

**QUEST INTERNATIONAL RESOURCES CORP.**

**HAND TRENCHING and SAMPLING PROGRAM  
BONUS KIMBERLITE PIPE**

**ICE PROPERTY**

Elkford, B.C. Area  
Canada

**Fort Steele Mining Division**

**N.T.S. 82G/14E & 15W; 82J/2W & 3E**

**UTM Coordinates  
5549000N and 644000E**

**Report by:**

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**GEOLOGICAL SURVEY BRANCH  
ASSESSMENT REPORT**

**June, 1998**

**25,576**

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**Quest International Resources Corp.**

**ICE PROPERTY**

**REPORT ON HAND TRENCHING AND SAMPLING PROGRAM  
Bonus Pipe**

**D.L. Pighin, P.Geo.**

**June/98**

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**1.00 SUMMARY**

The Ice property is a diamond prospect, located in Southeastern British Columbia, Canada. The coal mining town of Elkford, B.C., is situated immediately east of the property boundary. Elkford is serviced by paved highway, railroad and hydro.

This report describes exploration work performed on the Ice property in the Fall of 1997. The programs objective was to evaluate the diamond bearing potential of the Bonus kimberlite pipe.

The Ice property consists of the Ice, Gem, Pipe, Gten and Kimberlite claims totaling 581 units. All the claims except the Kimberlite claims are owned 100% by Quest International Resources Corp. The Kimberlite claims are operated by Quest under the Newmarch and Gilbert option agreement.

The Ice property lies on the northwest margin of the Crowsnest coal basin. The property is underlain by the late Paleozoic and Mesozoic clastic and carbonate sediments. Reconnaissance mapping suggests that structure in the area is dominated by folds and faults.

The Ice property covers at least 4 known kimberlite pipes referred to as the Cross Pipe, Bonus Pipe, Ram 5 Pipe and Ram 6.5 Pipe. The Ram 5 and Ram 6.5 are proven diamondiferous kimberlite pipes. Testing indicates that the Cross kimberlite pipe is not diamondiferous. The Bonus kimberlite pipe remains untested for diamond content.

Exploration work in the Fall of 1997 was designed to assess the chemistry of the Bonus pipe kimberlite indicator minerals. This work produced a quantity of pyrope garnets, chromites and eclogitic garnets. Chemical analyses by HDM Laboratories, Fort Collins, Colorado, strongly suggests that the Bonus pipe is diamondiferous.

**2.00 INTRODUCTION**

This report describes the results of a hand trenching and sampling program completed on the Gem mineral claims. The Gem claims are part of the Ice Property, located immediately west of Elkford, B.C.

**2.10 Objective**

The programs objective is to evaluate the size and diamond potential of the Bonus Kimberlite pipe.

**2.20 Location and Access** (see Plate 1) **2**

The property is centered around UTM coordinates 5549000N and 644000E. The property is located in the Fort Steele Mining Division and the claims are plotted on the N.T.S. mapsheets 82G/14E & 15 W and 82J/2W & 3E.

Access to the claims is available to the eastern portion of the claims by logging roads from Elkford, B.C. The western and central portion of the claims are accessible along 4-wheel drive trails and roads or by helicopter.

The nearest major centre is the city of Fernie, B.C., located approximately one hour to the south. Fernie is located one hour (110 km) east of the city of Cranbrook, B.C. from which commercial air transportation is available through Canadian Airlines and Air Canada (as Air B.C.).

**2.30 Physiography and Climate**

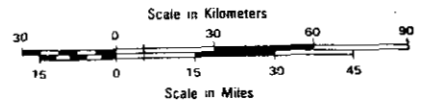
Topography in the area is rugged with local relief in the order of 2600 metres. Cliffs having in excess of 100 m vertical relief are locally common. Cirques and hanging valleys are evident throughout the region, supporting interpretation of glacial modification of the topography and geomorphology of the area. Outcrop is locally abundant at upper elevations with glacial deposits and talus cover present at lower elevations. The drainages on the property are V-shaped (river) valleys.

Forest cover is continuous at lower elevations, becoming thinner and smaller at upper elevations. It has been noted that timber distribution at higher elevations is controlled by rock type in that tree growth preferentially occurs on shaly and argillaceous horizons rather than carbonate formations (Meeks, 1979).

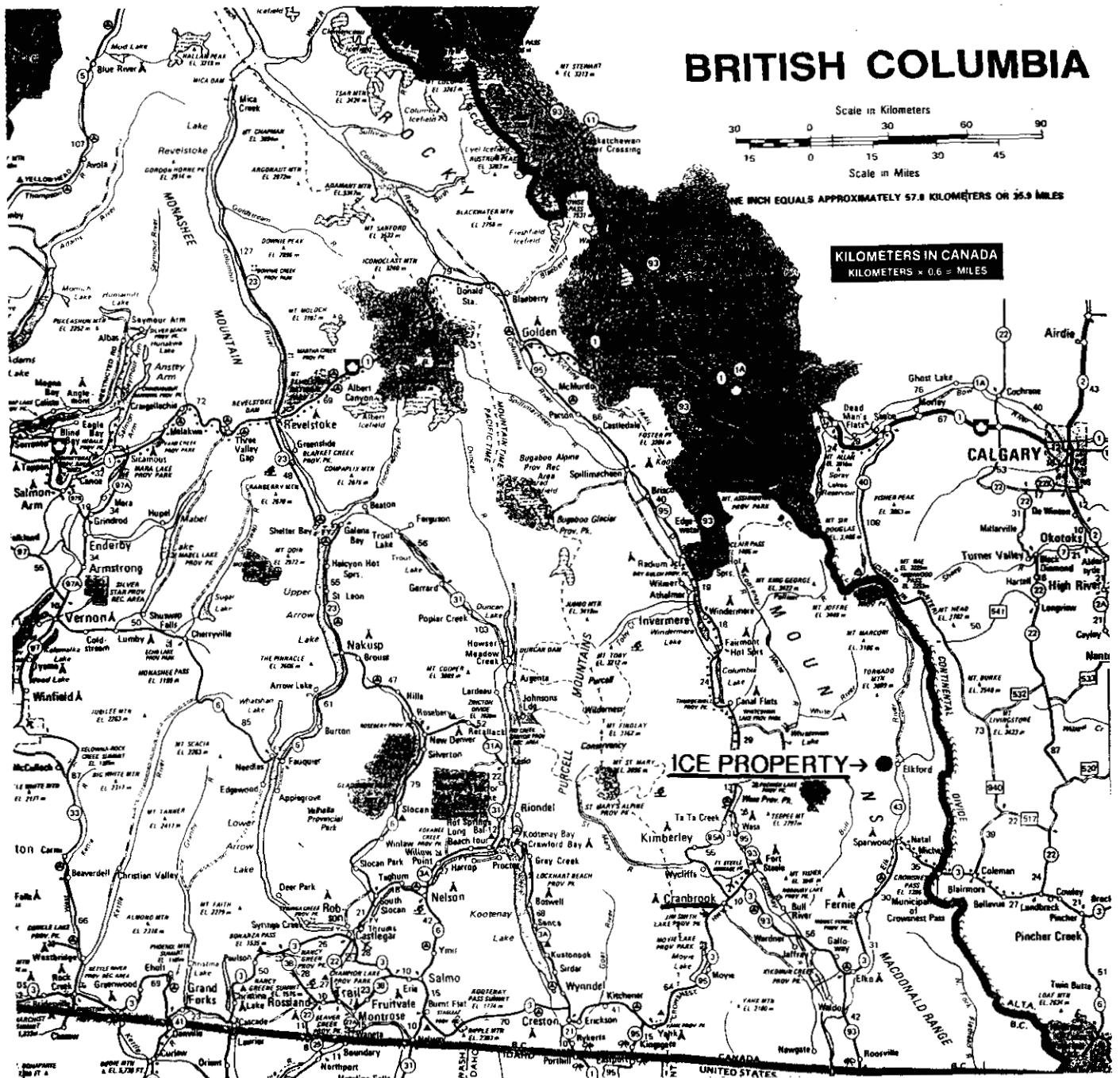
Coniferous trees, including spruce, pine, balsam and larch, are the dominant type of vegetative cover, evident at all elevations where as subordinate deciduous trees, predominantly poplar and cottonwood, are present only at lower elevations. Underbrush consists of willows and alders together with assorted berry-bearing bushes. Commercial logging activity is locally evident as are several burns from past forest fires.

