15	2.3				
10		16	20	39	18	1.0				
11		16	18	39	23	1.5				
12		15	20	40	21	2.3				
13		18	20	41	19	1.6				
14		21	18	44	23	1.3				
15		23	18	43	31	1.8				
16		23	14	47	18	4.3				
17		23	22	42	23	4.7				
18		18	22	34	26	2.5				
19		21	24	37	32	9.2				
20		20	16	39	29	2.8				
21		23	22	39	38	2.5				
22		21	18	43	41	2.5				
23		20	22	44	45	2.5				
24		23	30	41	37	2.5				
25		19	18	37	27	2.2				
26		20	18	42	24	2.5				
27		21	14	41	20	9.8				
28		21	24	43	29	5.3				
29		19	24	40	19	23.0				
30		17	20	40	20	2.5				
31		19	20	40	17	4.0				
32		17	24	36	30	5.3				
Core/East Ore Body					216					
Core/West Ore Body					165					



LEGEND

SOIL GAS SAMPLE LOCATION — Hg in soil-gas (ng/100cu.ft.) • Sample no. — Approx. depth (ft.) to bedrock

Fig. 1. SACATON PROSPECT - ARIZONA

Hg Content of Soil-Gas

Scale 1" = 300'

L D J. June 1970

Fig. 2.

SACATON PROSPECT - ARIZONA

Hg in SOIL and SOIL-GAS

E-W Sample Traverse (1100N)

Hg (soil) – ppb

Hg (soil-gas) ng/100 cu.ft.

Hg (soil)

Hg (soil-gas)

Scale (Horiz.)
0 300' 600'

Approx. location W. blind Orebody

W

Sample Nos. + Locations

E

file

J.H.C.

JAN 21 1965

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

January 19, 1965

W.E.S.

MAR 11 1965

MR. J.H.C. W.E.S.
READ AND RETURN
PREPARE ANSWERS HANDLE
FILE INITIALS

TO: J. H. COURTRIGHT

FROM: N. P. WHALEY

GEOCHEMICAL SAMPLES - SACATON DIAMOND DRILL CORE AND ROTARY CUTTINGS SAMPLES ANALYZED FOR TRACE AMOUNTS OF COPPER AND MOLYBDENUM

SUMMARY

The sampling of in-storage drill hole materials from the Sacaton Project area was carried out with a dual purpose in mind: (1) the continuation of a program to investigate the potential of geochemical sampling in porphyry copper exploration and, (2) the hope that, should such a potential be realized in this instance, the results might contribute to a greater knowledge of the distribution of mineralization within the prospect area. Sampling was conducted under the preconceived assumption that trace amounts of molybdenum would probably be of greater value in delineating regional copper distribution than the seemingly erratic concentrations of copper often found in samples and hence, as much material as possible, including that which exhibited visible copper mineralization, was sampled while the opportunity was available. One hundred and sixteen samples were taken from diamond drill core and rock bit cuttings of assumed bedrock material. Both the oxide and the sulfide zones were represented. Seventy-six of these samples were analyzed by our laboratory in Salt Lake City, and the values plotted on a plan map.

Visual examination, incorporating values of all sample types, suggests that there are very weakly anomalous areas which are crudely correlative to those areas of higher concentration of base metal as developed by C. J. Orback from drill hole data in September and October of 1963, but values are much lower than those usually regarded as significant. Considering the degree of correlation, low values, and number of variables in material sampled, it might be said that the dispersion pattern displays a tendency to reflect the areas of known mineralization when used in conjunction with data from other sources, but that it is intrinsically non-definitive.

SAMPLING

A total of 116 samples of assumed bedrock materials was collected from the Sacaton Project area between March 27 and April 6, 1964. Of these, 74 were chip samples from the diamond

drill core, 37 were portions of the contents of vials of rotary cuttings samples, and 5 were rock chip samples from the small outcrop in the NE¼ of Sec. 35, T.5S., R.5E. Drill hole material was sampled with the intent of hypothetically stripping overburden from the bedrock and hence, samples were generally taken from the interval just below the assumed depth to bedrock. Chips from diamond drill core were considered the preferred sample material, and when the assumed contact between overburden and bedrock had been drilled with a rock bit and a rotray cuttings sample taken, a chip sample was frequently collected from the first run of core below this point. Many of these chip samples displayed visible mineralization in the form of oxide copper or pyrite and/or chalcocite. The probability of anomalous, and hence meaningless, values for copper in these samples was recognized at the time of their collection, but they were taken with the thought that they might contribute something to the distribution pattern of molybdenum.

