1983 ASSESSMENT REPORT ON GEOLOGICAL, ROCK GEOCHEMICAL AND SOIL GAS GEOCHEMICAL SURVEYS

by

I. G. Sutherland

on the

PIPE AND DREAM MINERAL CLAIMS

situated east of Lawyers Creek
in the Omineca Mining Division
57°18', 127°15'W
NTS 94E/6E, 6W

owned by
KIDD CREEK MINES LTD.

work by
KIDD CREEK MINES LTD.

November, 1983

Vancouver, B.C.

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INTRODUCTION

Location, Access and Terrain

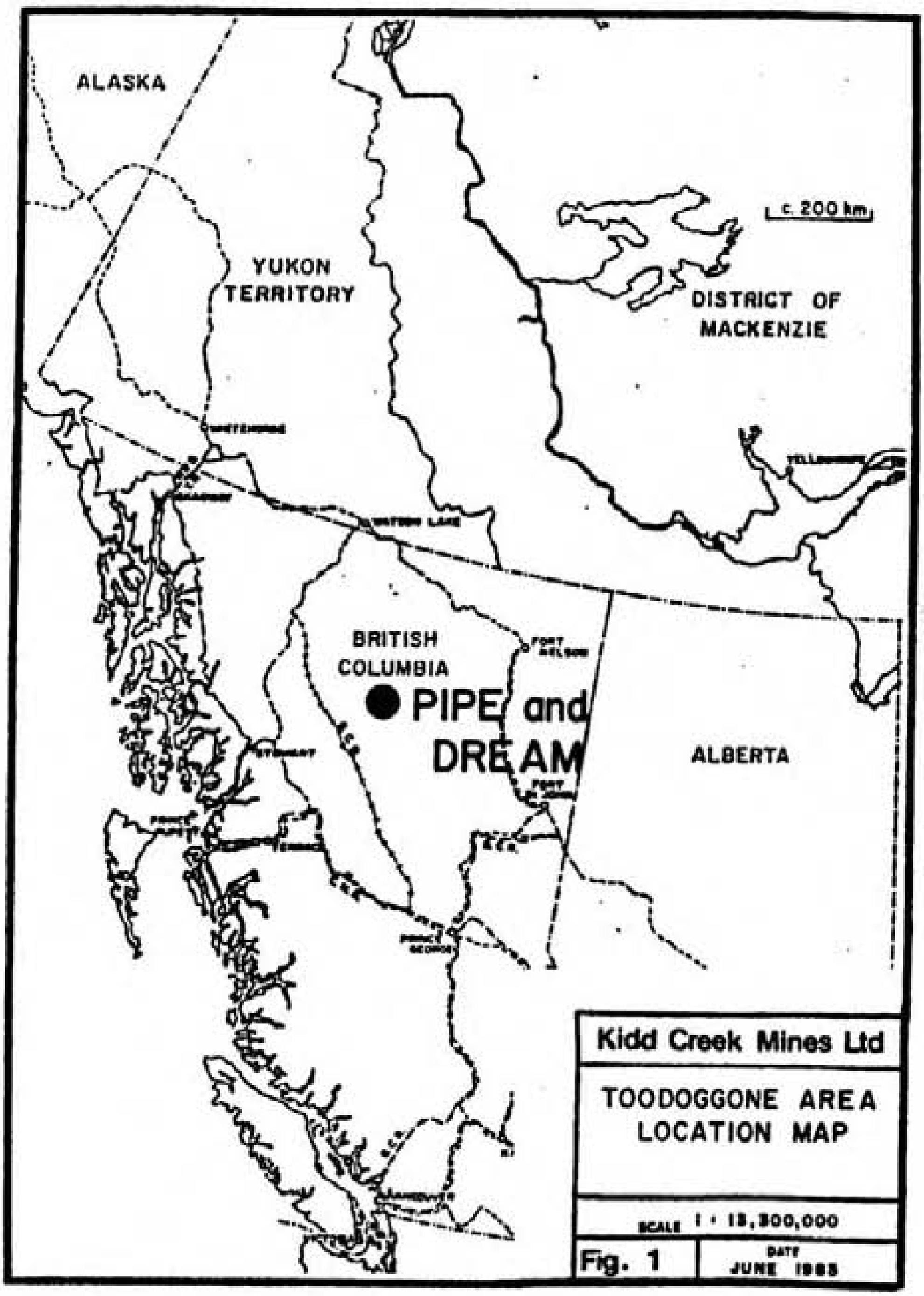
The 'Pipedream' property is located south of the Toodoggone River and directly east of Lawyers Creek, in north-central British Columbia (Figure 1). The nearest supply and transportation centres are Smithers, some 300 km due south, and Watson Lake in the Yukon, some 300 km to the north.

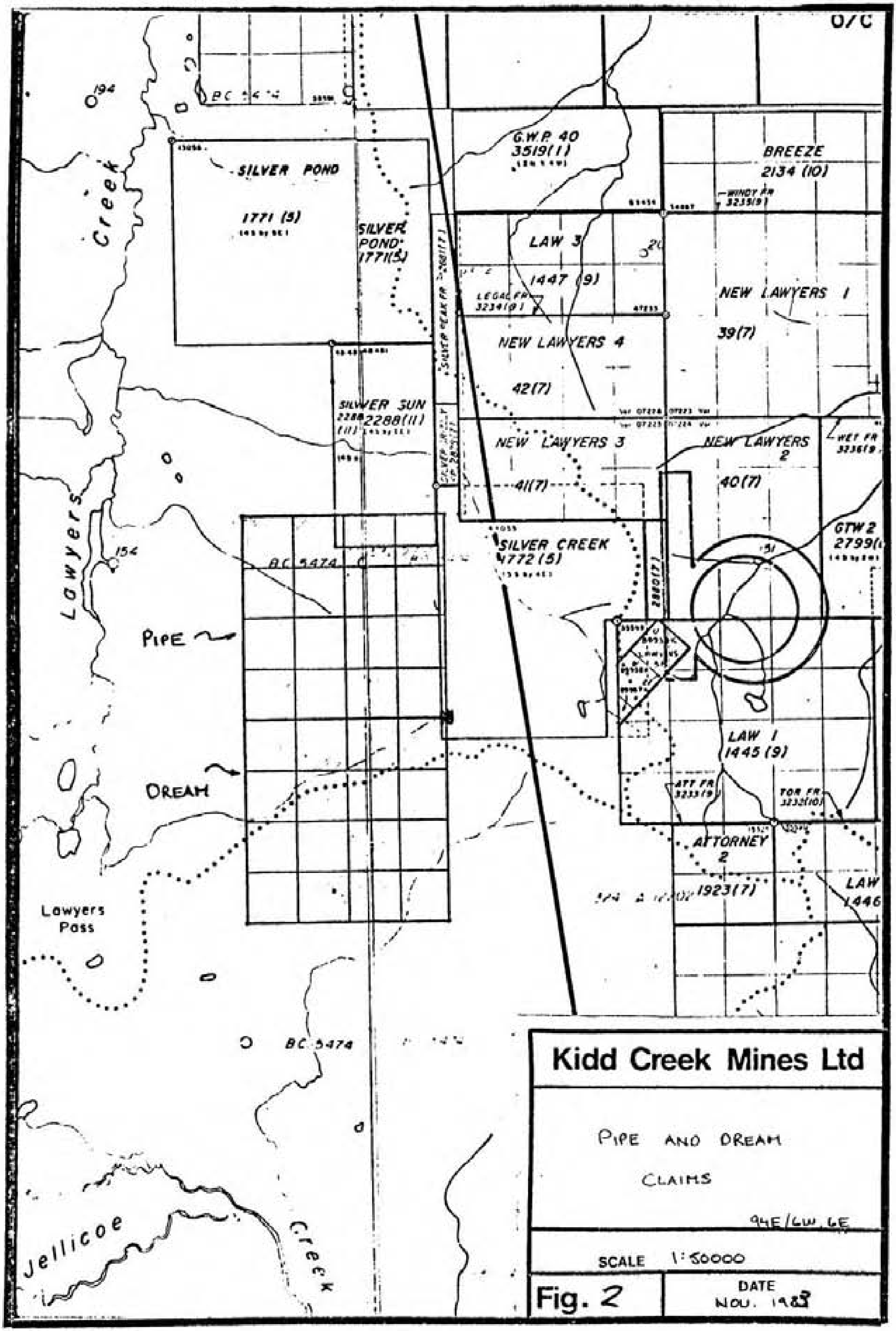
Access to the claims is by a combination of fixed-wing aircraft from Smithers or Watson Lake to the Sturdee Valley airstrip 8 km southwest of the property, and local helicopter charter thereafter. Float equipped aircraft can also land at Black Lake. There is no road access to the region although it has been suggested that the Omineca mining road to the south may be extended into the Toodoggone River area in the near future. A local road exists from the Sturdee Valley airstrip to the Lawyers property (Serem) via Dupont's Baker Mines and ends only 3.5 km to the northeast of the property.