The claims are located in the Main Ranges and are therefore subject to heavy snowfall during the winter months, as supported by the location of two major ski resorts, one north (Sunshine Village) and one south (Fernie) of the property. Average annual precipitation is approximately 90 cm of which 30% is in the form of snow. Snow pack may be present at upper elevations from October to late June. Most of the precipitation during the field season occurs from June to mid-July whereas the property typically is very dry from mid-July through August, and

# BRITISH COLUMBIA



**KILOMETERS IN CANADA**  
KILOMETERS x 0.6 = MILES



**Consolidated Ramrod  
Gold Corporation**

## ICE PROPERTY

**FORT STEELE M.D.**  
**N.T.S. 82G/15W, 82J/2W&3E**

**PROPERTY LOCATION MAP**

Scale: **As Shown**    Date: **MAR/95**    Plate: **1**

Ice Property - Bonus Kimberlite Pipe

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often into September. As such, the property is available for exploration from late May to late October in most years.

**2.40 Claim Status** (see Schedule A in pocket)

The Ice Property consists of the Ice, Gem, Pipe, Gten and Kimberlite claims totally 581 units, covering an area of 150.75 sq. km. Significant claim data is summarised as follows:

<u>Claim Name</u>	<u>Units</u>	<u>Record No.</u>	<u>Anniv. Date</u>
ICE 1	1	311076	June 29/99
ICE 2	1	311077	June 29/99
ICE 3	1	311078	June 29/99
ICE 4	1	311079	June 29/99
ICE 5	1	311080	June 29/99
ICE 6	1	311081	June 29/99
ICE 7	1	311082	June 29/99
ICE 8	1	311083	June 29/99
ICE 9	1	311084	July 07/99
ICE 10	1	311085	July 07/99
ICE 11	1	311086	July 07/99
ICE 12	20	317451	May 5/2000
ICE 13	16	317452	May 3/99
ICE 14	20	317453	May 2/99
ICE 15	20	317454	May 4/2000
ICE 16	20	317455	May 1/2000
ICE 17	20	317456	May 3/2000
ICE 18	20	317457	May 4/99
ICE 19	20	317458	May 5/99
ICE 20	8	317459	May 1/2000
ICE 21	20	317460	April 30/99
ICE 22	20	317461	May 3/99
ICE 23	15	317462	April 30/99
ICE 24	18	317463	April 30/99
ICE 25	18	317464	April 30/2000
ICE 26	1	317443	April 28/2000
ICE 27	1	317444	April 28/2000
ICE 28	1	317445	April 28/2000
ICE 29	1	317446	April 28/2000
ICE 30	1	317447	April 28/2000
ICE 31	1	317448	April 28/2000
ICE 32	1	317449	April 28/2000
ICE 33	1	317450	April 28/2000

## Ice Property - Bonus Kimberlite Pipe

<u>Claim Name</u>	<u>Units</u>	<u>Record No.</u>	<u>Anniv. Date</u>	5
ICE 34	10	317493	April 29/99	
ICE 35	18	317494	April 28/99	
ICE 36	18	317495	April 28/99	
ICE 38	20	317521	May 13/99	
ICE 39	20	317522	May 13/99	
ICE 40	20	320092	Aug. 13/99	
ICE 41	20	320093	Aug. 13/99	
ICE 42	18	323237	Jan. 5/99	
ICE 43	8	323238	Jan. 7/99	
ICE 48	20	323239	Jan. 9/99	
ICE 49	8	323240	Jan. 7/99	
GEM 1	1	310504	June 18/2002	
GEM 2	1	310505	June 18/2002	
GEM 3	1	310506	June 18/2002	
GEM 4	1	310507	June 18/2002	
PIPE 1	1	310508	June 20/2002	
PIPE 2	1	310509	June 20/2002	
PIPE 3	1	310510	June 20/2002	
PIPE 4	1	310511	June 18/2002	
PIPE 5	1	310512	June 18/2002	
PIPE 6	1	310513	June 18/2002	
PIPE 7	1	310514	June 18/2002	
PIPE 8	1	310515	June 18/2002	
PIPE 9	1	310516	June 18/2002	
PIPE 10	1	310517	June 18/2002	
PIPE 11	1	310518	June 18/2002	
PIPE 12	1	310519	June 18/2002	
PIPE 13	1	310520	June 18/2002	
PIPE 14	1	310521	June 18/2002	
PIPE 15	1	310522	June 18/2002	
GTEN 1	1	310523	June 20/2002	
GTEN 2	1	310524	June 20/2002	
GTEN 3	1	310525	June 20/2002	
GTEN 4	1	310526	June 20/2002	
GTEN 5	1	310527	June 19/2002	
GTEN 6	1	310528	June 19/2002	
GTEN 7	1	310529	June 19/2002	
GTEN 8	1	310530	June 19/2002	
GTEN 9	1	310531	June 19/2002	
GTEN 10	1	310532	June 19/2002	
GTEN 11	1	310533	June 19/2002	

## Ice Property - Bonus Kimberlite Pipe

<u>Claim Name</u>	<u>Units</u>	<u>Record No.</u>	<u>Anniv. Date</u>	<b>6</b>
GTEN 12	1	310534	June 19/2002	
GTEN 13	1	310535	June 19/2002	
GTEN 14	1	310536	June 19/2002	
GTEN 15	1	310537	June 19/2002	
GTEN 16	1	310538	June 19/2002	
GTEN 17	1	310539	June 19/2002	
GTEN 18	1	310540	June 19/2002	
GTEN 19	1	310541	June 19/2002	
GTEN 20	1	310542	June 19/2002	
Kimberlite 1	20	324163	March 12/2000	
Kimberlite 2	20	324164	March 12/2000	
Kimberlite 3	15	324165	March 12/2000	
Kimberlite 4	15	324166	March 12/2000	
Kimberlite 5	16	317911	May 18/2000	
Kimberlite 7	1	322614	Oct. 31/98	
Kimberlite 8	1	322615	Oct. 31/98	

### 2.50 Historical Exploration - Ice Property

"Hovdebo (1957) described the Crossing Creek diatreme found during work with a California Standard field party under the supervision of G.G.L. Henderson ... " (Grieve, 1981). Subsequently, the Crossing Creek kimberlite pipe "... was staked by a prospector in the 1960's but it was not until late 1976 that Cominco recognized the kimberlitic nature of the pipe and Cominco commenced exploration of a number of kimberlitic occurrences at that time. A three hundred (300) lbs. sample was taken from the Cross kimberlite by Cominco and tested for micro-diamonds. The results were not reported.