Samples were collected in small paper cans with a total volume of approximately 137 cc. Rock chips from diamond drill core generally represented roughly a 10-foot interval if that much core had been available. Rock bit cuttings samples were generally a composite of a one-half split of from one to three 15 dram plastic vials, each representing a 10-foot interval of rock bit drilling.

ANALYSES

Seventy-six of these samples were analyzed for trace amounts of copper and molybdenum by our laboratory in Salt Lake City. A copy of the results and Mr. Hart's letter of transmittal describing the analytical procedures is attached for reference (Attachment A).

EVALUATION

Initially, the character of the sample itself should be considered. The chip sample from core is, while generally representing from one to ten feet of rock in a vertical direction, extremely limited or selective in a horizontal or areal sense. Rock bit cuttings samples, particularly from the earlier holes, are subject to varying degrees of contamination and the intervals sampled are based on assumed depths to bedrock.

However, if these reservations are disregarded, the absolute values collectively reflect a weak regional background and local threshold. When plotted on a plan map (Attachment B) and considered as an aggregate, the values tend to exhibit a poorly defined pattern of weakly anomalous areas which are crudely correlative to those areas of higher concentration of base metal as developed by C. J. Orback from drill hole data in September and October of 1963. The

variables involved in the materials sampled preclude valid contouring of these weakly anomalous areas, so they are only roughly outlined for purposes of clarity.

Aggregate plotting on vertical cross sections and segregation of samples into different catagories for plotting on either a horizontal plan or vertical section reveals no additional significant relationships or dispension patterns. Results as a whole are seemingly intrinsically non-definitive. A list of the samples analyzed and their characteristics is appended (Attachment C).

N. P. Whaley

N. P. WHALEY

NPW/jak
Attachments - 3

AMERICAN SMELTING AND REFINING COMPANY
GEOPHYSICAL DIVISION
3422 SOUTH 700 WEST
SALT LAKE CITY, UTAH

R. J. LACY
CHIEF GEOPHYSICIST

May 20, 1964

Mr. N. P. Whaley
American Smelting and Refining Company
813 Valley National Building
Tucson, Arizona 85701

GEOCHEMICAL ROCK SAMPLES
COPPER-MOLYBDENUM ANALYSIS
SACATON PROJECT

Dear Mr. Whaley:

We have now completed the analysis on the samples which you sent us. I am sorry that these took so long, however, I now have help in the lab so I hope these delays are now at an end.

These samples were prepared in the standard way. The samples were first crushed and pulverized to an average -80 mesh size. Then the samples were split, one-half being re-boxed for you and the other half taken into the lab for analysis. In the actual analysis, only the -80 mesh fraction was used.

Each sample was first analyzed for copper using the standard total copper technique, pyrosulfate fusion and a determination using 2-2' Biquinoline. Blanks were inserted at regular intervals and no contamination was encountered. Values ranged from 12 to 10,000 parts per million.

A second run was then made for the molybdenum analysis. This again is the standard method, employing a carbonate fusion and a molybdenum thiocyanate complex in iso-prople ether. Blanks were inserted at regular intervals - also several known values were also added - and no contamination was encountered. Values ranged from 0 to 60 parts per million.

The enclosed list gives your sample number and description, plus the copper and molybdenum values in parts per million. If you have any questions, just drop me a line.

Also, under separate cover, I am sending one-half of the total bulk of each sample back to you. This box also includes five samples which Jim Sell sent us.

I would be very interested in your comments on these results compared to your earlier studies. I have found your earlier reports very interesting. Moly most certainly appears to be an excellent indicator for porphyry coppers. Do you have any studies which can give a relationship between the amount of molybdenum found at the surface and the actual amounts associated with the copper ore? I understand some interesting data is being developed along this line.

It is my hope to do some work in the southwest in the near future with Bill Saegart. I shall look forward to meeting with you and discussing some of the possibilities of geochemistry in the southwest at that time. In the meantime, if I or the lab can be of any assistance to you, don't hesitate to write.

Yours very truly,

D. H. HART

DHH:ao
Enc.

cc: R. J. Lacy, w/enc.