The claims are located east of the Spatsizi Plateau and cover a slope of gentle relief with elevations ranging from 1500 m to 1700 m (Figure 2). The lowermost parts of the property are covered by an intermixed growth of spruce, and scrub willow. Extensive areas of alpine grassland, occurring above 1600 m, make for easy foot travel.

Property History and Definition

Records give no indication of any previous staking on this ground. The present claims were staked in July 1982 by Kidd Creek Mines Ltd., prompted by the geological setting of the property as well as the location


ALASKA
YUKON TERRITORY
DISTRICT OF MACKENZIE
c. 200 km
BRITISH COLUMBIA
PIPE and DREAM
ALBERTA
Kidd Creek Mines Ltd
TOODOGGONE AREA LOCATION MAP
SCALE
Fig. 1
DATE
JUNE



Kidd Creek Mines Ltd

PIPE AND DREAM CLAIMS

94E/6W, 6E

SCALE 1:50000

Fig. 2

DATE NOV. 1983

of the claims immediately to the southwest of Serem's Lawyers prospect and south of Great Western Petroleum's Silver Pond claims.

The property now consists of 2 MGS claims, part of the Pipedream-83 Group, which account for a total of 32 units within the Omineca Mining Division (Figure 3).

Summary of Work Completed

Geological surveys

Between July 25 and July 29, 1983, I. G. Sutherland undertook geological mapping on the claims, the majority of the time spent on the Pipe M.C. Mapping was carried out on a scale of 1:25,000 using a contoured, topographic base map.

G.R. Peatfield (Kidd Creek Mines; Central Regional Manager) and P.R. DeLancey (Kidd Creek Mines; Western Regional Manager) accompanied the author to the property on July 29 and provided considerable geological assistance and advice.

Geochemical surveys

Between June 27 and July 11, soil gas geochemical samples were collected on the Dream M.C. A total of 45 gas-collecting bottles were buried at 50 m spacings along 3, 700 m grid lines and, later, collected for analysis.

A total of 9 rock samples were collected for assay in conjunction with geological mapping on the property. The collected samples were primarily of silicified and/or quartz veined host rocks.

Work Distribution

All work was done on the Pipe and Dream claims; 62% of the expenditures apply to the Dream claim and 28% apply to the Pipe claim.

GEOLOGY

Regional setting

The Toodoggone district lies along the eastern margin of the Intermontane Belt. It is flanked to the east by the Omineca Crystalline Belt, to the north by the Stikine Range, and to the west and south by the Sustut and Bowser Basin assemblages. Regional mapping was conducted in the 1970's by the Geological Survey of Canada (Gabrielse and Dodds, 1974; Gabriesle, et al. 1976), and a 1:250000 scale geology map was produced by Gabrielse, et al., 1975. The B.C. Ministry of Energy, Mines and Petroleum Resources has recently undertaken more detailed work, and will soon publish a comprehensive regional map.

The Toodoggone volcanic rocks were first distinguished by Carter (1971), who described them as a Jurassic sequence of dacite and latite porphyry flows and pyroclastic rocks, which unconformably overlie the Upper Triassic Takla Group. Souther (1977) analysed some Toodoggone rocks and showed them to be mainly calc-alkaline in character. Recent works by Schroeter (1981a, b; 1982) and Panteleyev (1982) described the Toodoggone volcanic sequence as a complexly intercalated pile of volcanic and volcaniclastic rocks of Lower to Middle Jurassic age, comprising a transitional submarine-subaerial island arc environment.

The oldest rocks exposed in the Toodoggone area are blocks of Permian Asitka Group limestones which sit in thrust fault contact with younger volcanic rocks. The Triassic Takla Group consists of submarine basaltic to andesitic augite-phyric flows and pyroclastic rocks, and is in turn unconformably overlain (often fault contacts) by the Toodoggone volcanic sequence. Toodoggone rocks have been subdivided by Schroeter (1982) into a lower volcanic sequence of coarse pyroclastic andesite to dacite tuffs, a middle volcanic division of intermediate to felsic tuffs and porphyries, and an upper volcanic-sedimentary unit of tuffs, porphyries, and lacustrine alluvial volcanosediments. The sequence is at least 1000 m thick and has been tentatively correlated with the Early Jurassic Hazelton Group which lies to the east. The belt extends at least 90 km in a NW-SE felsic tuffs and porphyries, and an upper volcanic-sedimentary unit of tuffs, porphyries, and lacustrine alluvial volcanosediments. The sequence is at least 1000 m thick and has been tentatively correlated with the Early Jurassic Hazelton Group which lies to the east. The belt extends at least 90 km in a NW-SE direction and is up to 15 km wide. Upper Cretaceous to Tertiary conglomerates and sandstone (Sustut Gp.) unconformably overlie both the Toodoggone and Takla rocks.

Toodoggone rocks are cut by the Omineca intrusions (granodiorites to quartz monzonites). Rb-Sr and K-Ar dates for the intrusions range from 181-207 Ma, and the volcanics from 179 $\pm$8 to 189 $\pm$6 Ma (Gabrielse, et al., 1980), indicating that they may be, in part, coeval. Schroeter (1981b) points out that these large plutonic bodies have porphyry deposits which are anomalous in precious metals, and that local "syenomonzonite" and quartz-feldspar-porphyry dykes may represent feeders to the Toodoggone volcanic rocks.

The dominant structural component of the Toodoggone district is northwest-trending faults, with lengths of more than 50 km. These major structures may be transcurrent and long-lived in nature. Extensive and repeated normal block faulting has also occurred from Jurassic through Tertiary time (Schroeter, 1981a). Folding is not evident, and most anomalous dips can be accounted for by natural depositional dip variations in a dynamic volcanic environment and fault block movement. On average, the Toodoggone volcanic rocks dip gently to the west (Schroeter, 1981a; b). Metamorphism is very low grade, ranging up to lower greenschist facies.

Epithermal precious metal showings in the Toodoggone are abundant and characterized by both vein/breccia and replacement-type systems. The main showings are summarized by Schroeter (1982), and the Baker Mine is described by Barr (1978).

Property Geology

The claims are underlain by a sequence of intermediate volcanic flows and minor, possibly reworked, volcaniclastic equivalents (Toodoggone volcanic rocks). No intrusive phases were recognized. Compositionally, the rocks are latitic to andesitic or dacitic and are invariably porphyritic. The geology of the Pipedream property remains largely unknown as mapping and interpretation are hampered by a lack of outcrop, and much of the geology must be interpreted from talus and frost-heaved material.