Beginning in 1993, Quest International Resources Corp. (formerly Consolidated Ramrod Gold Corp.) conducted a program of airborne geophysics and stream sediment kimberlite indicator heavy mineral surveys to assess the area for further kimberlite occurrences. This work discovered 4 new kimberlite diatremes named the Bonus, Ram 5, Ram 6 and Ram 6.5 pipes.

Small bulk sample tests were take from the Ram 5, Ram 6 and ram 6.5 kimberlite pipes. No work was done on the Bonus pipe until the Fall of 1997.

### 3.00 REGIONAL GEOLOGY

The Ice Property lies on the northwest margin of the Crowsnest Coal Basin, comprised of Jurassic age coal-bearing strata. The strata of the region are comprised of sedimentary lithologies, however, relatively small but significant igneous occurrences are locally present. These include the Crowsnest Volcanics, small alkaline granitoid intrusions (i.e. Wild Horse River area and the Howell Creek occurrences) and



## Ice Property - Bonus Kimberlite Pipe

peralkaline to ultrapotassic diatremes (i.e. Cross Creek Kimberlite).

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Feldspathoids (including nepheline, melilite, leucite and sodalite) and spinels (chromite). Kimberlite indicator minerals have been found throughout the RMAB in many occurrences. One widely recognized kimberlite (Crossing Creek) has been identified and documented while another (Joff-Shatch Mountain) has been identified as both a kimberlite and as an alkaline lamprophyre (olivine melilitite). Possible emplacement ages interpreted for diatreme occurrences in the RMAB, based on intrusive relationships, are as follows: Ordovician-Silurian, Devonian-Mississippian and Permian-Triassic. Partial geochronological evidence determined to date support these proposed periods of alkaline, ultrapotassic intrusive activity.

Diatremes in the southern Rocky Mountains were intruded predominantly in the early Paleozoic yet contain zircon xenocrysts of Archean to early Paleozoic age. Crustal-type xenoliths are documented from several of the occurrences as well as mantle-derived xenoliths such as pyroxenite, peridotites and eclogites. In addition to abundant indicator minerals, micro-diamonds have been recovered from the Jack and Mark lamprophyric diatremes located near the Columbia Ice Fields. Eight macro-diamonds have recently been recovered from Quest's ELKFORD Kimberlite diatremes (Ice Property).

The basement of the Alberta Basin has been correlated to exposures of the Canadian Shield using U-Pb age determinations of basement material from drill core and aeromagnetic signatures. Canadian Shield exposures have been correlated from Saskatchewan and northwestern Alberta to aeromagnetic, southwest trending anomalies in the sub-surface of Alberta. Furthermore, these anomalies can be correlated with confidence to the basement underlying the Eastern Cordillera. Therefore, the Ice Property is very likely underlain by Archean basement rocks.

Diamonds have been recovered from at least four alkalic diatremes located in a Paleozoic mobile belts, tectonically emplaced onto Archean and Proterozoic basement. The Rocky Mountains are underlain in this area by Archean Basement for which an age of 2.6 to 3.2 billion years has been determined, consistent with the ages of peridotitic diamonds documented world-wide (3.3 billion years). Diatremes of the southern Cordillera appear to have intruded this composite Archean Cratonic Block, correlated to the Hearn Province. It is therefore reasonable to expect the presence of diamonds with mantle-derived peridotitic/eclogitic nodules and zircons of Archean age.

Furthermore, ultramafic nodules (pyroxenitic and eclogitic) and abundant kimberlitic indicator minerals have been reported from several of the occurrences. At present, it is not clear where these intrusives originated relative to the diamond stability field.

However, it is particularly significant that the diamond-bearing lamprophyres north of the Golden, B.C. restore palinspastically outboard of the Crossing Creek and Elkford kimberlite occurrences, from which diamonds have also been recovered.

## 4.00 PROPERTY GEOLOGY

### 4.10 Stratigraphy

#### Mississippian

##### 4.11 Rundle Group

The Rundle Group has been sub-divided into the basal Livingstone, Mt. Head, and uppermost Etherington formations, comprising over 760 m (2,500 ft.) of *predominantly carbonate lithologies*. Leech (1958) described the Rundle Group as follows (note: prior to recognition and subsequent sub-division of the Rundle Group into the Livingstone, Mt. Head and Etherington formations):

"The Rundle formation is characterized by crystalline grey limestone and weathers white or grey and which is commonly crinoidal and coralline, and mostly fetid. the beds generally lack internal layering. Light-coloured "chert" is conspicuous in parts of the sequence. Thin-bedded dark "cherty" limestone of Banff type occurs here and there, particularly in the lower part of the formation ...". The top of the formation occurs where there are at least two beds of sandstone a foot thick in crystalline limestone overlain by quartzite of the Rocky Mountain Group.

#### Carboniferous and Permian

##### 4.12 Rocky Mountain Supergroup

The Rocky Mountain Supergroup underlies shales and siltstones of lowermost Triassic age and has been sub-divided into three formations: the Ishbel Formation of Permian age, the Kananaskis Formation of Middle Pennsylvanian age and the Tunnel Mountain Formation, separated by significant stratigraphic breaks or paraconformities. The Rocky Mountain Group is between 240 and 300 m in thickness and is separated from the underlying Mississippian Formation by an unconformity. A description of the Rocky Mountain Supergroup is summarized below.

#### 4.13 Tunnel Mountain Formation

"The Tunnel Mountain formation consists of cliff-forming, brown-weathering dolomitic siltstones and sandstones which usually contain much less bedded and nodular chert than the Kananaskis formation. Parts of the formation approach a true orthoquartzite with little or no dolomite. Silica vugs possibly replacing algal material are common at various levels and may be used for local correlation; white beds of novaculitic silicestone are also fairly common. The uppermost 400 ft. of the formation is commonly a coarse cross-bedded sandstone, while there is a tendency for the carbonate content to increase downwards. Low in the formation a jagged ridge is typically formed by a series of alternating highly resistant and less resistant beds of grey, green, and pink weathering quartzitic dolomites, siltstones, sandy limestones and thin shales ...

West of the Elk Valley, the Tunnel Mountain formation forms 1,500 ft. or so of the high cliffs there capped by the Ishbel formation ..." (McGugan and Rapson, 1962).

### Middle Pennsylvanian

#### 4.14 Kananaskis Formation

The Kananaskis Formation consists of light gray silty dolomites with chert breccias together with nodular and bedded cherts. This formation is absent in western localities, including Crossing Creek, and the Lower Ishbel formation rests directly on Tunnel Mountain clastics (McGugan and Rapson, 1962).

### Permian

#### 4.15 Ishbel Formation

The Ishbel Formation consists of a possible regolithic chert member (Upper Ishbel) overlying dark cherty phosphatic, thin bedded siltstones with rhythmically interbedded shaly siltstones (Lower Ishbel). A phosphatic conglomerate separates the overlying cherty member from underlying siltstones. In the Crossing Creek area, the Upper and Lower Ishbel are separated by an erosional surface representing a minimum of 718.5 ft. of Middle Ishbel carbonate strata.