SAMPLE NO. GOC-S-	PPM/Cu	PPM/Mo
Outcrop Summit	75	4.0
50-1339.5	75	4.0
62-1492	1400	4.0
70-(1390-1400)R	75	4.0
53-1110	1200	4.0
Outcrop (S)	50	4.0
15-(570-580)R	50	4.0
66-(1260-1270)R	200	4.0
23-(420-430)R	37	4.0
5-(1270-1280)R	100	4.0
21-(240)R	125	4.0
26-(100-110)R	50	4.0
14-252	400	4.0
54-1959	75	4.0
16-(250-270)	300	4.0
17-835	3000	4.0
42-1828	1200	12.0
43-281	50	4.0
4-574	800	4.0
79-1077	50	4.0
13-(130-140)R	900	8.0
41-1197	4500	4.0
72-1825	75	4.0
55-1753	25	8.0
68-1024	6000	4.0
59-1777	1800	48.0
14-(243-250)R	250	4.0
10-233	200	8.0
12-125	75	12.0
35-486	100	8.0
78-1708	4000	0
9-393	1200	8.0
Outcrop (E)	50	0
Outcrop (N)	100	0
33-2030	300	4.0
3-(1710-1720)R	25	4.0
39-1832	300	0
74-(770-780)R	50	0

SAMPLE NO. GOC-S-	PPM/Cu	PPM/Mo
44-1923	25	0
58-1460	10,000	60.0
22-(60-70)R	50	0
61-(1010-1020)R	100	0
6-276	400	8.0
31-941	1000	4.0
85-2032	50	2.0
65-1280	100	2.0
1-16	25	4.0
Outcrop (W)	25	8.0
67-(1130-1140)R	25	0
37-(1020-1030)R	50	4.0
36-(1180-1190)R	150	4.0
38-(1360-1380)R	25	0
2-(542)	3000	16.0
30-(100)R	1600	4.0
46-104	25	0
69-(1350-1360)R	50	4.0
24-(680-690)R	100	0
7-355	4000	4.0
64-(1050-1060)R	50	0
52-2043	100	0
8-214	300	4.0
17-(530-540)R	500	16.0
18-1098	25	0
63-(980-990)R	25	0
19-(120-130)R	200	0
29-(590-600)R	150	0
11-406	450	4.0
25-(80-90)R	50	4.0
20-(210-220)R	75	0
49-1510	900	0
57-948	0	0
38-(110-120)R	600	0
51-65	25	0
32-(1710-1720)R	300	4.0
56-(1690-1700)R	50	0
76-(810-820)R	50	0

ATTACHMENT B

R5E
R6E

22 | 23 | 24 | 19

27 | 26 | 25 | 30

34 | 35 | 36 | 31

T5S
T6S

2200 W | 0 E | 2200 E | 4400 E | 6600 E

4400 N | 2200 N | 0 N | 2200 S | 4400 S

EXPLANATION

- Sample from Rotary Cuttings
- Sample from Core Fragments
- Drill Hole Not Sampled
- Outcrop Sample
- Cu / Mo — Sample Values (ppm)
- Inferred anomalous Cu concentration
- Inferred anomalous Mo concentration

TO ACCOMPANY Report
DATED Jan. 19, 1965
BY N.P. Whaley

SACATON PROJECT
Pinal County, Arizona
GEOCHEMISTRY
Scale 1" = 1000'

N.P. Whaley — Jan., 1965

GEOCHEMISTRY SAMPLES - SACATON CORE AND ROTARY CUTTINGS

Sample No.	Sample Type		Analysis		Rock Type	Remarks
	Core	Rotary	Mo (ppm)	Cu (ppm)		
GOC-S-1-16	X		4.0	25	Gr	Capping
S-2-542	X		16.0	3000	Mp	Visible sulfides
S-3-(1710-1720)R		X	4.0	25	Porph(?)	Uncertain (rotary)
S-4-574	X		4.0	800	Mp	Sulfide w/wk leaching
S-5-(1270-1280)R		X	4.0	100	Gr(?)	Uncertain (rotary)
S-6-276	X		8.0	400	Mp Bx	Capping
S-7-355	X		4.0	4000	Mp	Visible py-cc
S-8-214	X		4.0	300	Mp Bx	Capping
S-9-393	X		8.0	1200	Mp Bx	Capping w/ox Cu
S-10-233	X		8.0	200	Mp Bx	Capping
S-11-406	X		4.0	450	Mp	Capping
S-12-125	X		12.0	75	Gr	Capping
S-13-(130-140)R		X	8.0	900	Mp Bx(?)	Uncertain (rotary)
S-14-(243-250)R		X	4.0	250	Mp(?) or Gr(?)	do
S-14-252	X		4.0	400	Mp(?) or Gr(?)	Capping w/tr ox Cu
S-15-(570-580)R		X	4.0	50	Gr(?)	Uncertain (rotary)
S-16-(250-270)R		X	4.0	300	Qtz. Dior Porph(?)	do
S-17-(530-540)R		X	16.0	500	Mp(?) or Gr(?)	do
S-18-1098	X		0	25	Porph Bx	Capping
S-19-(120-130)R		X	0	200	?	Uncertain (rotary)
S-20-(210-220)R		X	0	75	Gr(?)	do