The Sustut sediments lie west of Lawyers Creek and a small cap of thee rocks is present 2 to 3 kilometres southeast of the property.

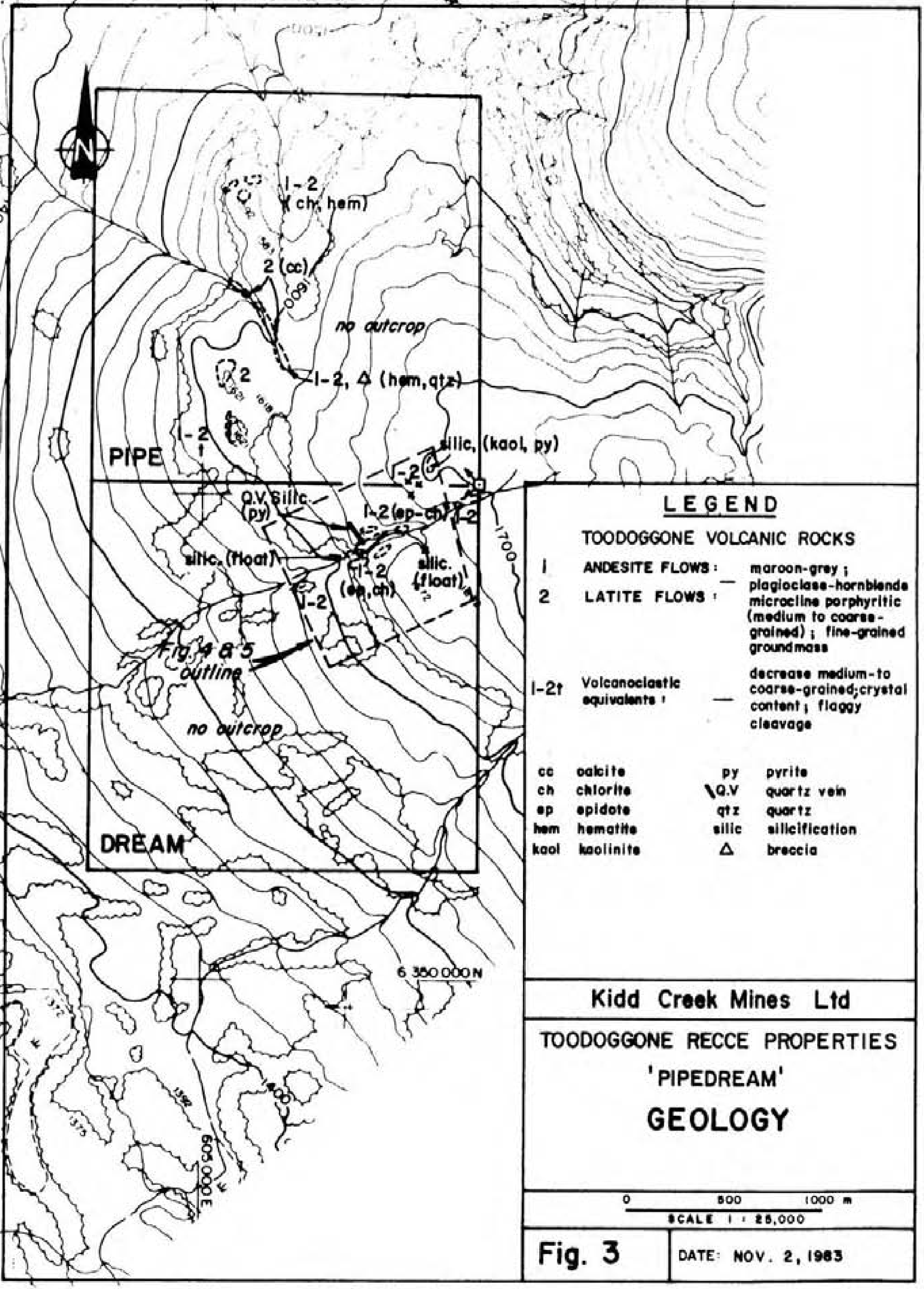
Exposures of apparently fresh rock are typically plagioclase-hornblende-'microcline' porphyritic and maroon-grey with up to 5% dioritic inclusions. Plagioclase phenocrysts (average 20-30%) are generally medium-grained, prismatic with local flow alignment. They are commonly weakly to moderately sausseritized. Medium-grained, prismatic hornblende phenocrysts make up 10% (average) of the rock and are generally hematized or chloritized. Scattered, very coarse-grained potassium feldspar phenocrysts (microcline?) are visually striking though they constitute only about 1-3% of the total rock. They appear to be late-stage in the crystallization of the melt as they contain various phases of crystal inclusions and are even seen to grow across mafic xenolith boundaries. The intermediate groundmass host for these phenocrysts is uniformly fine-grained and primarily maroon-grey.

Alteration of the country rocks is primarily low-grade to deuteric (as described above) and typical of subaerial volcanism. Epithermal-style alteration is common locally along suitable structures resulting in intense silicification (± quartz veining), kaolinization (± pyrite) or propylitization (± carbonate ± epidote veining). These three alteration types represent a decreasing 'grade' of alteration. Silicification/quartz veining is most important on the 'Pipedream' property due to the potential of associated precious metal mineralization. Distribution of exposed alteration of this type is limited primarily to a small zone in the northeast section of the Dream claim. Here, a northwest-trending fault structure is occupied by a silicified and quartz-veined zone along 150 m of strike length and over a few centimetres to 1 metre in width. This zone is typical of similar, mineralized material from the nearby Lawyers property with characteristic drusy quartz in vugs, local brecciation and patchy, finely disseminated pyrite. In the immediate vicinity of this zone the rocks are cut by quartz-epidote and epidote veins and fracture coatings of calcite, typical of the essentially fracture-controlled propylitic alteration on the property. Nearby to the east and northeast are found partially silicified country rocks with minor kaolinite and pyrite.

Abundant large angular float of hematitic, silicified breccia is found in stream beds in the immediate vicinity of the main silicified zone.

Alteration on the Pipe claim is much more spatially restricted and is dominated by very localized hematite-quartz breccias and minor calcite or epidote and/or chlorite coatings along fractures. No major zones of alteration were recognized on this claim in spite of extra mapping efforts.

The most important structural elements are the major and associated, minor faults that control potentially mineralized alteration zones. A large, northwesterly trending, regional fault zone that runs from the Baker Mine, through the Lawyers prospect and on to Alberts Hump may have considerable influence on faulting on the 'Pipedream' property. A dominant fracture trend of 340° (60° dip to the northeast) and a second order fracture trend of 350° (60° dip to west) as observed



Kidd Creek Mines Ltd

TOODOGGONE RECCE PROPERTIES

'PIPEDREAM'

GEOLOGY

Fig. 3

DATE: NOV. 2, 1983

locally may be associated with the major, apparently ore-controlling, regional structure.

A second regional structure that may influence local structure is an apparent fault along the Jellicoe Creek valley that continues past the Lawyers property and eastward down the Toodoggone River valley. This northeast-trending fault appears to express itself in a dominant fracture trend of 050° (50° dip to northwest) and a second order trend of 010° (60° to east).

The poor exposure on this property is due primarily to the presence of an apparently continuous cover of glacial debris. Test pits dug on the property exposed at least 0.5 m of lodgement till. Such glacial material has a strong, negative effect on the potential of future soil geochemical surveys on this property.

