000

EL 9/66

336001

OPEN FILE

REPORT ON A

MERCURY VAPOUR SOIL GAS TEST SURVEY

QUEENSTOWN AREA, NORTH WEST TASMANIA

ON BEHALF OF

THE MOUNT LYELL MINING AND RAILWAY COMPANY LTD.

MICROFILMED

D. of M.	A.O.	C.G.	E.O.	D.S.I.T.
				Registrar
D. DIR.	2 OCT 1984			E & IL
	DEPT. OF MINES			
D.E.E. No.	10,076/84			

AMG REFERENCE POINTS ADDED

001

336002

PRIVATE AND CONFIDENTIAL

REPORT ON A MERCURY VAPOUR SOIL GAS TEST SURVEY QUEENSTOWN AREA, NORTH WEST TASMANIA ON BEHALF OF THE MOUNT LYELL MINING & RAILWAY COMPANY LTD.

BY

P. ROBERTSHAW, M.Sc.,DIC.

and

A.W. HOWLAND-ROSE, M.Sc.,DIC,AMAusIMM,FGS.

GEOPHYSICISTS

SYDNEY, N.S.W. FEBRUARY, 1973

TAS - 015

CONTENTS

003

336004

SCINTREX PTY. LTD.

Formerly

SEIGEL ASSOCIATES AUSTRALASIA PTY. LTD.

GEOPHYSICAL CONSULTANTS AND CONTRACTORS

SUMMARY

Semi-quantitative field determinations of mercury vapour content in ore samples showed the Crown Three body to be an ideal target. The ores from Comstock, 12 West and to a lesser extent, Cape Horn, were also shown to be good targets for the mercury soil gas technique.

In spite of the somewhat adverse weather conditions immediately prior to and during the survey, the results of soil gas profiles are considered to be encouraging, especially in the Comstock area.

1031 WELLINGTON STREET, WEST PERTH, W.A. 6005
TELEPHONE 21 6934. TELEGRAMS "SCINTREX" PERTH

6 TRAMORE PLACE, KILLARNEY HEIGHTS, N.S.W. 2087
TELEPHONE 451 5367. TELEGRAMS "SCINTREX" SYDNEY

504

336005

REPORT ON A
MERCURY VAPOUR SOIL GAS TEST SURVEY
QUEENSTOWN AREA, NORTH WEST TASMANIA
ON BEHALF OF
THE MOUNT LYELL MINING & RAILWAY COMPANY LTD.

INTRODUCTION

During the period 20th to 22nd January, 1973, a mercury vapour soil gas test survey was conducted under the direction of Mr. P. Robertshaw, M.Sc., of Scintrex Pty. Ltd. in the Queenstown area, north west Tasmania on behalf of The Mount Lyell Mining and Railway Company Ltd.

The programme included soil gas measurements in the Mount Lyell and Mount Tyndall areas. The locations of the test profiles in these areas are shown in Figures 1 and 2 respectively.

Soil gas profiles totalling over 6000 feet were completed over areas of known mineralisation. In addition, 20 ore and mineral samples were tested for free mercury content.

The survey was intended to assess the applicability of the soil gas technique in the search for further possible mineralisation of this type in this area.