Sample No.	Sample Type		Analysis		Rock Type	Remarks
	Core	Rotary	Mo (ppm)	Cu (ppm)		
GOC-S-21-(240)R		X	4.0	125	Gr(?)	do
S-22-(60-70)R		X	0	50	Gr(?)	do
S-23-(420-430)R		X	4.0	37	Mp(?)	do
S-24-(680-690)R		X	0	100	?	do
S-25-(80-90)R		X	4.0	50	Gr(?) or Mp(?)	do
S-26-(100-110)R		X	4.0	50	Mp(?)	do
S-29-(590-600)R		X	0	150	Mp Bx(?)	do
S-30-(100)R		X	4.0	1600	Gr(?)	do
S-31-941	X		4.0	1000	Gr & Gr Bx	Capping w/ox Cu
S-32-(1710-1720)R		X	4.0	300	?	Uncertain (rotary)
S-33-2030	X		4.0	300	Mp Bx	Uncertain (Tcgl or BR?)
S-34-(1360-1380)R		X	0	25	pG Gneiss(?)	Uncertain (rotary)
S-35-486	X		8.0	100	Gr Bx	Capping
S-36-(1180-1190)R		X	4.0	150	Gr Bx(?)	Uncertain (rotary)
S-37-(1020-1030)R		X	4.0	50	Dp	do
S-38-(110-120)R		X	0	600	Mp(?)	do
S-39-1832	X		0	300	Porph	Sulfides-diss & fg
S-41-1197	X		4.0	4500	Gr(?)	Capping(?) or Tcgl(?) w/ox Cu
S-42-1828	X		12.0	1200	Mp	Capping(?) w/py
S-43-281	X		4.0	50	pG Meta Gr	Fresh Meta Gr
S-44-1923	X		0	25	pG Meta Gr	do
S-46-104	X		0	25	pG Meta Gr	do

Sample No.	Sample Type		Analysis		Rock Type	Remarks
	Core	Rotary	Mo (ppm)	Cu (ppm)		
GOC-S-49-150	X		0	900	Gr	Capping w/ox Cu
S-50-1339.5	X		4.0	75	Gr(?)	Capping(?) or Tcgl(?)
S-51-65	X		0	25	Biot Gr	Fresh "Coolidge"(?) Gr
S-52-2043	X		0	100	Gr	Very wk'ly alt'ed pG(?) Gr
S-53-1110	X		4.0	1200	Gr	Capping(?)-wk'ly alt'ed Gr Bx
S-54-1959	X		4.0	75	pG Gr	pG Gr and Gneiss
S-55-1753	X		8.0	25	Gr	Capping(?)
S-56-(1690-1700)R		X	0	50	Gr(?)	Uncertain (rotary)
S-57-948	X		0	0	Gr	Biot Gr w/hm on fracs.
S-58-1460	X		60.0	10,000	Porph	Sulfide w/py-cc & hm
S-59-1777	X		48.0	1800	Gr	Sulfide (diss py-cpy)
S-61-(1010-1020)R		X	0	100	Gr(?)	Uncertain (rotary)
S-62-1492	X		4.0	1400	Gr & Porph	Sulfide (py-cc)
S-63-(980-990)R		X	0	25	Gr(?)	Uncertain (rotary)
S-64-(1050-1060)R		X	0	50	Gr(?)	do
S-65-1280	X		2.0	100	Gr	Below ox zone (no min obs)
S-66-(1260-1270)R		X	4.0	200	?	Uncertain (rotary)
S-67-(1130-1140)R		X	0	25	Gr(?)	do
S-68-1024	X		4.0	6000	Porph(?) or Gr(?)	Capping w/ox Cu
S-69-(1350-1360)R		X	4.0	50	Gr(?)	Uncertain (rotary)
S-70-(1390-1400)R		X	4.0	75	Gr(?)	do
S-72-1825	X		4.0	75	pG Gr	pG Series w/tr ox Cu
S-74-(770-780)R		X	0	50	Gr(?)	Uncertain (rotary)