The Lower Ishbel Formation is a recessive weathering unit consisting of up to 45 m (150 ft.) of thin bedded siltstones. The contact between the Upper and Lower Ishbel may be marked by several cm of irregularly developed phosphatic

conglomerate, interpreted to represent a period of non-deposition (a hiatus) and erosion.

"The Lower Ishbel formation consists of dark grey to black, argillaceous, poorly sorted, thin bedded, quartzitic siltstones which alternate rhythmically with black, platy, silty shales and occasional dolomite ... Intraformational siltstone conglomerates recur through the rhythmic sequence usually at bedding surfaces. The elements of these conglomerates consist of siltstone pellets and curled splinters similar to desiccation debris. Intraformational residual breccia-conglomerates containing derived older rocks also occur ... Thin beds of silica vugs of probable algal affinity recur regularly, and a number of thin beds rich in phosphate are found in several sections" (McGugan and Rapson, 1962).

The Upper Ishbel Formation is composed predominantly of chert and underlies a paraconformity. The upper surface may be gently undulating and may exhibit scattered low cherty mounds with intervening hollows infilled by Triassic shales.

"The Upper Ishbel formation consists mainly of massive black, blue-grey or white chert with subordinate patches and lenses of sandstone and silicified carbonate ... Chert breccias and quartz veins are common" (McGugan and Rapson, 1962). In the Cross Creek area, the Upper Ishbel Formation is 3 to 37 m (10 to 120 ft.) thick.

"The section of the Ishbel formation at Crossing Creek ... is of particular importance. The bedding in the Lower Ishbel is strongly lensed and exhibits conspicuous depositional dips. The upper surface has been bevelled by erosion before deposition of the overlying Upper Ishbel chert, resulting in a striking unconformity between the Upper and Lower Ishbel formations. A patchy conglomerate of clack siltstone is developed in the basal few inches of the Upper Ishbel ... " (McGugan and Rapson, 1962).

## Triassic

### 4.16 Spray River Group

Undivided portions of the Spray River Group are described as consisting of dark grey, silty shale, dolomitic or sideritic, argillaceous limestone. Where recognized, the Spray River Group is sub-divided into the Whitehorse Formation and underlying Sulphur Mountain Formation. The Spray River Group is between 360 and 450 m in thickness. The Spray River Group is separated from the underlying Upper Carboniferous and Permian Rocky Mountain Group by an unconformity.

4.17 Sulphur Mountain Formation

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The Sulphur Mountain Formation consists of calcareous and dolomitic siltstone and sandstone; silty limestone and dolomite, with lesser marine shale.

4.18 Whitehorse Formation

The Whitehorse Formation has been briefly described as consisting of calcareous and dolomitic sandstone and siltstone with minor sandy, quartzose dolomite and limestone intervals. Marine solution collapse breccia were also noted.

**4.20 Structure**

Reconnaissance mapping suggests that the area is structurally complex, containing both folds and faults. The folds which occur throughout the area are generally asymmetrical and variable in magnitude. Many faults are also present with the dominant type being dip slip thrust faults. Structures in the area are generally north trending and are interpreted to have resulted from local east-west compression, rather than southwest-northeast directed compression interpreted for the Rocky Mountains regionally.

The property is contained in the hangingwall of the east verging Bourgeau Thrust. At least three small splay thrusts and numerous overturned anticlines and synclines were mapped in the hangingwall. Several of the small splay thrusts undergo transition into east verging, overturned anticlines or synclines. both folds and splay thrusts appear to have an en echelon relationship to one another as variations in the amount of deformation are accommodated by folding or, in more extreme cases, faults. There is a change in the structural expression of the folds in the hangingwall of the uppermost splay thrust, from overturned folds to the east in the immediate hangingwall of the Bourgeau Thrust to an upright fold style farther west.

Preliminary mapping in the area immediately adjacent to the diamondiferous Ram 5 and Ram 6.5 kimberlite pipes found no evidence of any major folds or thrust faults. The nearest major thrust fault (Bourgeau) comes to surface 1.5 km east of the kimberlite pipes. The Bourgeau thrust fault dips west and should cut the kimberlite pipes below surface at a depth of between 3,000 ft. and 4,300 ft.

**5.00 GEOLOGY OF THE BONUS KIMBERLITE PIPE**

At surface the Bonus pipe intrudes flat-lying Permian Carbonate sediments (ISHBEL GROUP). Contacts between the Bonus kimberlite and sediments are not exposed at surface. At surface the Bonus pipe, in plan, appears to have a minimum dimension of 80m X 50m, however, it may continue to the east down a steep heavy timbered slope.

The kimberlite is best observed on the ridge between the Cross kimberlite and a unnamed south flowing tributary of Crossing creek.

There are no competent exposures of the Bonus kimberlite. The kimberlite, at surface, is totally decomposed to a phlogopite rich dark green soil. In hand trenches the kimberlitic soil contains abundant xenoliths of local sediments and lesser nodules of peridotite and pyroxenite. Relatively fresh autoliths and glimmerites occur in the hand trenches. Xenocrysts of pyrope garnet, chromediopside and chromite are also present in the kimberlitic soil.

## **6.00 1997 EXPLORATION PROGRAM - BONUS KIMBERLITE PIPE**

The 1997 exploration program can be divided into three parts:

- 1) Helicopter supported hand trenching and sampling.
- 2) Sample processing to produce a heavy mineral concentrate.
- 3) Chemical analyses of diamond indicator mineral (garnets, chromites and clinopyroxenes).

### **6.10 Helicopter Supported Hand Trenching and Sampling**

This phase of the program utilized 6 men equipped with hand tools. The crew was camped at Elkford, B.C. and was ferried by helicopter to and from the work site on a daily basis. The six man crew was subdivided into 3X2 man teams. Each team was equipped with one 48" handle, Fox No.2 round nose, gravel shovel and one 36" handle, 5 lbs., pick mattock. An average of 15 cm of grass sode and top soil was removed from the top of each small hand trench to expose soft decomposed in-place kimberlite. Six large ore bags were filled with decomposed (weathered) kimberlite taken from the six small trenches. The filled ore bags were transported to Elkford, B.C. by helicopter and hauled by truck to the Vine property near Cranbrook, B.C.

### **6.20 Sample Concentration Process - Vine Property**

Approximately two tonnes of Bonus kimberlitic soil was processed through a 12 ft. sluice box. This procedure produced approximately 100 lbs. of heavy mineral concentrate. The sluice box concentrate was further concentrated by sieving and hand panning. Garnets, chromite, and clinopyroxene was sorted by hand and placed in separate vials.

### **6.30 Chemical Analysis of Kimberlite Indicator Minerals**

(See attached Figures 3 to 8)

Bonus pipe kimberlite indicator samples were sent to M.E. McCallum of HDM Laboratories, Fort Collins, Colorado, U.S.A. Results as follows:

"A population of 157 garnets was selected for analysis from the thousands available in concentrate from the Bonus Pipe. Eight of these proved to be from metamorphic host rocks; 7 of almandine composition and 1 grossularitic. The main population is comprised of 106 peridotitic and 43 eclogitic garnets (Figure

5). The majority of the peridotitic garnets are G9's (characteristic of garnet lherzolite), but 4 (3.77%) are G10's reflecting a probable diamondiferous harzburgite source. Eight of the eclogitic garnets (18.6%) contain greater than 0.07% Na<sub>2</sub>O and plot in the probable diamond inclusion field (Figure 6). Three other grains contain ~0.07% Na<sub>2</sub>O and also may reflect a diamond stability field source (possibly 25+% of total analyzed eclogite grains in diamond inclusion field). Although the compositions of some of these grains overlap with those of megacrystal garnets, MgO and FeO contents can be utilized for distinction.