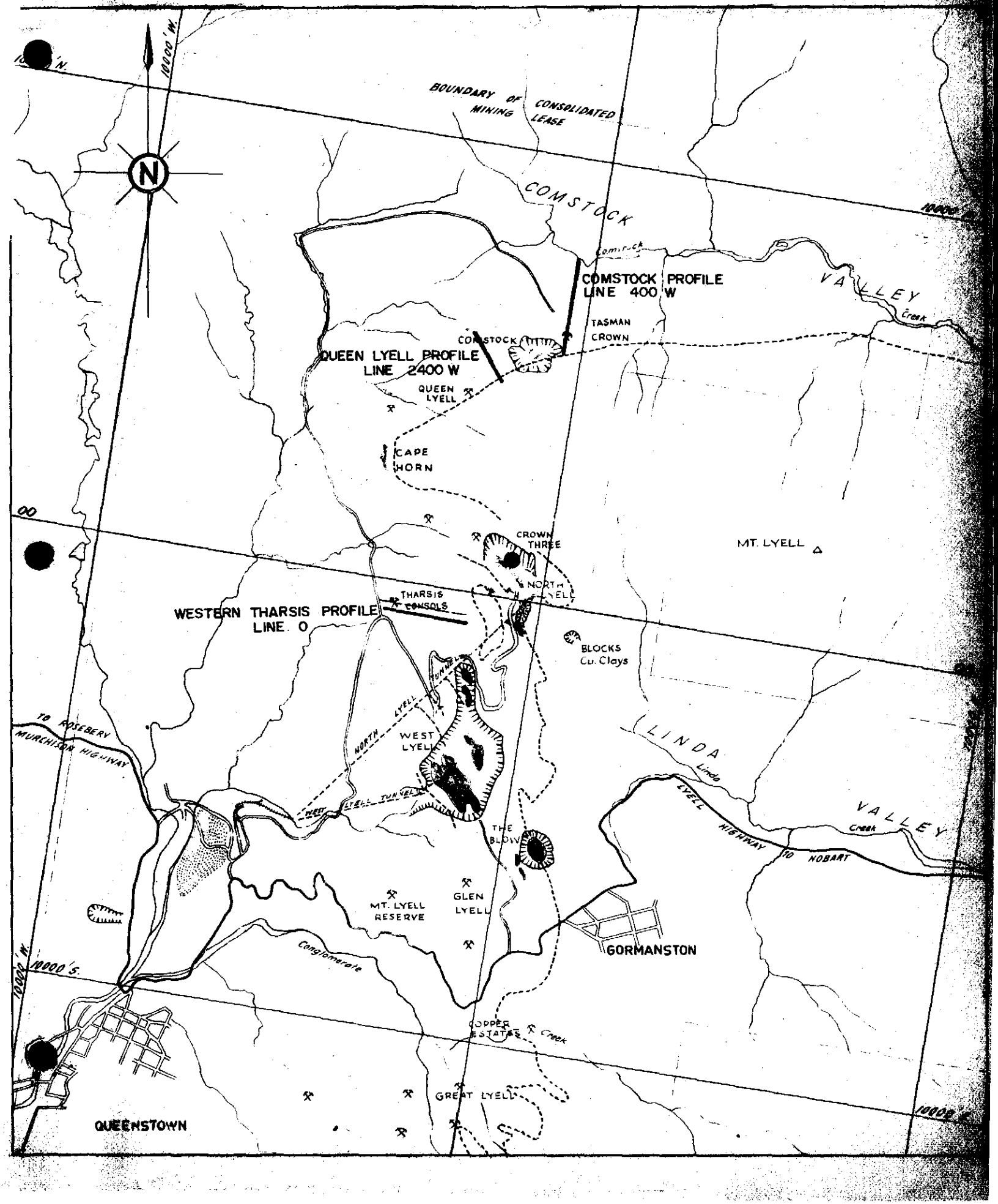
5 cm

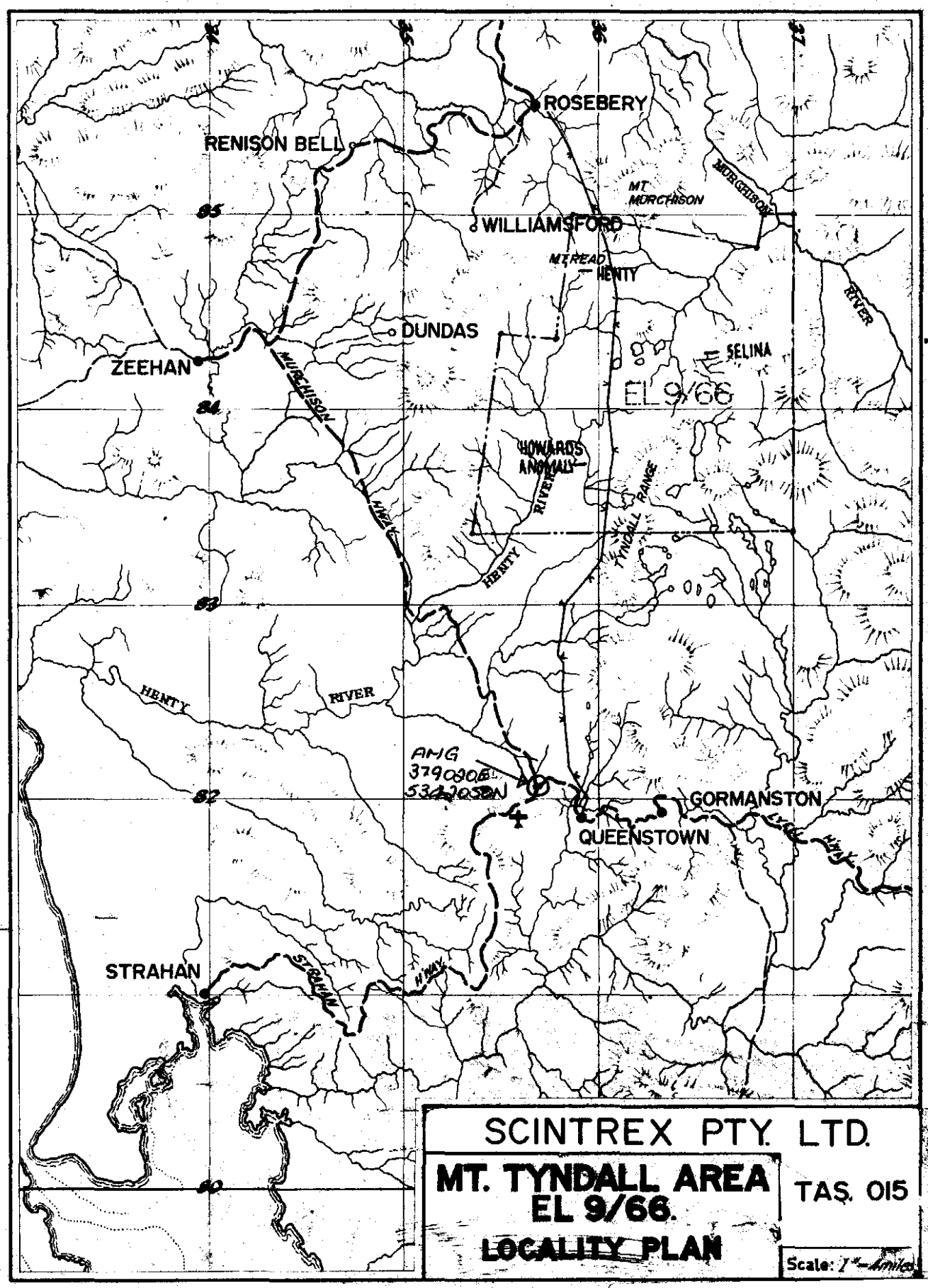
QUEENSTOWN AREA - TAS. 015

SCALE : 2" = 1 mile

LOCALITY PLAN

336006





AMG REFERENCE POINTS ADDED

5 cm

The equipment used was a Scintrex HGG-3 mercury vapour soil gas spectrometer the principles of operation and specifications of which are attached in Appendix HGG.

ECONOMIC GEOLOGY

A number of open cut and underground mining operations are in progress on the Mount Lyell copper field, yielding approximately 2½ million tons of ore per year. The orebodies lie in a belt of Cambrian sericitic and chloritic schists of the Dundas Group, at or close to a contact with the Ordovician Owen Conglomerate.

The mineralisation occurs in two distinct horizons. The upper horizon, which includes the Comstock (Tasman Mine) lead-zinc-silver lode, is clearly associated with hematitic breccias and chert-quartzites within the schist belt. The lower horizon includes the Prince Lyell and Cape Horn orebodies which are associated with fragmented zones in the sericitic and chloritic schists. (Geology of the Mt. Lyell Mine, P.G. Burgdorf, 1971).

The Mount Tyndall area lies further to the north on the same belt of Cambrian volcanics. Here, zones of disseminated mineralisation have been found in the sheared and altered tuffs.

DISCUSSION OF RESULTS

Three soil gas traverses in the Mt. Lyell area are presented in profile form on Plate 1 at a horizontal scale of 1 inch = 200 feet, together with geological sections kindly supplied by The Mount Lyell Mining & Railway Company Ltd. Also on Plate 1, at a horizontal scale of 1 inch = 100 feet are three profiles from the Mt. Tyndall area.