GEOCHEMISTRY

A total of 9 rock samples were collected from the Dream claim. All samples consisted of quartz-veined and/or intensely silicified country rocks. Geochemical analyses for Au and Ag were carried out on the 9 samples.

A summary of the extraction and analytical techniques is as follows:

Elements	Extraction	Method
Ag	Hot aqua regia	A.A.
Au	Hot aqua regia: MIBK	A.A.

The results of all analyses are plotted on Figure 4 and tabulated in Appendix C.

A soil gas geochemical survey was completed, also on the Dream claim, and involved the placing of 45 bottles of absorbing material at a depth of approximately 0.5 m within the soil. Each bottle of sorbent was held within a protective plastic bottle, attached to a long stake and buried for two weeks. The exposed sorbent was then unearthed, capped and shipped to Mideco, an analytical laboratory in Salt Lake City, Utah. Analysis for 6 carbon and/or sulphur compounds was carried out on each bottle of sorbent. The results of this survey are plotted in Figures 5a to 5c and are tabulated in Appendix C. Details of the principles of this geochemical technique are outlined in Appendix D.

The results of the rock and soil gas geochemistry reveal no distinctly anomalous areas of potential mineralization. The lack of encouragement received from the rock geochemistry of visually suitable looking rocks suggest very little potential for this tested zone. This does not preclude the existence of other altered and potentially mineralized zones across the property, however, and much additional work is required before testing for such a zone(s) can be considered complete.

I. G. Sutherland

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APPENDIX A

Statement of Qualifications

APPENDIX A

Statement of Qualifications

I.G. Sutherland - Geologist

I.G. Sutherland holds a BSc (Hons) degree in Geology from the University of Western Ontario, granted in 1976. Since that time he has held several positions in Industry and Government, and has been employed by Kidd Creek Mines Ltd. in Vancouver since March 1981.

APPENDIX B

Statement of Expenditures

APPENDIX B

STATEMENT OF EXPENDITURES

I GEOLOGY AND ROCK GEOCHEMISTRY

(a) SALARIES AND FRINGE BENEFITS, KIDD CREEK MINES LTD.

I.G. Sutherland, Geologist Period: June 27-July 29	2 1/4 days @ $136		$ 306.00	
P.R. DeLancey (P.Eng.), Geologist Period: July 29	1/3 day @ $227		75.67	
G.R. Peatfield (P.Eng.), Geologist Period: July 29	1/3 day @ $227		75.67	
(b) ROOM AND BOARD				
Kidd Creek Mines Personnel 2.9 man-days @ $80			232.00	
(c) HELICOPTER SUPPORT				
ALC Corp. Hughes 500D	3 hrs @ $510/hr		1,530.00	
(d) ANALYTICAL COSTS				
9 rock sample preparations	@ $2.50	22.50		
9 Au and Ag geochem analyses	@ $5.60	50.40		
		72.90	72.90	
			2,292.24	2,292.24

II SOIL GAS GEOCHEMISTRY

a) SALARIES AND FRINGE BENEFITS, KIDD CREEK MINES LTD.

K. Norris, Assistant Period: June 28-July 11	1 1/2 days @ $58	87.00	
D. Coolidge, Assistant Period: June 28	1 day @ $65	65.00	
R. Vandenbrink, Assistant Period: July 11	1/2 day @ $60	30.00	
(b) ROOM AND BOARD			
Kidd Creek Mines Personnel 3 man-days @ $80		240.00	
(c) HELICOPTER SUPPORT			
ALC Hughes 500D	2 hrs @ $510/hr	1,020.00	
(d) ANALYTICAL COSTS			
45 soil gas geochemical analyses @ $20		900.00	
		2,342.00	2,342.00

APPENDIX B

STATEMENT OF EXPENDITURES - Cont'd.

III REPORT PREPARATION

I.G. Sutherland, 2 days @ $136 (incl. drafting)	272.00	
Typing	60.00	
	332.00	332.00
	TOTAL	$4,996.24

Total assessable to Dream claim

25% Subtotal of ' I '	$ 573.06
100% Subtotal of 'II '	2,342.00
50% Subtotal of 'III'	166.00
	$3,081.06

Total assessable to Pipe claim

75% Subtotal of ' I '	$1,719.18
50% Subtotal of 'III'	166.00
	$1,885.18

APPENDIX C

Analytical Results

ACME ANALYTICAL LABORATORIES LTD.
852 E. HASTINGS, VANCOUVER B.C.
PH:253-3158 TELEX:04-53124

DATE RECEIVED AUG 2 1983

DATE REPORTS MAILED Aug 4/83

GEOCHEMICAL ASSAY CERTIFICATE

A .500 GM SAMPLE IS DIGESTED WITH 3 ML OF 3:1:3 HCL TO HNO3 TO H2O AT 90 DEG.C. FOR 1 HOUR.
THE SAMPLE IS DILUTED TO 10 MLS WITH WATER. ELEMENTS ANALYSED BY AA : AG.
SAMPLE TYPE : ROCK - CRUSHED AND PRULVERIZED TO -100 MESH.
AU* - 10 GM, IGNITED, HOT AQUA REGIA LEACH MIBK EXTRACTION, AA ANALYSIS.

ASSAYER ~~DeToye~~ DEAN TOYE, CERTIFIED B.C. ASSAYER

KIDD CREEK MINES LTD PROJECT # 910 FILE # 83-1433 PAGE# 1

SAMPLE	AG PPM	AU* PPB
AA-27019	8.1	30
AA-27020	1.3	20
AA-27021	4.6	40
AA-27022	1.1	5
AA-27023	3.4	25
AA-27024	2.8	20
AA-27025	1.8	25
AA-27026	2.5	75
AA-27027	8.9	310

TABLE OF RESULTS
Micrograms per sample

SAMPLE	CS_2	SO_2	COS	CO_2	H_2S	C_3
910-001	TR	ND	ND	202	ND	ND
910-002	TR	ND	ND	124	ND	ND
910-003	TR	ND	ND	243	ND	ND
910-004	TR	ND	ND	231	ND	ND
910-005	TR	ND	ND	184	ND	ND
910-006	TR	ND	ND	207	ND	ND
910-007	TR	ND	ND	202	ND	ND
910-008	TR	ND	ND	155	ND	ND
910-009	TR	ND	ND	172	ND	ND
910-010	TR	ND	ND	137	ND	ND
910-011	TR	ND	ND	190	ND	ND
910-012	TR	ND	ND	118	ND	ND
910-013	TR	ND	ND	141	ND	ND
910-014	TR	ND	ND	210	ND	ND
910-015	TR	ND	ND	132	ND	ND

TABLE OF RESULTS
Micrograms per sample

SAMPLE	CS_2	SO_2	COS	CO_2	H_2S	C_3
910-016	TR	ND	ND	246	ND	ND
910-017	0.51	ND	ND	174	ND	ND
910-018	TR	ND	ND	118	ND	ND
910-019	TR	ND	ND	219	ND	ND
910-020	0.98	ND	ND	295	ND	ND
910-021	0.35	ND	ND	243	ND	ND
910-022	0.25	ND	ND	204	ND	ND
910-023	0.35	ND	ND	269	ND	ND
910-024	1.09	ND	0.61	244	ND	ND
910-025	1.09	ND	ND	729	ND	ND
910-026	0.97	ND	ND	241	ND	ND
910-027	TR	ND	ND	222	ND	ND
910-028	0.35	ND	ND	181	ND	ND
910-029	TR	ND	ND	145	ND	ND
910-030	TR	ND	ND	213	ND	ND