Sample No.	Sample Type		Analysis		Rock Type	Remarks
	Core	Rotary	Mo (ppm)	Cu (ppm)		
GOC-S-76-(810-820)R		X	0	50	Gr (?)	do
S-77-835	X		4.0	3000	Gr	Capping w/ox Cu
S-78-1708	X		0	4000	Porph	Capping(?) w/ox Cu
S-79-1077	X		4.0	50	Gr	Capping (no min obs)
S-85-2032	X		2.0	50	Gr	Capping(?) (no min obs)

SUPPLEMENTAL SAMPLES FROM OUTCROP IN NE¼ SEC. 35, T.5S., R.5E

GOC-S-OUTCROP-(N)	Rock Chip	0	100	Gr	Chips fr alt'ed Gr
S-OUTCROP-(S)	do	4.0	50	Gr	do
S-OUTCROP-(E)	do	0	50	Gr	do
S-OUTCROP-(W)	do	8.0	25	Gr	do
S-OUTCROP-(SUMMIT)	do	4.0	75	Gr	do

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

September 15, 1961

Mr. C. P. Pollock, Exploration Manager
American Smelting and Refining Company
120 Broadway
New York 5, New York

DRILLING RECOMMENDATIONS
Sacaton Prospect
Pinal County, Arizona

Dear Sir:

Reference is made to Mr. Saegart's memorandum of September 1 to Mr. Lacy, and his covering letter regarding the results of the thorough geophysical work in the Sacaton area, and including their recommendations.

Saegart concludes that the area of indicated significant sulphide mineralization is limited to Zone A and is rather small in area (2800' by 3500'). Though small, this area still is large enough to contain an ore body. Mr. Courtright and I recommend six drill holes as a minimum test. The positions of three are shown on the attached map which is a copy of Attachment "A" from Saegart's report.

Proposed drill hole locations A, B, and C are within the area of highest I. P. response. These three are rather close-spaced, the reason being that one or two holes could be misleading in terms of average copper content.

Location D is intended to test Zone A along its apparent strike.

Location E is situated outside of the area of significant sulphides as described by Saegart. This hole is intended to determine whether the southerly drop-off in I. P. response is due to diminishing sulphide content or to some other geological condition such as deep leaching.

Location F in Zone B falls in the category of "just to be sure". In this regard Mr. Saegart says that, "If a sulphide source exists, the sulphide content is too small to be of interest." This statement is entirely correct for most disseminated deposits, but there are exceptions. As an example, disseminated bornite alone can constitute ore even though theoretically the I. P. response would be low.

We have assumed an average depth of 500' for these six holes. Actually, this will vary depending on the strength of primary mineralization from hole to hole.

We estimate the drilling cost per foot at $9.50, including contract costs, sampling, assaying, supervising, etc. We are planning to purchase

C. P. Pollock
Drilling Recommendations-
Sacaton Prospect

September 15, 1961

a used trailer from the Mission Contractor. This will be used for field core storage so that no persons but our samplers will see the core.

The cost of this program is summarized:

Drilling - (3000' at $9.50/ft.)	$28,500
Trailer -	400
Contingencies -	1,100
Total	$30,000

If you agree with this program would you please get authorization for this amount. We would expect to begin drilling shortly thereafter.

It would seem that Zone D, termed the Casa Grande prospect, should be in a separate category. Consequently, the above total does not include money for any work that might be contemplated in that area.

There is an unexpended balance of approximately $9,000 in M. A. 880. This authorization originally was set up principally to acquire options. One option payment of $7,500 is due December 1, 1961. By that time our drilling results may not be conclusive, in which case we would need to make the option payment.

Yours very truly,

Original Signed By
K. Richard

KENYON RICHARD

KR/z
Attach.

cc: DJPope, w/attach.
RJLacy, " "

Route file copy to:
TASnedden
ACHall
JHCourtright
KvdSteinen
WESaegart

AO-16A. 3.17-B

MINING DEPT.
SEP 14 1961
TUCSON

A. C. H.
SEP 14 1961

AIRMAIL September 13, 1961

Mr. R. J. Lacy, Chief Geophysicist
Geophysical Division
Salt Lake City, Utah

T A S
SEP 18 1961

Geophysical Report - Sacaton Area
Pinal County, Ariz.