The values plotted at each location represent the averages of two or more separate readings taken in close proximity. Where soil gas anomalies occurred extra measurements were taken to demonstrate repeatability and to better assess the mercury vapour concentrations. The readings are expressed as an instrumental readout in millivolts, where 1 millivolt is approximately equivalent to a mercury vapour concentration of 10 nanograms/m^3 in the gas inside the spectrometer sample cell. The vertical scale throughout the profile presentation on Plate 1 is 1 inch = 100 millivolts.

Mount Lyell Area

The Comstock area profile, line 400W, shows a clearly anomalous response over the Tasman Shaft lead-zinc-silver

lode. Here maximum readings of 70 to 75 millivolts were recorded close to the shaft at station 20.00S, with a general background level in the range 10 to 25 millivolts. The anomalous zone is over 100 feet wide and is clearly not associated solely with tailings around the shaft. At 22.00S a further mercury vapour anomaly was detected, of a slightly higher amplitude but much narrower. The source of this anomaly is not apparent from the geological section but may be due to further mineralisation.

At the northern end of this profile, in the vicinity of Comstock Creek, an additional anomalous zone was detected with peak readings in the range 75 to 90 millivolts at 4.00S and 5.00S. Glacial moraine in this area is perhaps 150 feet thick and the geological section offers no explanation as to the source of the mercury vapour.

Although it is possible that oxidising mineralised debris within the glacial cover could be the source of the mercury anomaly, it is considered highly unlikely. A source beneath the moraine should seriously be considered.

The soil gas profile on line 00 of the Western Tharsis Grid is characterised by measurements entirely in the range 0 to 20 millivolts with no apparent mercury vapour anomalies.

The 1 foot thick soil cover at the western end of the profile was adequate for soil measurements, but could not act as a satisfactory soil gas reservoir. This limited soil cover progressively diminishes up slope until measurements had to be abandoned at station 15.00E. Near station 8.50E but 40 feet to the south of the traverse line, soil gas measurements on a tailings heap near an old adit gave anomalous values in the range 70 to 75 millivolts.

The Queen Lyell Grid profile, on line 2400W gave no indication of anomalous mercury vapour concentrations over pyritic zones assaying up to 19% in near surface drill hole intersections. The highest individual reading on this line was one of 30 millivolts at 1.00S. Elsewhere all the measurements fell within the range 0 to 20 millivolts, typical background values. The soil cover throughout this profile was shallow, consisting in some areas of coarse rock fragments, not an ideal soil gas reservoir.

At the Crown Three open cut, where approximately 10% pyrite and 1½% chalcopyrite is found in the schist host rock, a series of soil gas measurements were made on ore bench 1930. Almost all the readings were in the low amplitude mercury background range of 10 to 20 millivolts, except in one location where values up to 80 millivolts occurred. The

"soil" cover here, was generally wet clay which is considered to be too disturbed to act as an effective soil gas reservoir.

Mount Tyndall Area (EL 9/66)

The Henty Grid profile, line 63N shown on Plate 1, crossed a contact between the acid volcanics of the Mt. Read sequence and the mineralised sheared chloritic tuffs at approximately 26.00E. About 20 feet north of this traverse, close to 24.50E, is the No. 1 shaft where pyrite-chalcopyrite mineralisation occurs. The soil cover for this profile was adequately deep and undisturbed but no mercury vapour concentrations were detected in the vicinity of the mineralisation, all measurements being in the range 0 to 20 millivolts. Soil gas measurements near a narrow, exposed pyrite-chalcopyrite vein close to the shaft gave only values in the range 10 to 15 millivolts. Measurements on a tailings heap near the shaft, however, gave values in the range 65 to 80 millivolts.

A soil gas profile on line 128N of the Lake Selina Grid gave low amplitude values in the range 0 to 20 millivolts, the maximum readings of 20 millivolts occurring at 24.50W and 26.00W. Broad zones of disseminated pyrite-chalcopyrite

mineralisation, defined by drill hole intersections with up to 20% pyrite, occur between 27.00W and 22.00W. The soil cover was mostly waterlogged in the western portion of the profile but appeared to be sufficiently dry up slope to the east.

In the Howards Anomaly area the soil gas profile crossed a broad gossan zone over disseminated pyrite-chalcopyrite and continued to the west along the side of a costean to a contact between the host rock tuffs and a feldspar-hornblende porphyry. Diamond drill hole intersections in this area show up to 14.5% pyrite with copper values generally less than 0.1%. Over the gossan, individual soil gas readings of 30 and 25 millivolts occurred, but elsewhere values were in the range 0 to 15 millivolts.

Sample Tests: Free mercury content analyses carried out on 20 ore and mineral samples from the Mt. Lyell area are presented in Table I. The procedure involved heating and agitating a half gram, -65 mesh fraction specimen of each sample and analysing the evolved vapour for mercury content. The values obtained should be regarded as relative, semi-quantitative assessments and cannot be expressed in terms of p.p.b.

Massive responses of over 3000 millivolts were recorded from samples of semi-massive pyrite-chalcopyrite-chalcocite ore from the Crown Three open cut, taken from the vicinity of the high soil gas measurements. Other samples of similar nearby ore gave weaker responses. A sample of gossanous material over this section of high grade Crown Three ore also showed a massive free mercury response (over 3000 millivolts).

Tests on ore from the Tasman mine, Comstock (massive galena-sphalerite) and from the 12 West orebody (massive bornite) gave significant responses, with maxima of 700 and 550 millivolts respectively. Samples of massive chalcopyrite from the Cape Horn and Prince Lyell orebodies gave relatively low responses of 120 and 100 millivolts respectively, whilst massive and disseminated ores from elsewhere gave insignificant results in the range 10 to 30 millivolts.

Selected samples are in the process of being quantitatively analysed in our Perth laboratory for mercury vapour. At the time of writing these results were unavailable.

CONCLUSIONS AND RECOMMENDATIONS

The semi-quantitative free mercury tests, Table I, are measurements of the easily volatilised component of the total mercury content. It is this component which would

be available to form mercury vapour concentrations in soil gas over unoxidised ores. The tests indicate that free mercury is unequally distributed throughout the ores in the Mt. Lyell area and was only found in significant quantities in the Comstock, 12 West and Crown Three ores. This probably accounts for the lack of mercury vapour anomalies on the Queen Lyell and Western Tharsis profiles whilst the Comstock lead-zinc-silver lode was detected.