TABLE OF RESULTS
Micrograms per sample

SAMPLE	CS_2	SO_2	COS	CO_2	H_2S	C_3
910-031	TR	ND	ND	209	ND	ND
910-032	TR	ND	ND	154	ND	ND
910-033	TR	ND	ND	173	ND	ND
910-034	TR	ND	ND	250	ND	ND
910-035	TR	ND	ND	113	ND	ND
910-036	TR	ND	ND	78	ND	ND
910-037	0.94	ND	ND	159	ND	ND
910-038	TR	ND	ND	251	ND	ND
910-039	TR	ND	ND	212	ND	ND
910-040	TR	ND	ND	157	ND	ND
910-041	TR	ND	ND	102	ND	ND
910-042	TR	ND	ND	140	ND	ND
910-043	TR	ND	ND	279	ND	ND
910-044	TR	ND	ND	176	ND	ND
910-045	TR	ND	ND	172	ND	ND

TABLE OF RESULTS
Micrograms per sample

SAMPLE	CS_2	SO_2	COS	CO_2	H_2S	C_3
910-046	TR	ND	ND	81	ND	ND
910-047	TR	ND	ND	180	ND	ND

APPENDIX D

Details of Soil Gas Geochemical Surveys

Charles G. Clifton, President
EXPLORATION RESEARCH LABORATORIES
P. O. Box 9086, University Station
Reno, Nevada 89507 U.S.A.
Tel. (702) 329-1088

Soil Gas Collection Procedure

A vapor-phase (gas) geochemical anomaly is associated with most types of ore deposits. This includes low and high temperature, epigenetic or syngenetic. Primary gas dispersion haloes are often developed in wall rocks as deposits are formed. The gases originate in the hydrothermal solutions or are products of mineral dissolution reactions. Secondary gas dispersion haloes are produced in two ways: during oxidation of sulfides or organic carbon-bearing compounds; or through natural dissipation of volatile species such as mercury or helium, light hydrocarbons, or radioactive daughter products. Secondary gas dispersion products are collectively termed soil gases.

Soil gases may be analyzed directly in the atmosphere or can be collected and analyzed in separate steps. It is well known that instantaneous measurements of soil gases in the atmosphere or shallow subsurface often produce results which are difficult to duplicate from day to day, or hour to hour. This is due to the influence of short-term fluctuations of barometric pressure, temperature, and humidity on vapor flux at the soil-atmosphere interface. In order to obtain a more reliable soil gas sample, it is preferable to collect the gases over a period of time, at a shallow depth below the surface. The result is an integrated or averaged measurement which is more representative of the long-term vertical vapor flux.

The soil gas collection procedure developed by EXPLORATION RESEARCH LABORATORIES includes: (a) a hydrophobic, non-catalytic, non-oxidative porous polymer sorbent selective to a wide range of sulfur and carbon gases; (b) a reusable container for housing the sorbent while buried in the ground; and, (c) a rapid, inexpensive analytical method for identifying the gases collected. Each aspect of the gas collection procedure is a major improvement on older techniques. In addition, the selected sorbent is particularly sensitive to CS_2 and COS, species recently identified as the primary gaseous products of sulfide oxidation (Taylor, Kesler and Cloke, 1982, Journal of Geochemical Exploration, V. 17, pp. 165-185).

The containers which hold the sorbent material, keep it free from contamination, and provide an open space for air circulation have been thoroughly researched. Follow directions carefully for best results.

Data Interpretation

At this time little information is available which relates gas species to the quantity and type of mineralization present at depth. It is suggested that vapor-phase data be treated like any other type of geochemical data. Always try to relate results to a ground truth (known mineralization). Work with gas ratios or total quantities. Be aware of fractures or porous horizons which may channel gases preferentially or locally accentuate oxidation. Make adjustments for varying thicknesses of overburden on results; consider calculation a trend surface and positive residuals.

Analyzed Gases

The sorbent material is selective to the following gases:

CO_2	carbon dioxide
C_3H_8	propane
C_4H_{10}	butane
CS_2	carbon disulfide
COS	carbonyl sulfide
H_2S	hydrogen sulfide
SO_2	sulfur dioxide

Other gases such as mercury, helium, radon, oxygen, nitrogen, methane, ethane, are not collected. Analytical sensitivity is approximately 50 parts per billion for most species. Analysis is by gas chromatography/mass spectrometry at 175°C.

Feel Free to Call

Vapor-phase geochemistry is a relatively new but rapidly expanding field in minerals exploration. Contact me at the above address or phone number for advice or opinion on data interpretation, or information on sample placement or analytical procedure.

Return Address
Charles G. Clifton
EXPLORATION RESEARCH LABORATORIES
P. O. Box 9086, University Station
Reno, Nevada 89507 U.S.A.
Tel. (702) 329-1088

Instructions

General

- Take care not to spill sorbent material from glass vials.
- Do not expose open vials to motor exhaust, aerosols (i.e., spray paint), sulfur-rich atmospheres such as mine air or industrial smoke.
- A minor amount of contaminant (soil, water) in vials will not affect results.
- Short exposure (minutes) of sorbent to air will not affect results.
- Sealed vials can be stored for years without affecting stability of sorbent material.

Placing Vials In Ground

(SEE ASSEMBLED SAMPLE ENCLOSED WITH MATERIALS.)

A. Attach label to each vial while vials are clean and dry. Apply a sample designation to each vial with waterproof ink.

B. Remove cap and rubber stopper from each vial at sample location and immediately prior to burial. Keep all caps and rubber stoppers.

C. After cap and stopper is removed, attach vial to supporter stick with rubber band. Insert vial and stick into plastic bottle, attach a perforated lid to bottle.

D. Plastic bottles, with enclosed vials, can be attached to a 3-4 foot long marker stake with filament tape or wire. Advantages: bottles can be pulled from ground, rather than dug, and stake exactly marks location of sample. Disadvantages: marker stake can be broken off or pulled up by animals. Alternatively, mark sample location with short, study stake driven into ground a short distance from sample.

E. Bury bottles at least 6 inches deep, 12-20 inches is recommended.

F. For shallow cover (less than 10 feet), leave samples in ground for at least 10 days. For deeper cover, allow up to 30 days. Samples can be left in ground indefinitely; it is impossible to saturate sorbent material with soil gas.

Removing Vials From Ground

A. If bottles are attached to marker stake, pull bottles from ground slowly. If not attached to stake, dig up carefully. Keep bottles upright until glass vial is removed.

B. Pry off perforated lid to bottle with coin or knife, allow supporter stick to drop out into hand and remove vial. Immediately insert rubber stopper and replace cap. Screw cap on firmly. Add sample designation to label if not already done.

C. Replace supported stick and lid to bottle. Keep bottles for future use.

D. Send vials to above address in sturdy cardboard box, well insulated against breakage. Ship airmail, air freight, or bus.

Supplement #1

EXPLORATION RESEARCH LABORATORIES

An Improved Method for Locating Blind or Buried Sulfide Mineralization

The detection of blind or buried mineralization is the most difficult problem facing the exploration geologist. As the amount of unexplored ground possessing both high mineral potential and good exposure decreases, the requirement for techniques capable of "seeing through" post-mineral cover becomes more acute. In many situations standard geochemical methods are not applicable and geophysical methods too costly to be applied in a reconnaissance fashion.

It is well known that certain gases are produced by oxidizing sulfides and that these gases migrate to the surface through overlying host rock and overburden. The smell of H_2S in the vicinity of sulfide ore is familiar to all geologists. Other gases, including SO_2, CS_2, COS, and CO_2, have also been reported above oxidizing sulfide deposits (Geochemistry in Mineral Exploration, 1979, p. 511). Gas geochemical samples are generally collected in the atmosphere or just below the surface (soil gases). Soil gases are less subject to short-term variations due to changes in atmospheric pressure, humidity, or wind disturbance.