A representative suite of 180 chromite grains was analyzed. They exhibit characteristic kimberlitic trends (Figure 7), and 10 (5.55%) plot in the diamond inclusion field (Figure 8).

Only eight chrome diopside grains were recovered from the Bonus pipe heavy mineral concentrate. Most of these plot within or close to the eclogitic diamond inclusion field (Figures 3 and 4) but as previously indicated, this may not be a significant determinant in establishing a diamond source affinity."

## 7.00 CONCLUSIONS

Field techniques used to evaluate the diamond potential of the Bonus kimberlite pipe have proven to be effective. The work resulted in an abundant supply of kimberlite indicator minerals.

Lab results show that the chemistry of kimberlite indicator minerals recovered from heavy mineral concentrate from the Bonus pipe strongly suggest that diamonds are present in that system. G10 garnets comprise 3.77% of the peridotitic pyrope population whereas about 25% of the analyzed eclogitic garnets plot in the diamond inclusion field. Furthermore, more than 5% of the analyzed chromites are of diamond inclusion field composition. These combined results are sufficiently positive to warrant a mini-bulk sample be collected and processed for diamond content.

## 8.00 RECOMMENDATIONS

Further work on the Bonus kimberlite pipe is warranted. It is recommended that a 30 tonne mini-bulk sample be collected from the Bonus kimberlite pipe and processed for macro-diamond content.

## 9.00 REFERENCES

Price, R.A. (1981) The Cordilleran foreland thrust and fold belt in the southern Rocky Mountains, In: McClay, K.R. and Price, J.J. eds., Thrust and Nappe Tectonics, Geological Society of London Special Publication 9, pp. 427-448.

- Price, R.A. and Mountjoy, E.W. (1970) Geological structure of the Canadian Rocky Mountains between Bow and Athabaska Rivers - a progress report. Geological Assoc. Of Canada, Special Paper 6, pp. 7-26.
- Pighin, D.L. (1997) Technical Report for the Ice Property, unpublished.
- McCallum, M.E. (1998) Technical Report on Chemical Assessment of Kimberlite Indicator Minerals from the Bonus Pipe, unpublished.



**STATEMENT OF EXPENDITURES**

**ICE PROPERTY  
Bonus Kimberlite Pipe**

**Hand Trenching and Sampling Program**

CONTRACTOR WAGES

Bestech Services, Cranbrook, B.C.		
M. Best - Supervisor/sampling	6 days @ \$250	\$1,500
Crew of 5	20 mandays @ \$200/day	<u>4,000</u>
	(incl. trucks,saws,radios, & lodging)	\$ 5,500.00
EK Expediting Contractor, Cranbrook, B.C.		
-transport supplies,helicopter fuel,ATV's etc. to Elkford & sluice samples at Vine property	4 days (transport incl.)	1,075.00
High-Grade Geological Consulting, Cranbrook, B.C.		
Compile data, interpretation, report writing	4 days @ \$300/day	1,200.00

SALARIES

J. Heibein - Pan and pick samples	695.75
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ASSAY CHARGES

M.E. McCallum, HDM Laboratories, Fort Collins, Colorado	5,285.00
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TRANSPORATION - Helicopter

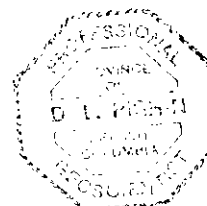
Big Horn Helicopter, Cranbrook, B.C.	
10.5 hrs. @ \$895/day + \$1092.00 fuel	10,489.50

<u>EQUIPMENT RENTAL</u>	720.00
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<u>SUPPLIES AND FIELD EQUIPMENT</u>	<u>2,725.83</u>
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**PROGRAM COST = \$27,691.08**

*David L. Righin*  
\_\_\_\_\_  
David L. Righin

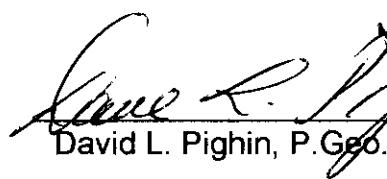


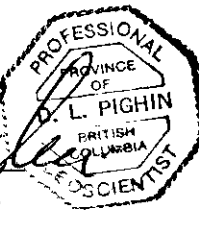
### AUTHOR'S QUALIFICATIONS

As author of this report I, David L. Pighin, certify that:

1. I am a self employed consulting geologist whose office is at Hidden Valley Road, Cranbrook, B.C., mailing address is P.O. Box 728, Cranbrook, B.C. V1C 4J5
2. I am a Member in good standing of the Association of Professional Engineers and Geoscientists of the Province of British Columbia.
3. I have been actively involved in mining and exploration geology, primarily in the Province of British Columbia, for the past 32 years.
4. I was employed by Cominco Ltd. as a prospector, exploration technician and geologist for 24 years and later by numerous junior exploration companies.

Dated at Cranbrook, British Columbia, this 2<sup>nd</sup> day of July, 1998.

  
David L. Pighin, P. Geo.



**APPENDIX "A"**

**Report by M.E. McCallum**

**Chemical Assessment Work on Kimberlite Indicator Minerals  
from the Bonus Pipe and Boivin Creek Area, Ice Prospect, S.E.B.C.  
March, 1998**

# CHEMICAL ASSESSMENT WORK ON KIMBERLITE INDICATOR MINERALS FROM THE BONUS PIPE AND BOVIN CREEK AREA, ICE PROSPECT, SOUTHEASTERN BRITISH COLUMBIA

## Introduction

Representative kimberlite indicator minerals recovered from heavy mineral concentrates obtained from the Bonus pipe and from colluvial samples from the Bovin Creek area were analyzed chemically by electron microprobe. Bonus pipe concentrate is characterized by abundant chromite and both peridotitic and eclogitic garnets; chrome pyroxene grains were limited in available sample material and no microilmenite was recognized. Indicator minerals were quite sparse in the Bovin Creek samples, a situation that probably reflects poor quality of the samples. Indicators were recovered only from samples I 97-2, I 97-4, I 97-7 and I 97-8, and these were predominantly garnet. Other than garnet, only a single grain of chrome diopside was recovered (from sample I 97-4).

## Bovin Creek Samples

Nineteen garnet grains from Bovin Creek samples were analyzed; 3 from sample I 97-2, 13 from sample I 97-4, 1 from sample I 97-7 and 2 from sample I 97-8. Six of these garnet grains plot in the garnet lherzolite field (G9), whereas the remainder appear to be eclogitic (Fig. 1). None of the eclogitic garnets contain in excess of 0.07% Na<sub>2</sub>O, a composition that is characteristic of eclogitic garnets found as inclusions in diamonds (Fig. 2). The single chrome diopside grain found in I 97-4 concentrate has chemistry in part characteristic of eclogitic clinopyroxene found as inclusions in diamond (Figs. 3 and 4). However, there is a substantial overlap with pyroxenes of non-diamondiferous sources, thus grains that plot in the fields on Figures 3 and 4 designated as eclogitic diamond inclusion field are not necessarily definitive.