The total mercury content of the ores, measurable by chemical extraction, is much greater than the volatile component, but the majority of the mercury may be chemically bound or interstitially held within the unweathered ore so as not to form a significant mercury vapour halo. On oxidation, however, it would be expected that all or most of the mercury would be released to the environment. It is probably this effect which accounts for the mercury vapour anomalies on the tailings heaps on the Western Tharsis profile at 8.50E and at the No. 1 shaft near the Henty grid profile.

The unseasonably wet weather prior to, and during, the execution of these surveys may have influenced the results in such a way as to reduce the amplitude and perhaps areal extent of soil gas anomalies.

As no mineral samples from the Mt. Tyndall area have been tested for free mercury content, the potential of the method remains to be demonstrated. However, the positive results in the Comstock area indicate that free-mercury-rich ores of this type are easily detectable by the mercury vapour analysis technique.

Further mercury soil gas surveys are recommended in the area. These should be carried out after a period of reasonable weather and should not be undertaken in saturated soils. Additional mercury testing of mineralised samples is strongly recommended, particularly from the Mt. Tyndall area. The method may assist in screening induced polarization anomalies prior to drilling in this area, providing the primary ores can be shown to contain volatile mercury.

We look forward to discussing the implications of this test work with you at the earliest opportunity.

Respectfully submitted on behalf of:

SCINTREX PTY. LTD.

P. ROBERTSHAW, M.Sc.,DIC.

A.W. HOWLAND-ROSE, M.Sc.,DIC,AMAusIMM,FGS.

GEOPHYSICISTS

TABLE I

Semi-quantitative free mercury content tests on ores and minerals from the Mt. Lyell area.

Half gram (± 10%) crushed (-65 mesh) sample heated for 15 seconds in spirit burner flame.

Sample	Location	Description	Spectrometer reponse (m.v
1	Comstock Mine	massive galena/sphalerite	600
	As above	As above	700
2	Cape Horn Orebody	massive chalcopyrite vein	120
	As above	As above	120
3	Cape Horn Orebody	disseminated pyrite-chalcopyrite ore	15
4	12 West Orebody	massive bornite	380
	As above	As above	550
5	Prince Lyell Orebody	massive chalcopyrite vein	100
6	Prince Lyell Orebody	disseminated ore (~1.5% copper)	20
7	West Lyell Stockpile	massive pyrite	<20
8	West Lyell Stockpile	massive chalcopyrite/pyrite	30
9	West Lyell Stockpile	disseminated ore	10
10	Crown No. 3 Open Cut	semi-massive pyrite-chalcopyrite-chalcocite	3000+
	As above	As above	3000+
11	Crown No. 3 Open Cut	As above	3000+
12	As above	As Above	~50
13	As above	As above	~50

339017

TABLE I

Sample	Location	Description	Spectrometer Response (m.v
14	Crown No. 3 Open Cut	semi-massive pyrite-chalcopyrite-chalcocite	1750
	As above	As above	1150
15	Crown No. 3	gossan over semi-massive ore	3000+

336018

018

336019

SEIGEL ASSOCIATES AUSTRALASIA PTY. LTD.

APPENDIX 'HGG'

HGG-3 MERCURY SPECTROMETER

PRINCIPLES OF OPERATION

AND

SOIL GAS SAMPLING PROCEDURES

GENERAL BACKGROUND AND PRINCIPLES

This note describes the principles design and construction of an electro-optical apparatus for the measurement of very small concentrations of mercury vapour in a gas. Such an instrument finds application in the mineral exploration field where mercury vapour is believed to act as a trace for both base and noble metal deposits.

Various mercury vapour detection systems have been described over the last 15 to 20 years, the earlier application being in the laboratory analysis of soil and soil samples. Later techniques have been described that are suitable for atmospheric measurements, but prior to the system described here no satisfactory instrument had existed that combined the necessary sensitivity, selectivity and fast response.

All of the published literature cites detection by the measurement of the attenuation of the intense mercury emission line at 2537^{o}A. This radiation can be obtained by such sources as low pressure mercury discharge lamps, hollow cathode lamps resonance lamps etc. and is directed through a suitable sample cell onto a detector sensitive to the ultraviolet. The sensitivity of a simple detection system such as this is limited by the long term stability

of the radiation source and the fact that many other substances absorb strongly in the ultraviolet. The history of the systems developed in the last few years, shows the various efforts made to improve the sensitivity and selectivity of the basic technique.

To obtain selectivity, it is necessary to measure the absorption in the sample cell due to mercury vapour alone, eliminating the effect of interfering gases, vapours and suspended particular matter. This can be carried out by measuring the total absorption and then selecting from that the absorption due to the interfering substances.

The total attenuation in the cell can be measured using the 2537^{o}A emission lines. However, to measure the attenuation due to the interference gases, a reference wavelength must be chosen, where the interfering gases absorb but the absorption due to the mercury vapour is much less.

This reference wavelength should, of course, be close to the "signal" wavelength, so that the absorption in either case due to interference can be regarded as identical. In one earlier system (Barringer 1963) this reference wavelength was obtained by passing the radiation from a warmed discharge lamp through a small cell containing

saturated mercury vapour. This effectively removed the central portion of the 2537 radiation leaving the "wings". These "wings" served as the reference wavelength since the radiation could be little further absorbed by mercury vapour in the sample cell. One disadvantage of this system is that the signal line width has to be wide enough to include the wings, with consequent reduction in apparent gas absorption coefficient.

In the system described here, the reference wavelength is obtained by altering the nature of the discharge itself by means of the so-called Zeeman effect. When a suitable magnetic field, in this case some 15k gauss, is applied to the discharge, the emission line is partially split to give, as well as the original line new lines on either side of the central wavelength.

The main ultraviolet emission in the low pressure discharge lamp is the result of electrons, excited by the discharge of a higher energy level, falling back to the ground state. These states are 6^3P, the excited state and 6^1So, the ground state. The difference in energy levels is 4.86 eV, corresponding to 2537^oA.

The splitting of the spectral line can be traced back to

splitting of energy levels in a magnetic field. The orbit of an electron has associated with it a magnetic moment owing to the motion of the electron. When the atom is placed in a magnetic field, the total angular momentum vector is subject to a torque resulting from the interaction between the atomic magnet and the external field. The vector is caused to precess about the direction of the field. The frequency of the precession is given by $\frac{He}{4\pi mc}$ and is the well known Larmor frequency. Since the angular momentum is quantised, any energy level shift due to the applied field is also quantised. Thus discrete spectral lines are formed on either side of the original lines.