At Exploration Research Laboratories we have perfected a soil gas collecting procedure recently investigated by the U.S. Geological Survey. In studies of buried sulfide mineralization at Johnson Camp, Arizona (Hinkle and Kantor, 1978, J. Geochem. Explor. 9, 209-216) and the Roosevelt Hot Springs geothermal area, Utah (Hinkle et al., 1978, U.S. Geol. Survey J. Res. 6, 563-569), artificial zeolite was left buried in the ground for several months and later analyzed for adsorbed gases. Gas anomalies were identified above target zones in each study. Our research indicates that porous polymer sorbents are superior to artificial zeolite as collecting agents. A range of sorbents have been tested for their ability to adsorb certain gases and their tendency not to catalytically alter the gases during analysis. The sorbents we have selected are also very efficient: significant quantities of gas are adsorbed in days or weeks rather than months.

In Figure 1 (over), gases produced by oxidizing sulfides migrate to the surface. Small bottles containing a specific sorbent are left in the soil or overburden for several days or weeks. The vials are retrieved, capped, and shipped for analysis. In a recent study of an epithermal vein system in Nevada, vials were buried at 100-150 foot intervals along the hanging wall of the host structure and left to equilibrate for 2 weeks (Figure 2). Approximately one-half of the structure was buried by Quaternary alluvium (Qal). The remainder of the structure was difficult to locate due to intense alteration and lack of mineralization. Quartz-pyrite-gold mineralization was exposed only in the area of old workings. The data for CS_2, in particular, shows a strong anomaly above the known mineralization and 2 anomalies on strike, one of which is developed in thick alluvial cover. The anomaly over the old workings extends out into the hanging wall, reflecting the down-dip extension of the known mineralization. Similar results have been obtained on massive sulfide mineralization and an active geothermal field.

Price and Materials

Exploration Research Laboratories provides prepared vials containing gas-adsorbent material, directions for emplacement, capping materials, and analysis of gases by headspace gas chromatography/mass spectrometry. No payment is required until vials are analyzed.

Number of Samples	Unit Price
1-49	$ 20.00
50-99	$ 17.00
100 or more	$ 15.00

Materials are shipped within 5 days of order. Analyses are normally completed within 10 working days.

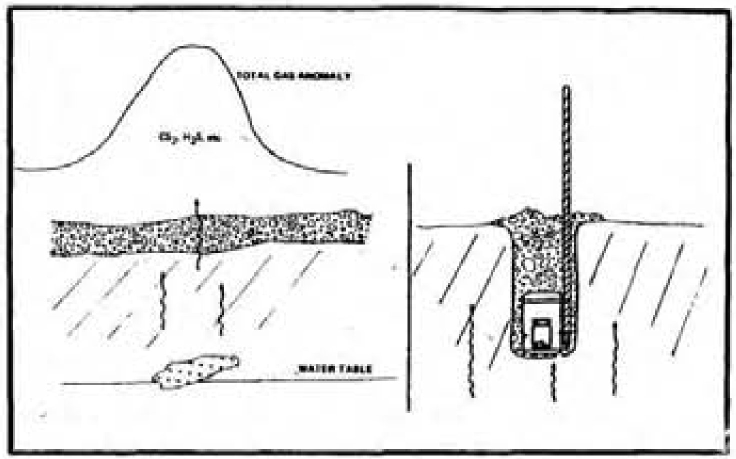


Figure 1. Left: migration of gases produced by oxidizing sulfide mineralization. Right: buried bottle containing vial with gas-adsorbent material.

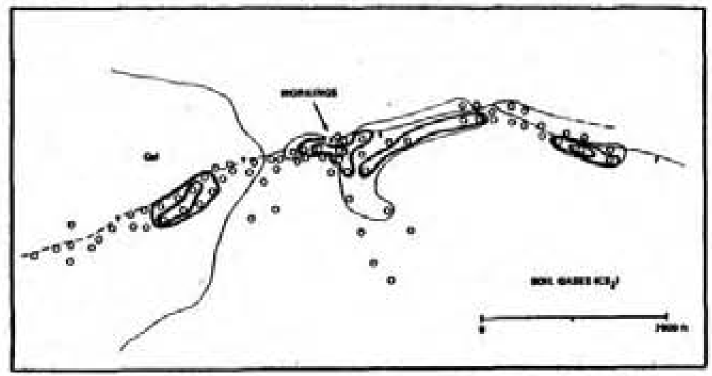
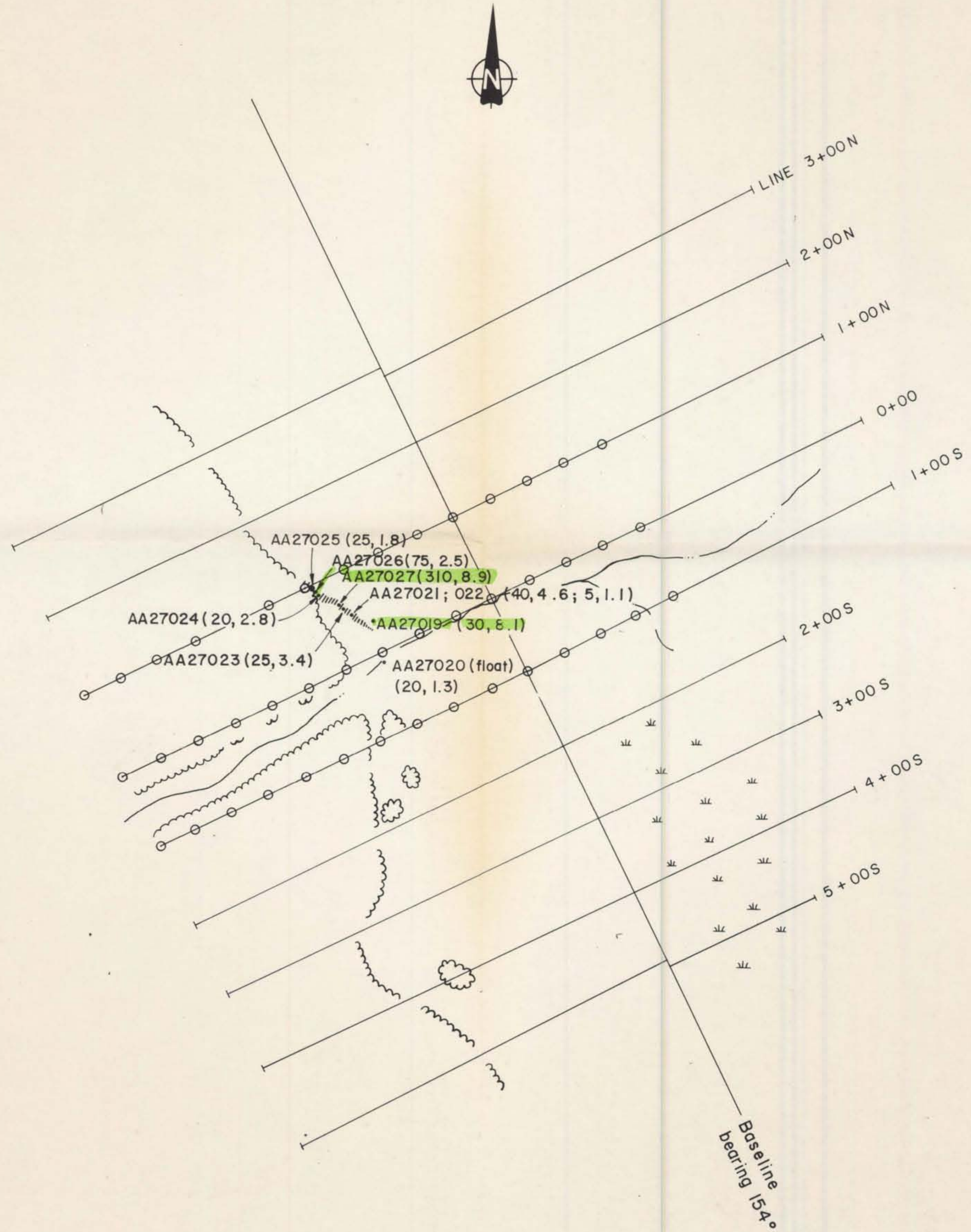


Figure 2. Soil gas anomalies in hanging wall of poorly exposed vein system, Miocene volcanics, Virginia Range, Nevada.