## Bonus Pipe Concentrate

A population of 157 garnets was selected for analysis from the thousands available in concentrate from the Bonus Pipe. Eight of these proved to be from metamorphic host rocks; 7 of almandine composition and 1 grossularitic. The main population is comprised of 106 peridotitic and 43 eclogitic garnets (Fig. 5). The majority of the peridotitic garnets are G9's (characteristic of garnet lherzolite), but 4 (3.77%) are G10's reflecting a probable diamondiferous harzburgite source. Eight of the eclogitic garnets (18.6%) contain greater than 0.07% Na<sub>2</sub>O and plot in the probable diamond inclusion field (Fig.

6). Three other grains contain ~ 0.07% Na<sub>2</sub>O and also may reflect a diamond stability field source (possibly 25+% of total analyzed eclogite grains in diamond inclusion field). Although the compositions of some of these grains overlap with those of megacrystal garnets, MgO and FeO contents can be utilized for distinction.

A representative suite of 180 chromite grains was analyzed. These exhibit characteristic kimberlitic trends (Fig. 7), and 10 (5.55%) plot in the diamond inclusion field (Fig. 8).

Only eight chrome diopside grains were recovered from the Bonus Pipe heavy mineral concentrate. Most of these plot within or close to the eclogitic diamond inclusion field (Figs. 3 and 4) but as previously indicated, this may not be a significant determinant in establishing a diamond source affinity.

### Conclusions

Despite the apparent poor quality of samples collected in the Bovin Creek area, the presence of several peridotitic G9's and eclogitic garnets and a grain of chrome diopside suggests the presence of kimberlite in that drainage. Follow-up sampling should be conducted and every effort should be made to collect samples from sites where more heavy minerals are likely to be concentrated.

Chemistry of selected kimberlite indicator minerals recovered from heavy mineral concentrate from the Bonus pipe strongly suggest that diamonds are present in that system. G10 garnets comprise 3.77% of the peridotitic pyrope population whereas about 25% of the analyzed eclogitic garnets plot in the diamond inclusion field. Furthermore, more than 5% of the analyzed chromites are of diamond inclusion field composition. These combined results are sufficiently positive to warrant a mini-bulk sample (several tens of tonnes) being collected and processed for diamond content.

### Quest Chromites

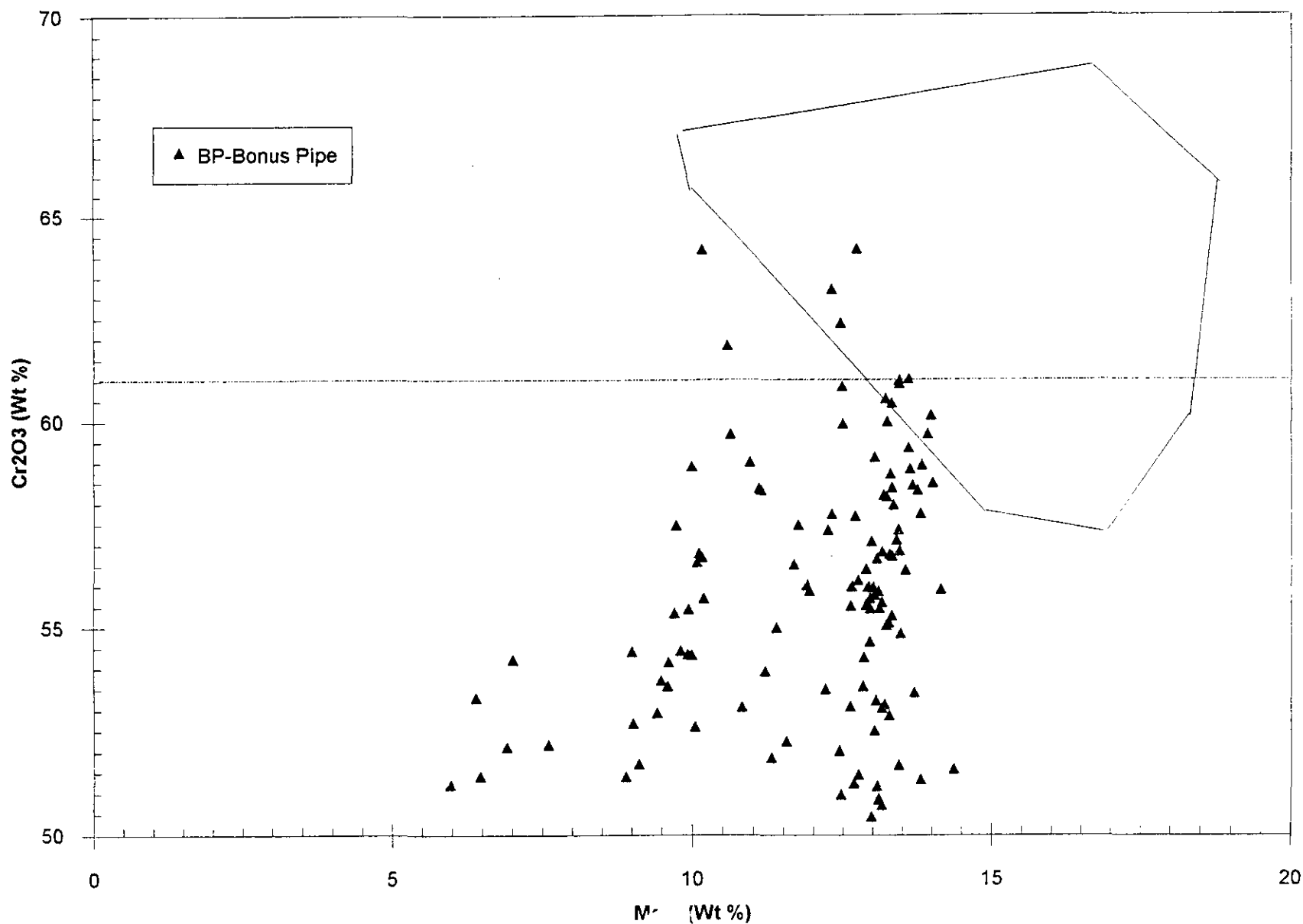


Figure 8. Cr<sub>2</sub>O<sub>3</sub>:MgO plot (wt %) of chromites (enclosed area is peridotitic diamond inclusion field).