If the field is further increased the precession velocity increases. At a higher field the coupling between the angular and spin momenta starts to break down, and the Paschen-Back effect is observed, when a new set of displaced lines can be observed.

Naturally occurring mercury contains 5 isotopes, so that the 2537^{o}A line, when investigated with high resolution, is seen to consist of 5 separate lines, each separated by between 10 and 15 mA^{o} (one-thousandth ^{o}Angstrom unit). At the electron temperatures reached in the discharge, Doppler and collison effects will widen these hyperfine lines so that to some

extent they will overlap. In the sample cell at ambient temperatures and pressures the overall width of the vapour absorption line is probably some 50 mA^{o}. Thus the shift required of the spectral lines to render them insensitive to absorption by mercury vapour is roughly of this order. The Zeeman shift is approximately 5×10^{-5} cm^{-1}/gauss, so that the field required is about 15 - 16k gauss.

Implementation of this method is carried out by repetitive application of the magnetic field to the discharge tube. The radiation is directed through a sample cell onto a detector and the resultant radiation during the time the field is applied, is compared to that when there is no field. In a high sensitivity system a small fraction of the radiation is split off prior to passing through the cell. By comparing the output of this reference detector with the signal detector long term drifts of the magnetic field may be eliminated.

DESCRIPTION

The spectrometer is a dual beam, dual wavelength unit operating in accordance with the principles outlined above. An aluminium tube is used as an insert sample cell. This tube is readily removable for cleaning by releasing two clamps.

The discharge lamp is located between the poles of the magnet assembly (see Sketch 2). The 2537°A radiation is directed by lense L1 to B.S.1 where it is split into two bundles. Half the light is directed to M1 and thence to the Reference Detector. The remainder of light is transmitted and passes through the sample cell to the Signal Detector.

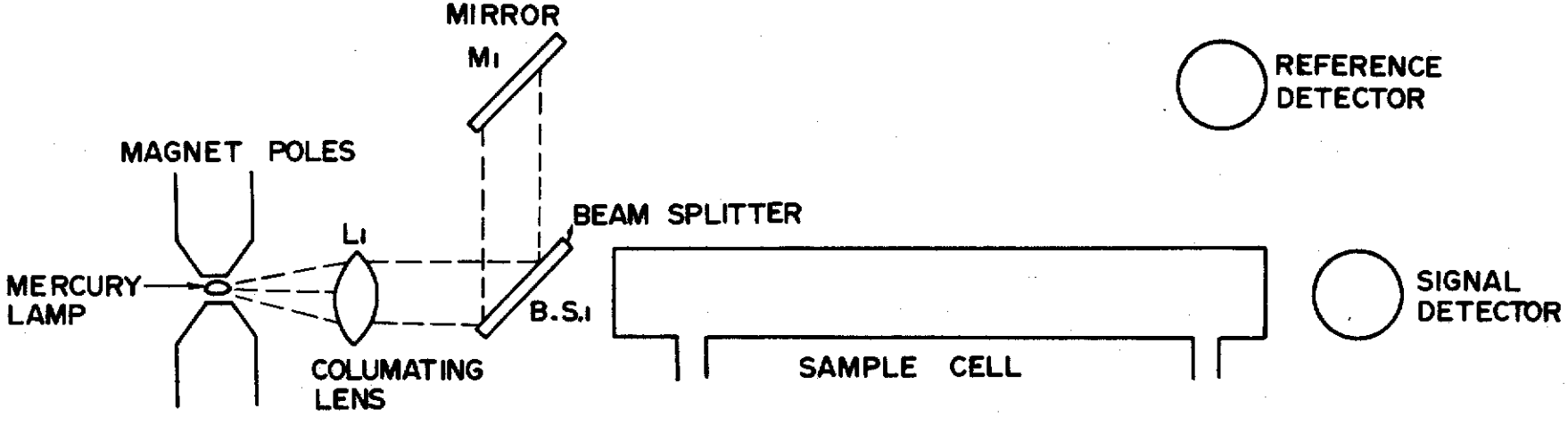
The magnet assembly is housed in C.R. steel to minimise magnetic coupling. The H.V. supply (100V) to the detectors and the 100kHz drive to the lamp are located in an aluminium box mounted next to the magnet housing.

The detectors in this unit are 935 photodiodes. Cathode load is 10MΩ and coupled with each detector is a F.E.T. input unit gain voltage follower. Output impedance of the pre-amplifiers is less than 1Ω.

SIGNAL PROCESSING ELECTRONICS

The function of the electronics within this configuration is to convert the raw signals from the spectrometer into voltage levels proportional to the mercury concentration within the sample cell.

In most normal situations, the output signal to be proportional to its mercury concentration is of the form



SKETCH 2

OPTICAL PATH

$$V_{out} \propto \frac{V_{SN} - V_{RN}}{V_{RN}} - \frac{V_{SF} - V_{RF}}{V_{RF}}$$

where V_{SN}, V_{RN}, V_{RF} are voltages proportional to the photocurrents measured by the signal and reference detectors during the "no field" and "field" periods respectively. Thus the expression assumes that the mercury concentration is low enough that the higher order times in the expression e^{-kcl} are negligible. A further assumption is made with regard to the presence or absence of other absorbing gases.

In general, in the absence of mercury, it is preferable for optimum signal-to-noise ratio that the two halves of the above expression tend to zero, i.e. that $V_{SN} \rightarrow V_{RN}$ and $V_{SF} \rightarrow V_{RF}$. In the case where this is not exactly so, it is necessary that the flux difference between the "field" and "no field" condition be minimised, i.e. $V_{SN} \rightarrow V_{SF}$ and $V_{RN} \rightarrow V_{RF}$.

The raw signals from the spectrometer are fed to buffer amplifiers 1 and 2, the outputs of which feed the common mode amplifier. This block performs the function $V_{SN} - V_{RN}$ and $V_{SF} - V_{RF}$. Division by V_{RN} and V_{RF} is carried out by the scalar circuit.

The presence of mercury vapour is indicated by differential absorption between the periods "field" and "no field"

appearing as an AC component. The effect of non-atomic absorbers appears as a DC offset at the output of the scaler and is blocked by a capacitor.

The AC component is detected by a shunt-gate synchronous detector, the resultant output having a mean DC output level proportional to the synchronous AC input component. This DC level is fed to a low pass filter and thence to the recorder. Further damping is provided at positions 1 and 2 of the Range switch. This position inserts a high value capacitance in the input circuit of the low pass filter.