Dear Mr. Lacy:

I have your letter of September 6th forwarding copy of Mr. Saegart's report dated September 1st on the Sacaton area. I wish to commend Mr. Saegart for a good job and his very concise presentation.

As yet, Mr. Richard has not submitted his request for a drilling appropriation, but I have discussed with him the suggestions you make in your covering letter, and I indicated that we should not overlook any possibilities and would go along with your recommendation for testing anomaly B provided results at the primary anomaly A were favorable. I am also in favor of testing anomaly D in order to analyze the extraneous results as you recommend, provided this can be done at reasonable cost. You might give him an estimate and I will obtain approval for the necessary drilling and logging as a geophysical research project.

I am pleased to note the seismic refraction equipment which we recently purchased improves the reliability of interpretation of your mobile surveys. The cost of the seismic instrument is obviously justified by the improved results of this survey alone.

Yours very truly,

C. P. POLLOCK

cc: DJPope
TASnedden
GRRichard } A/M

GEOPHYSICAL DIVISION
Salt Lake City, Utah

September 6, 1961

Mr. C. P. Pollock
American Smelting and Refining Co.
120 Broadway
New York 5, N.Y.

Dear Mr. Pollock:

GEOPHYSICAL REPORT
Sacaton Prospect
M.A. 880
Pinal County, Arizona

A copy of Mr. W. E. Saegart's excellent, concise report on the subject matter, dated September 1, is enclosed. I agree in general with his conclusions and recommendations as follows:

(1) Drill within the 7 m.v./v. contour (see attachment A) on Zone A in sections 26 and 35.

(2) No drilling is recommended in Zones B and C.

(3) No further property acquisition is necessary in the Sacaton area.

(4) Drilling of the Zone A anomaly can be initiated without consideration of the Zone D (Casa Grande Project) anomaly.

I should like to make some qualifying remarks concerning points 2 and 4 above. The negative recommendation in 2 most likely represents the best interpretation of the data, which is very good in the Sacaton area. This is really contingent on the results of drilling on Zone A, however, in that the copper sulphide/pyrite ratio is important in considering the significance of total percentage of sulphides. In our past experiences in the Southwest U.S. the I.P. depth probe curves at Zones B and C do not indicate significant quantities of sulphides, but strong secondary enrichment could increase the copper sulphide/pyrite ratio in a low total sulphide percentage environment.

Mr. Saegart has such strong evidence for his negative conclusions concerning Zone D (Casa Grande Project) that I support his recommendation (4) to drill Zone A without consideration of Zone D. Although his pending report on the Casa Grande Project will be negative, I would recommend some drilling and I.P. logging in this area. The intensity of the I.P. response is far beyond any obtained by us - or by anyone else as far as we know - for a non-metallic or non-graphitic mineral, extraneous polarizing medium. This might appear academic, but we should analyze extraneous results - especially in this high I.P. intensity range - in order to devise techniques of eliminating them by instrumentation or interpretational techniques.

agreed! JAS.

It should be noted that the reliability of interpretations of the mobile I.P.-magnetic-resistivity survey results has been increased appreciably by the addition of the seismic refraction survey results (see attachment I). In addition to indicating the depths to bedrock, the seismic data also suggests its nature.

Very truly yours,

R. J. LACY

RJL:th
attach.
cc: K.E.Richard
T.A.Snedden
A.C.Hall
A.G.Blucher/J.E.Kinnison
W.G.Farley

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

September 1, 1961

MEMO TO MR. R. J. LACY

GEOPHYSICAL REPORT
Secaton Prospect
M. A. 830
Pinal County, Arizona

Description of Surveys

Geophysical surveys conducted on the Secaton Prospect include the usual reconnaissance methods, induced polarization, resistivity and magnetics. All I.P. and resistivity traverses were made using an 800 ft. "a" electrode spacing. A total of 18 square miles was covered by the reconnaissance methods in the area bounded on the east by U. S. Hwy. 84 and on the north by the Gila River Indian Reservation.

A new I.P. technique which we call the "traveling depth profile" was established to improve interpretations. Four "traveling depth profiles" were run in the Secaton area. Their locations are shown on attachment B. The results are contoured in section to illustrate both vertical and lateral changes in polarization. The vertical units used in plotting these results are not directly related to depth. Consequently, the shape or attitude of a polarizing mass can be substantially distorted.