### Quest Chromites

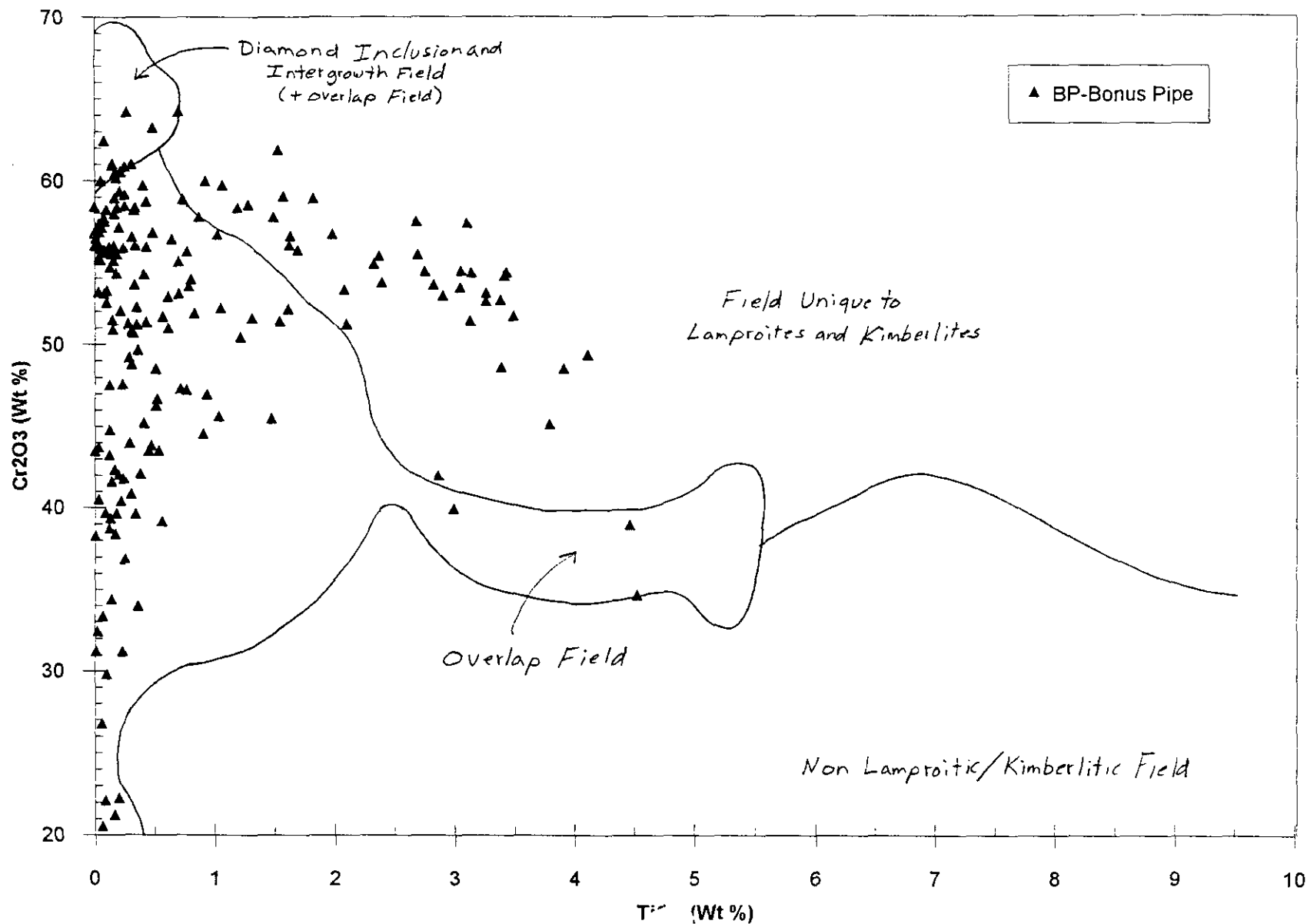


Figure 7. Cr<sub>2</sub>O<sub>3</sub>:TiO<sub>2</sub> (wt%) plot of chromites.

### Quest Eclogitic Garnets

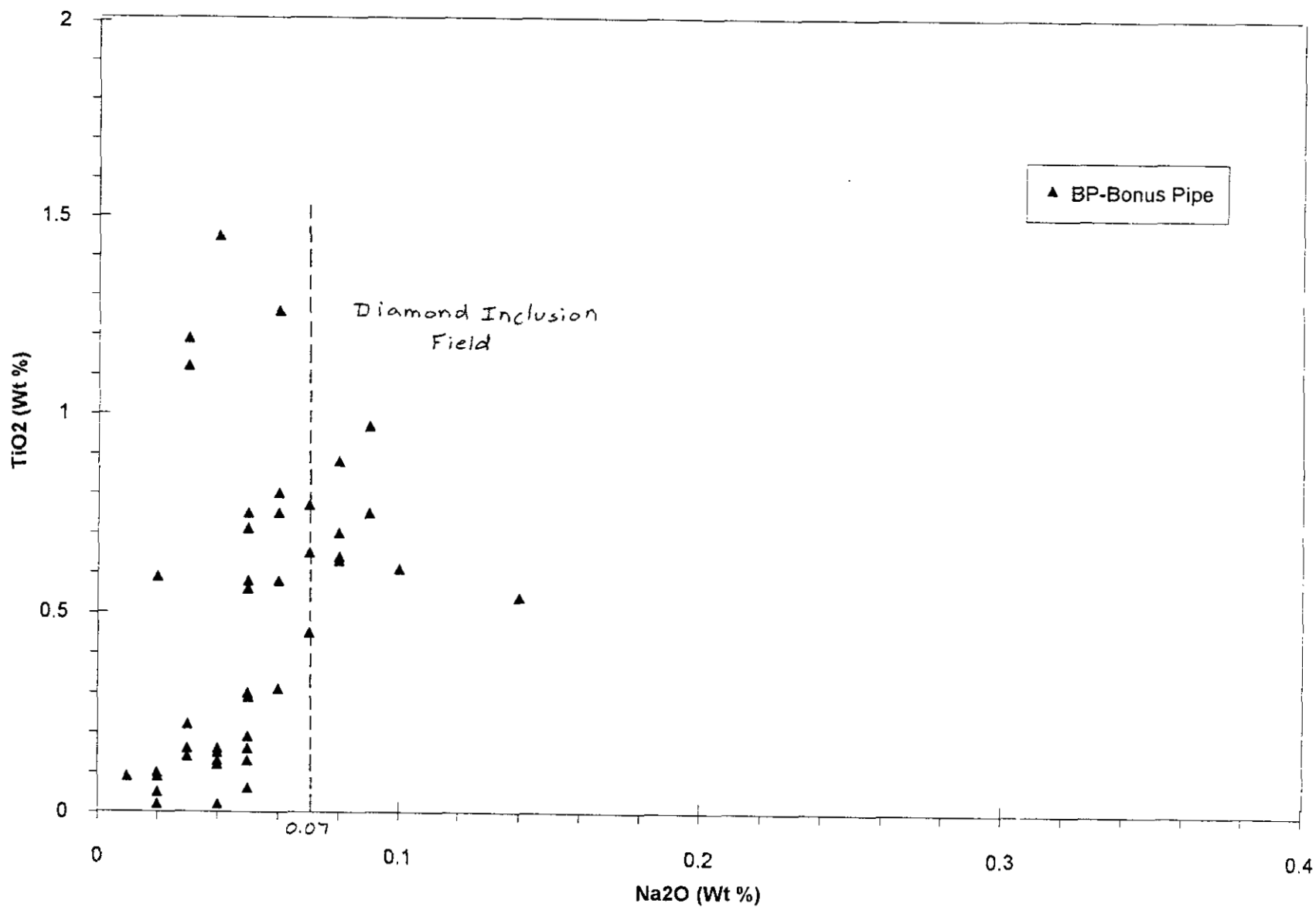


Figure 6. TiO<sub>2</sub>:Na<sub>2</sub>O (wt %) plot of garnets recovered from Quest Bonus Pipe samples.