The "field" and "no field" shunt gates operate at a 37.5% duty cycle. The remaining 25% is not sampled since the field is either growing or decaying and there are quite large transients which could otherwise saturate the synchronous detector.

The condition that $V_{SN} \rightarrow V_{RN}$ means that the optical and electronic gains in either channel should be equal. This balance is adjusted by operation of the gain balance control while the corresponding switch is in the Adjust position. In this position, one period of the synchronous detector is disabled and the input coupling capacitor shorted. Zero output indicates that the overall gain in both channels is equal.

The second condition that $V_{SN} \rightarrow V_{SF}$ implies that the flux for either channel should be equal during the periods of "field" and "no field". In practice when the magnetic field is applied to the lamp, the intensity is found to increase. This increase is compensated by reducing the lamp current for the duration of the "field" period. This decrease is performed automatically by a feedback control loop which senses any imbalance between the phases of the reference signal and corrects for it by altering the resistance of an active transistor in the voltage regulator circuit feeding the lamp drive.

The adjustment $V_{SN} \rightarrow V_{SF}$ implies that there should be no synchronous AC component in the signal. Accordingly, the Adjust position of the flux balance switch puts a high value capacitor across the feedback resistor of the signal buffer amplifier removing the AC component from the signal. The flux balance control is then adjusted until zero output is reached which indicates that the reference channel now also has no AC component.

Any residual errors are trimmed from the spectrometer using the zero control. This controls a set attenuation interposed during either the "field" or "no field" period in the input circuit of the signal amplifier. The phase of this correction is controlled by a panel mounted switch, and the extent of

correction by the FINE and COARSE controls.

SAMPLE EQUIPMENT

The supplied sample equipment consists of a probe, the spike and wrench, and a hand pump.

The probe is essentially a stainless steel tube. Surrounding the tube is a wooden cone which seals the top of the test hole. On top of the probe a test tube water trap may be fitted.

The spike, of specially tempered steel, is driven into the ground and then turned and lifted out with the wrench.

The pump is a hand operated aluminium bodied piston type, with stirrup for ease of operation.

SOIL GAS SAMPLING PROCEDURE

The following procedure has been successfully used under a wide variety of climatic conditions.

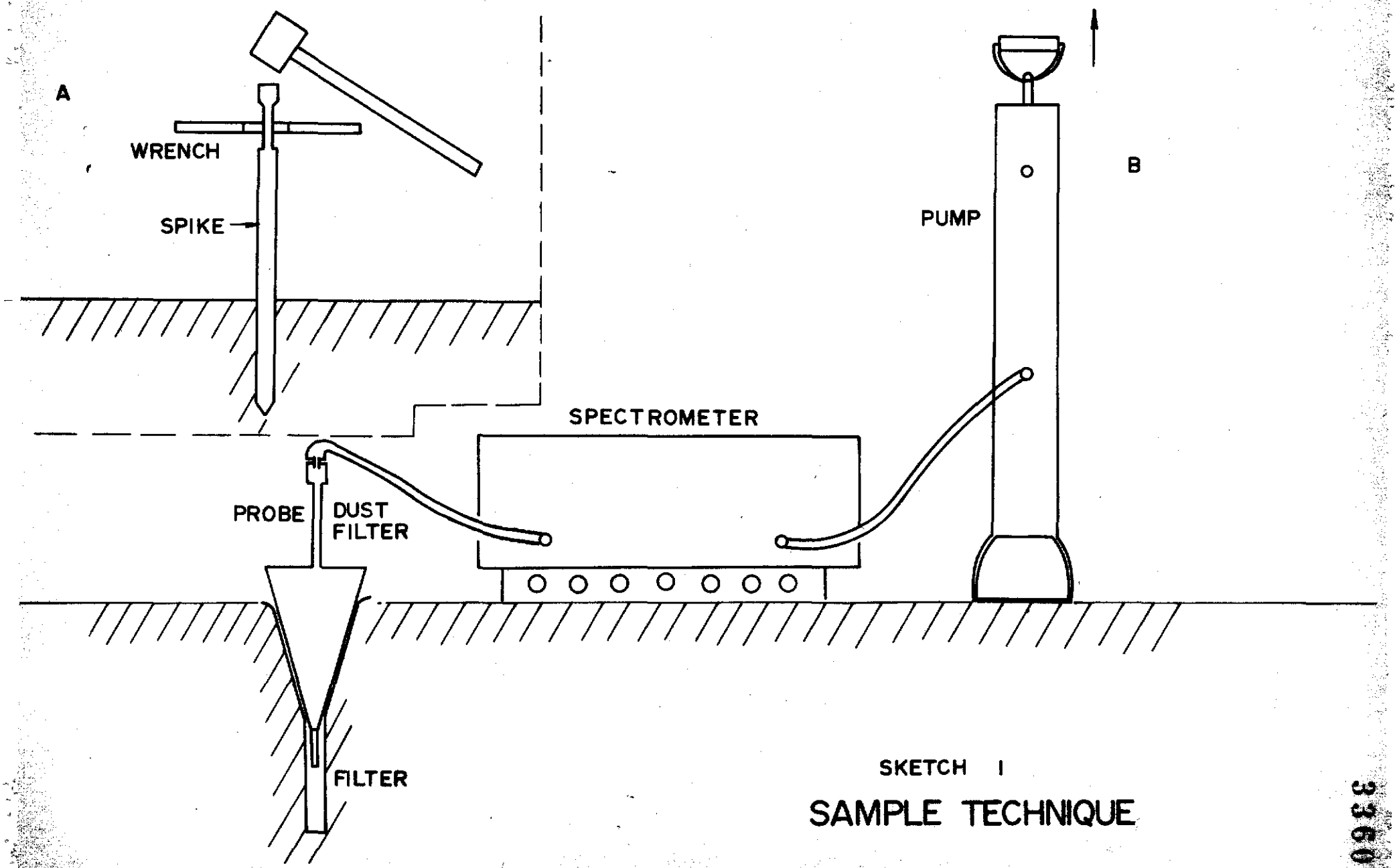
1. At the desired test spot the first step is to drive the steel stake approximately $1\frac{1}{2}$ feet into the ground. Then with the wrench the spike is twisted and lifted out.