A seismic refraction survey was conducted to determine bedrock depths. To facilitate seismic interpretations, velocity determinations were made on outcrops of various rock types present in the district. The velocities are as follows:

Granite	10,000 - 15,000	ft./sec.
Granite gneiss	11,000	"
Schist	7,400 - 8,000	"
Conglomerate	4,800 - 7,000	"

Four refraction profiles, initiated at the mineralized outcrop, were extended about a mile to the North, East, South and West respectively.

Field work was completed August 29.

Results and Interpretations (by areas)

Four anomalous zones were indicated by the I.P. traversing. They are shown on Attachment A. Each is discussed below.

Zone A

This I.P. high is the primary target area which includes the mineralized outcrop described by Kinnison and Blucher in their memo of February 13, 1961.

The source of the I.P. high is unquestionably sulfides. I.P. "traveling depth profiles" 1 and 2 (Attachments E' and F') indicate the significant sulfides have rather abrupt lateral limits. The 7 m.v./v. contour is interpreted as the boundary of significant sulfides. The target thus indicated has plan dimensions of 2800 ft. by 3500 ft., excluding the elongation to the north-east.

An I.P. depth profile made at the north base of the mineralized outcrop indicates a depth to the top of sulfides of 110 to 130 ft. Based on previous correlations, the response-depth comparison indicates a minimum of 5% total sulfides.

The seismic results (Attachment I) indicate the bedrock surface near the mineralized outcrop dips away from the exposure at 5 to 10° to a depth of 70 to 90 ft. where it merges with the bedrock pediment surface paralleling the alluvial surface.

The entire area within the I.P. anomaly is underlain by granite or similar acid igneous rock.

The granite velocity in the vicinity of the mineralized outcrop is less than 10,000 ft./sec. The lower velocity is probably due to alteration, fracturing and voids in the leached granite capping.

An intermediate velocity interface occurs at a depth of about 50 ft. in the central portion of section 26. The resistivity data obtained on "traveling depth profile" #2 (Attachment F) also indicates the presence of a shallow rock unit in this area. A conglomerate layer overlying granite in the south and central portions of section 26 is the current interpretation.

If the thickness of oxidized capping is not highly irregular, the sulfide content at the center of the anomaly is higher than beneath the outcrop. The center of the high is approximately 600 ft. west of the outcrop.

Zone B

This area is characterized by a relatively large, low intensity I.P. high. Two "traveling depth profiles" were run across this zone (see Attachments G, G', H and H'). The increase in I.P. with depth in this area is only a little above the average background. If a sulfide source exists, the sulfide content is too small to be of interest.

Comparison of magnetic and resistivity results (Attachments B, C, G, and H) yields the following interpretations:

1) The alluvial cover over that portion of the I.P. anomaly in sections 22 and 23 is only a thin veneer.

2) A substantial part of this area is underlain by a segregation of the granite with an abundance of ferromagnesian minerals or a core basic rock unit (Blucher has tentatively identified diorite about one mile to the northwest).

3) The I.P. response is only an increase in background level common to the rock unit referred to in 2) above.

Zone C

This was initially assumed to be a small zone of mineralization probably related to the primary target, Zone A.

"Traveling depth profile" #1 (Attachment E") recorded no significant I.P. response in this area. The zone can be discounted as a probable malfunction of the I.P. equipment on the initial traversing.

Zone B

The large, relatively strong I.P. response plotted in the north-east corner of Attachment A is the beginning of the anomalous area which has been titled "Casa Grande Project". Most of the anomaly lies East of Hwy. 84. The I.P. high exists over an area of 17 square miles with the southern limit undefined.

The combined results of I.P. depth profiles and seismic refraction profiles indicate the polarizing source lies within the alluvium.

This area is of no further interest as an exploration potential. A complete report on the Casa Grande Project will be submitted shortly.

Recommendations

Drilling is recommended in sections 26 and 35 within the 7 m.v./v. contour. As stated in my memo of July 15 to Mr. K. E. Richard, " The specific drill site locations within the I.P. envelope are not critical -- any convenient drilling pattern can be selected."

No drilling is recommended in Zones B and C.

No further property acquisition is necessary in the Sacaton area.

Drilling of the Zone A anomaly can be initiated without consideration of the Zone B (Casa Grande Project) anomaly. My report on this latter area will contain a negative evaluation.