EXPLORATION RESEARCH LABORATORIES
Specializing in Gas Chromatography/Mass Spectrometry
- gases and organic compounds in geochemical samples
- geochemical exploration (minerals, geothermal)
- ore deposit research

Charles G. Clifton, President
P. O. Box 9086
University Station
Reno, Nevada 89507 USA



Gas sample

Creek

Swamp

Tree line

E.G. of sample at each station: Gas-910-003

(Au ppb, Ag ppm)

GEOLOGICAL BRANCH
ASSESSMENT REPORT

11,506

Kidd Creek Mines Ltd.

TOODOGGONE RECCE PROPERTIES
'PIPEDREAM'

ROCK GEOCHEMISTRY
SAMPLE LOCATIONS, Au & Ag

NTS 94E — Proj. 910

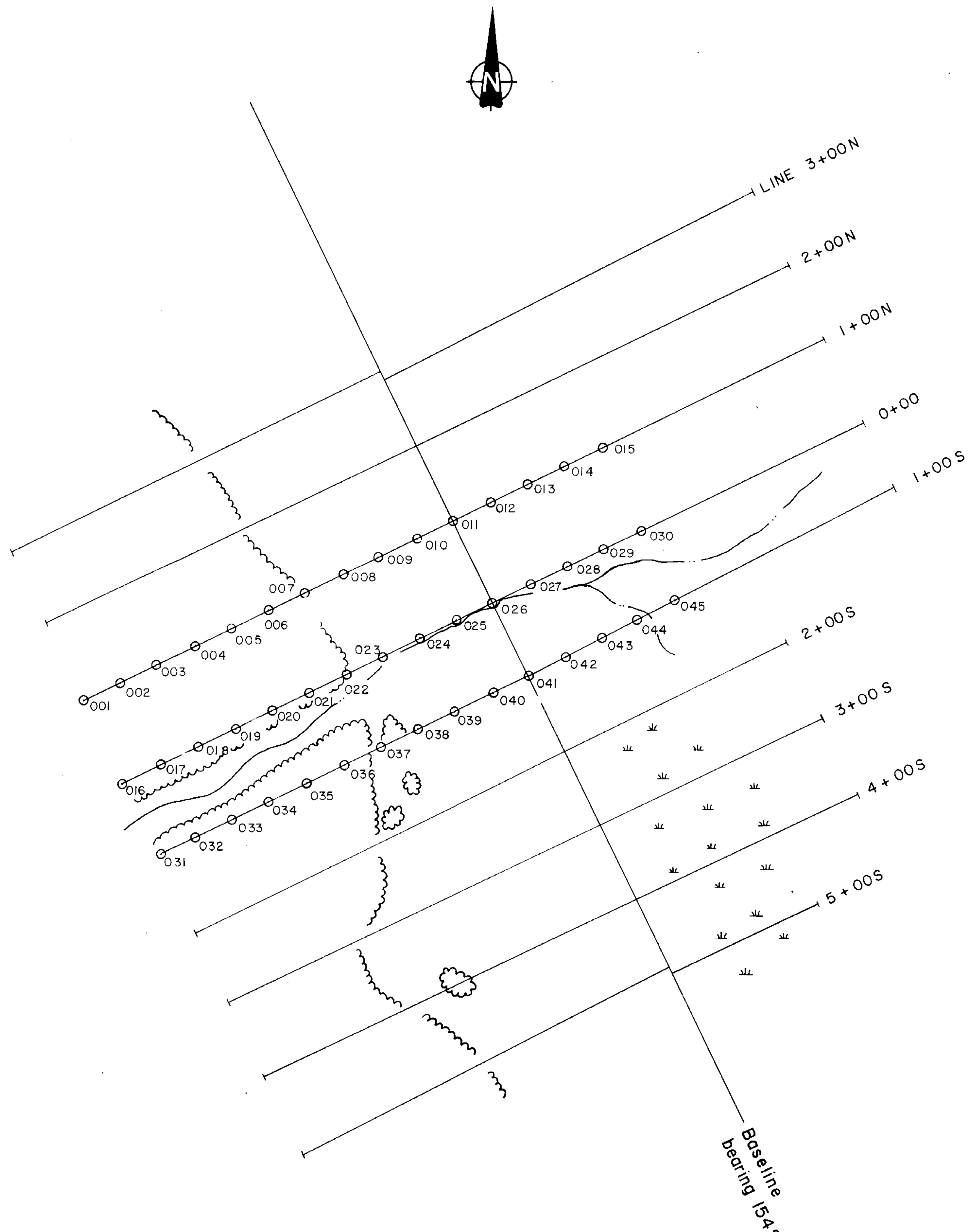
WORK BY	DRAWN BY	DATE: SEPTEMBER 14, 1983
L.L., K.N., D.C.	E.R.	

100 50 0 100 200 300 400

SCALE IN METRES 1 : 5,000 (1cm = 50m)

Figure: 4

kidd



Gas sample
Creek
Swamp
Tree line

E.G. of sample at each station: Gas-910-CO3

GEOLOGICAL BRANCH
ASSESSMENT REPORT

11,506

Kidd Creek Mines Ltd.

TOODOGGONE RECCE PROPERTIES
'PIPEDREAM'