2. The stainless steel probe, fitted with a foam rubber dust filter and securely clamped to the sealing cone, is inserted immediately into the hole and forced well home to exclude atmospheric air.

3. With the hoses connnected as shown in Sketch 1 the pump handle is slowly withdrawn to draw soil gas into the spectrometer. The optimum suction at the pump and the extent of the stroke depend to some extent on local ground conditions but can easily be recognised through experience and by watching the spectrometer meter for a peak.

4. After each sample the spectrometer cell should be flushed by drawing ambient air through it with two or three full strokes of the pump.

5. The required reading for each sample is the maximum steady displacement of the spectrometer meter from its initial ambient value. Flushing out the sample cell after the measurement should return the meter to its original value. Any small discrepancy due to drift during the measurement may be averaged out. The concentration of mercury vapour in the sample cell is proportional to the deflection in millivolts.



SKETCH 1

SAMPLE TECHNIQUE

6. In dry areas small plugs of cotton wool retained in sections of hose between the probe and the spectrometer inlet have proved effective in excluding dust.

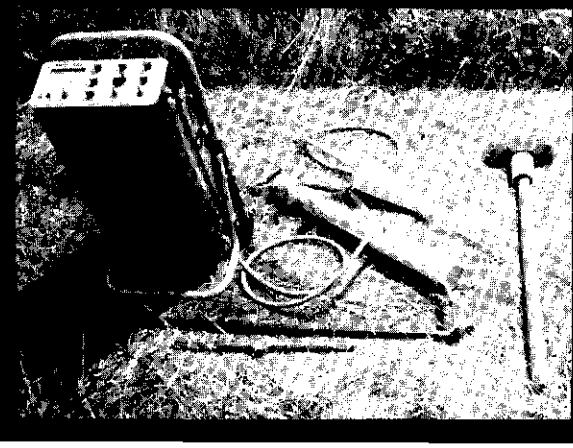
034

336034

TECHNICAL DESCRIPTION OF HGG-3 MERCURY SPECTROMETER

SCINTREX

DETECTION LIMIT:	$< 40 \times 10^{-12}$ g HG
RESPONSE TIME:	6 seconds
METER RANGES:	0 — 1.5×10^{-9} g Hg F.S. and 0 — 15×10^{-9} g Hg F.S.
RECORDER OUTPUT:	5×10^{-9} g Hg/Volt Maximum 10 Volts
POWER SOURCE:	4 GC 660-1 lead-acid gel-type rechargeable batteries
DISCHARGE TIME:	1 day normal field use 3.5 hours continuous
POWER REQUIREMENTS FOR CHARGER:	115/230 V, 50 to 400 Hz, 100 W
BATTERY ELIMINATOR:	115/230 V, 50/60 Hz, 100 W (optional continuous power source)
DIMENSIONS AND WEIGHTS:	
Spectrometer with Battery Pack:	5½ x 12 x 26″ (14 x 30 x 66 cm) 40 lbs. (18 kg)
Battery Pack:	5½ x 12 x 5½″ (14 x 30 x 14 cm) 14 lbs. (6.4 kg)
Charger:	5½ x 12 x 5½″ (14 x 30 x 14 cm) 9 lbs. (4.1 kg)
Backpack:	3 lbs. (1.4 kg)
OPERATING TEMPERATURE:	0°C to +45°C



SCINTREX LIMITED
222 SNIDERCROFT ROAD, CONCORD, ONTARIO CANADA

035

336035

SCINTREX

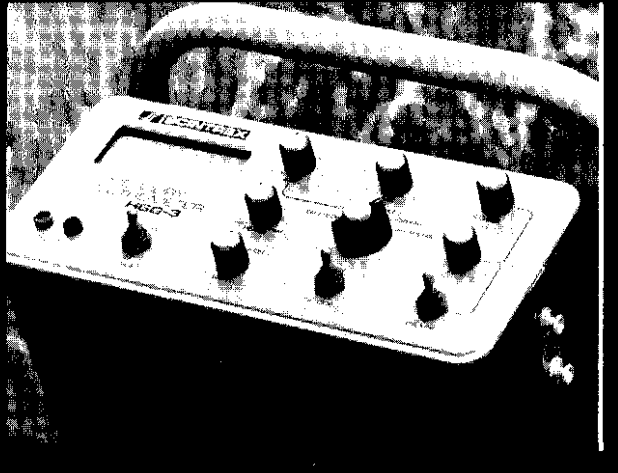
earth science division

mercury spectrometer

HGG-3

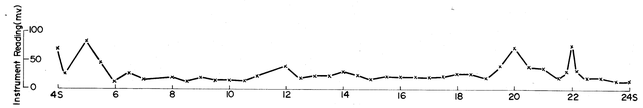
features

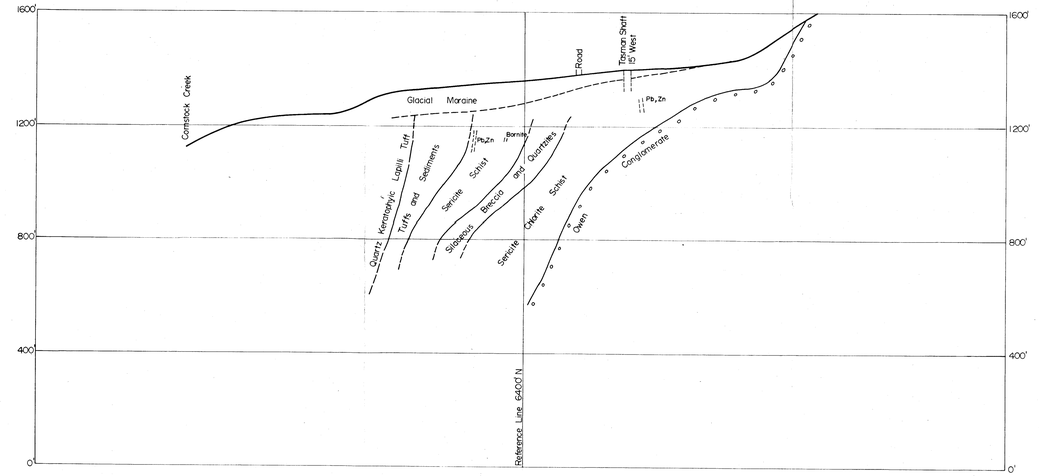
- *Sensitivity is better than 40 x 10^{-12} grams mercury.*
- *Specific readings of trace quantities of mercury are achieved by atomic absorption measurements using the intense 2537° A mercury spectral line.*
- *To reject other ultra-violet absorbing gases and vapours, a Zeeman spectral line-splitting technique is used to create reference wavelengths on either side of the parent line.*
- *A robust, modular construction combines the HGG-3 optics, which have no moving parts, and fully solid-state electronics with an easily replaceable lead-silica gel battery pack and charger.*
- *As a line-operated unit in a vehicle, camp or laboratory, the HGG-3 yields sensitivities and sample throughputs significantly beyond those achievable by conventional instruments.*
- *Versatility of approach is assured by the compatibility of the HGG-3 with most sampling accessories including soil gas kits, organic convertors, pyrolisers, wet chemical kits and silver foil collectors.*