W. E. SAEGART

WES/z
Attachments-pg. 4
cc: CPPollock, w/all attachments
KERichard, " " "
TASnedden, w/attachments A & 1
ACHall, " " " " "
AGBlucher/JRKinnison, w/all attachments
MGFarley, w/all attachments

Memo to P. J. Lacy
Geophysical Report - Secaton Prospect

September 1, 1951

LIST OF ATTACHMENTS

Attachment	
A	I.P. Contour Map
B	Resistivity Contour Map
C	Magnetic Contour Map
D	Map showing location of "Travelling Depth Profiles"
E	Resistivity Contour Overlay - Travelling Depth Profile #1
E'	I.P. Contours - Travelling Depth Profile #1
F	Resistivity Contour Overlay - Travelling Depth Profile #2
F'	I.P. Contours - Travelling Depth Profile #2
G	Resistivity Contour Overlay - Travelling Depth Profile #3
G'	I.P. Contours - Travelling Depth Profile #3
H	Resistivity Contour Overlay - Travelling Depth Profile #4
H'	I.P. Contours - Travelling Depth Profile #4
I	Map showing sections with Seismic refraction results
J	I.P. Depth Profile at Mineralized Outcrop

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

February 13, 1961

MEMORANDUM FOR KENYON RICHARD

SACATON PORPHYRY
COPPER PROSPECT
Casa Grande, Arizona

A previously unknown porphyry copper altered zone surrounded by alluvium lies 5 miles northwest of Casa Grande, Arizona. This prospect, which we call the Sacaton, was discovered February 9, 1961; we suggest that it should receive immediate Company attention, as outlined in Recommendations below.

Introduction

The exploration staff of the Tucson Office have frequently discussed the geometrical alignment of alteration, intrusives, and developed porphyry Cu mines along semi-continuous "belts" striking N-NW, and NE to east. This has particularly been emphasized recently in our Poston Butte-Blackwater and Mission-Amole exploration activities. These zones are shown in generalized manner on Att. A. The Casa Grande vicinity appeared interesting because it lies on the Poston Butte zone, near the intersection of the Silver Bell zone extended NW, and in particular because in this area there was thought to be a large expanse of shallow-covered pediment.

Another lead into the area is found in a reference in Company files to an old water-well churn drill hole on Potts Ranch (year 1919), which reportedly bottomed in 6% Cu from 460-487' (letter from K. S. Twitchell to Goodwin, August 6, 1941; and following correspondence). Unfortunately the hole was not found at that time (1941), and our present reconnaissance suggests that if it was present in the reported locality it has been covered and obliterated by flood plain silts.

Blucher initiated reconnaissance of part of the Casa Grande vicinity one day a month ago, and together we scouted the area north of Casa Grande on February 9, 1961, resulting in the discovery of a positive lead.

Recommendations

The only altered outcrop is Small Hill, separated from unaltered rocks both on the north and south by about 1 1/2 miles of alluvial-covered plain. This is a featureless desert flood-plain area; the Casa Grande cultivated region lies a few miles southerly.

Att. B shows the possible outline of an altered zone. We propose that in this area a preliminary property investigation be started as soon as possible, with the expectation of following this up by I.P. geophysical surveys and claim staking, in whatever order seems then most appropriate.

About 3 field days will be required to finish the geologic reconnaissance. This is planned in the immediate future.

The Prospect

The rocks in the Casa Grande area consist of the Tertiary Coolidge granite, coarse-grained granite, Pinal schist, and a post-ore conglomerate of Yellow Peak-type (refer Blucher's Blackwater report, 1960).

The Sacaton prospect is shown on Att. B. The single outcrop of altered granite is a little hill only 300 feet in diameter, surrounded by a large alluvial plain. To the north 1½ miles the Sacaton mountains appear to be fresh or but weakly altered. To the SE 2 miles Pinal schist crops out and is unaltered.

An examination of well logs on file at the U.S.G.S. in Tucson yielded certain information on the shape of a pediment cut on both pre- and post-ore rocks (Att. C) south of the altered area. There is really no basis to aid in predicting the depth to bedrock within the target area, but it is probably shallow; 200 feet or perhaps less.

The rock on this small hill is pervasively sericitized and kaolinized granite, containing limonite after pyrite and traces of "live" limonite. An altered porphyry dike cuts the southern slope. The original total sulphide content is estimated to have been about 2%.

Although the capping exposed on this hill does not suggest that ore lies directly beneath it, it may be the pyritic portion of a larger porphyry copper deposit -- another which lies along the projection of the Poston Butte-Ray mineral zone.

John E. Kinnison
JOHN E. KINNISON

ARTHUR G. BLUCHER

JEK, AGB/ds