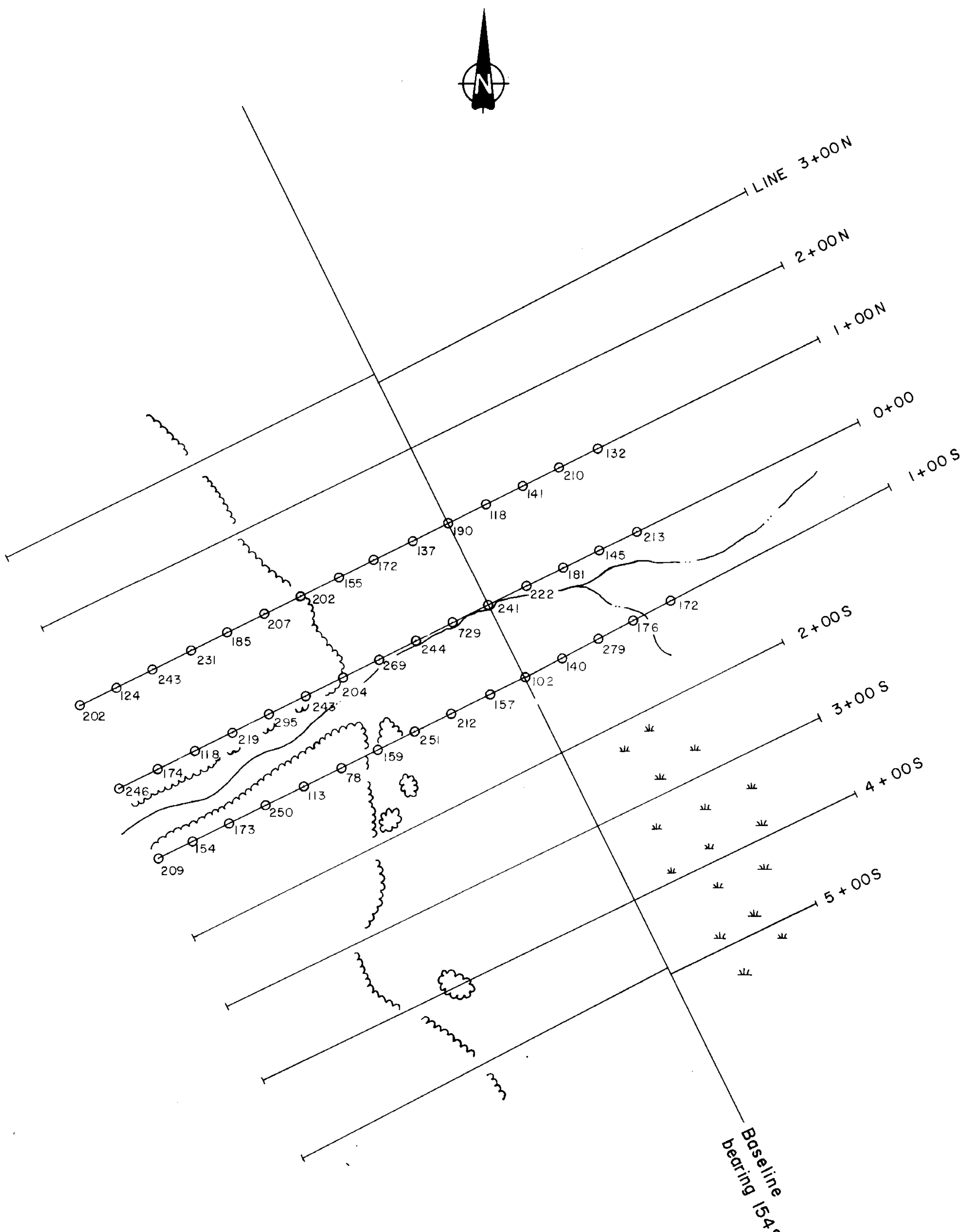
SOIL GAS GEOCHEMISTRY
SAMPLE LOCATIONS

NTS 94E Proj. 910

WORK BY	DRAWN BY	DATE: SEPTEMBER 14, 1983
L.L., K.N., D.C.	E.R.	

SCALE IN METRES 1 : 5,000 (1cm = 50m)

Figure: 5a



⊙ Gas sample

Creek

Swamp

Tree line

E.G. of sample at each station: Gas-910-003

○ Gas not detected

○210 (μgms. gas/weight of sorbent)

GEOLOGICAL BRANCH ASSESSMENT REPORT

11,506

Kidd Creek Mines Ltd.

TOODOGGONE RECCE PROPERTIES
'PIPEDREAM'

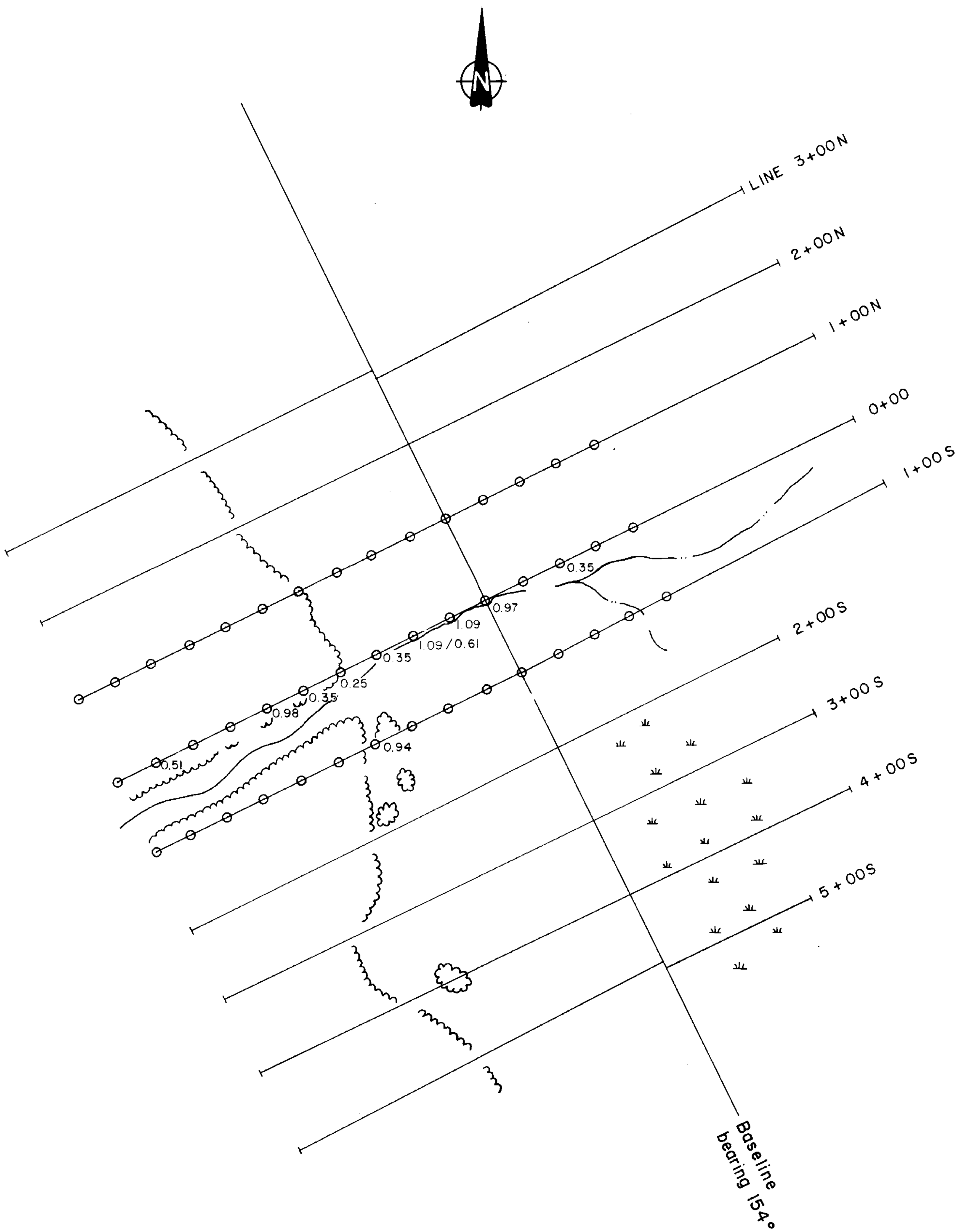
SOIL GAS GEOCHEMISTRY
CO_2

NTS 94E — Proj. 910

WORK BY	DRAWN BY	
L.L., K.N., D.C.	E.R.	DATE: SEPTEMBER 14, 1983

100 50 0 100 200 300 400
SCALE IN METRES 1 : 5,000 (1cm = 50m)

Figure: 5 b



Gas sample

Creek

Swamp

Tree line

E.G. of sample at each station: Gas-910-003

Gas not detected

1.09/0.61 CS2/COS (μgms. gas/weight of sorbent)

GEOLOGICAL BRANCH ASSESSMENT REPORT

11,506

Kidd Creek Mines Ltd.

TOODOGGONE RECCE PROPERTIES
'PIPEDREAM'

SOIL GAS GEOCHEMISTRY
CS_2/COS

NTS 94E — Proj. 910

WORK BY	DRAWN BY	DATE: SEPTEMBER 14, 1983
L.L., K.N., D.C.	E.R.	

100 50 0 100 200 300 400
SCALE IN METRES 1 : 5,000 (1cm = 50m)

Figure: 5c