The Scintrex HGG-3 mercury spectrometer is a field-portable unit which provides a rapid and economical geochemical technique for on-the-spot determinations of mercury in soils, soil gases, rocks, water and sediments.

Its high sensitivity and selectivity permit unambiguous mercury analyses to previously unobtainable detection limits.

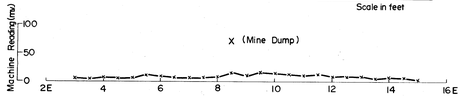


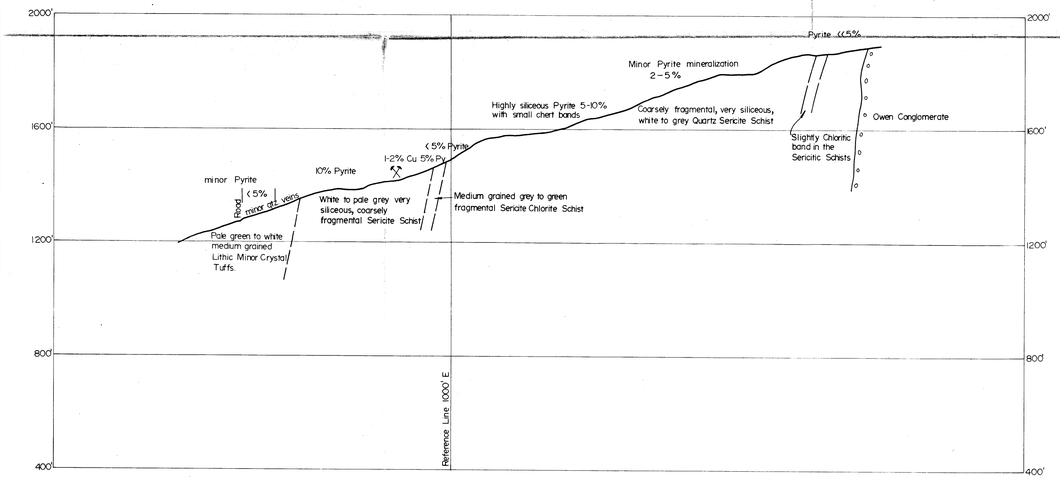


COMSTOCK GEOPHYSICAL GRID

SECTION ALONG LINE 400 W
SECTION LOOKING EAST

0 200 400
Scale in feet

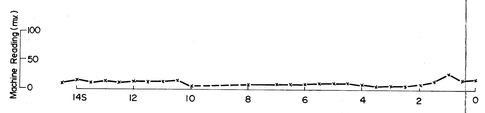


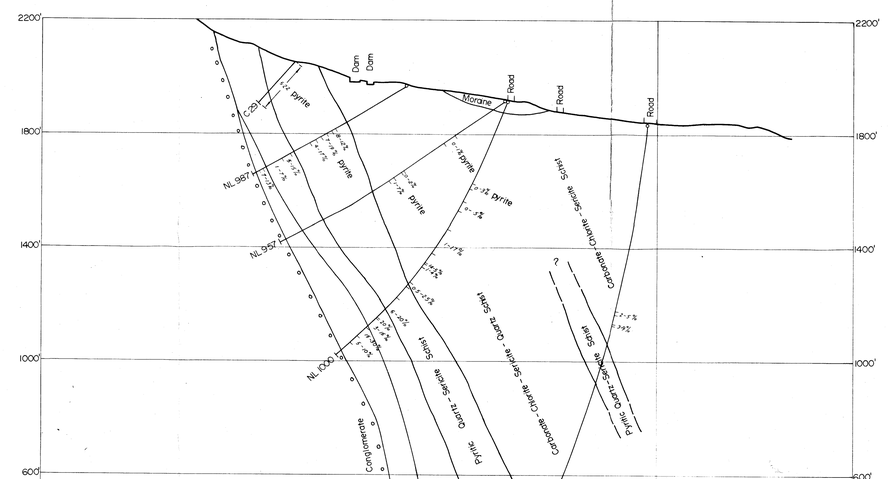


WESTERN THARSIS GEOPHYSICAL GRID

SECTION ALONG LINE 00
SECTION LOOKING NORTH

0 200 400
Scale in feet



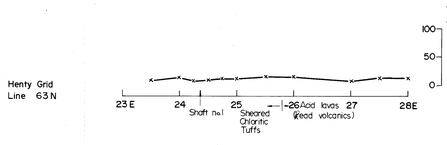


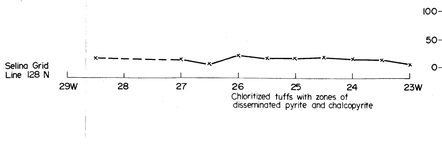
QUEEN LYELL GEOPHYSICAL GRID

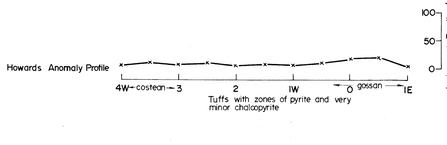
SECTION 2400' W
BEARING 136°

0 200 400
Scale in feet

MT TYNDALL AREA PROFILES







0 100 200
Scale in feet

THE MOUNT LYELL MINING AND
RAILWAY COMPANY LTD

QUEENSTOWN AREA
N.W. TASMANIA

HGG-3
MERCURY SOIL GAS SURVEYS
DATA PROFILES/GEOLOGICAL SECTIONS

336036

SURVEYED AND COMPILED BY
SCINTREX PTY. LTD.
JANUARY 1973

5 cm

JOB No. TAS 015 SHEET 1 of 1 PLATE 1

036
BL-2224