QUEST GARNETS

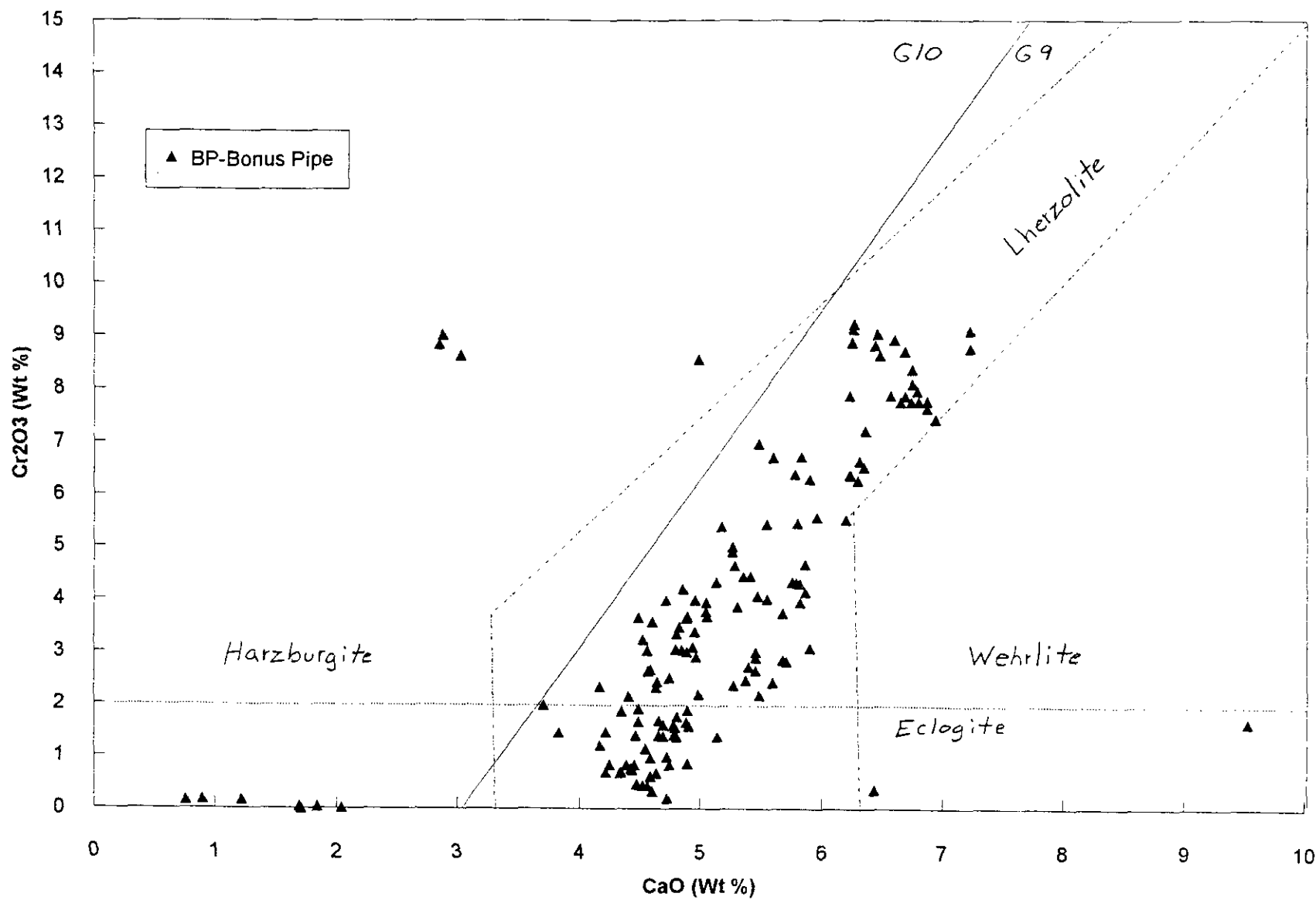
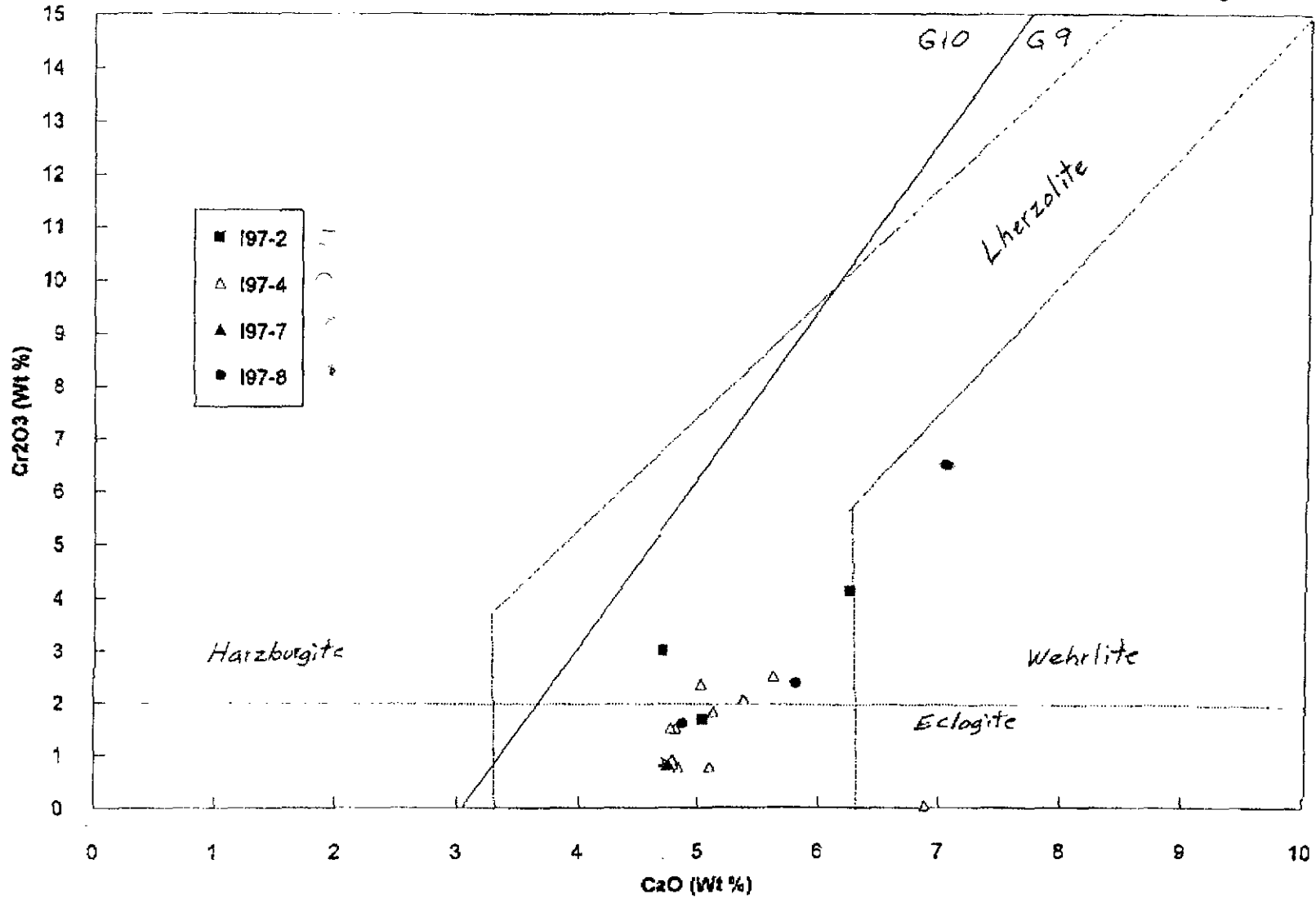


Figure 5. Cr<sub>2</sub>O<sub>3</sub>:CaO (wt %) plot of garnets recovered from Quest Bonus Pipe samples.

### QUEST GARNETS

Figure 1



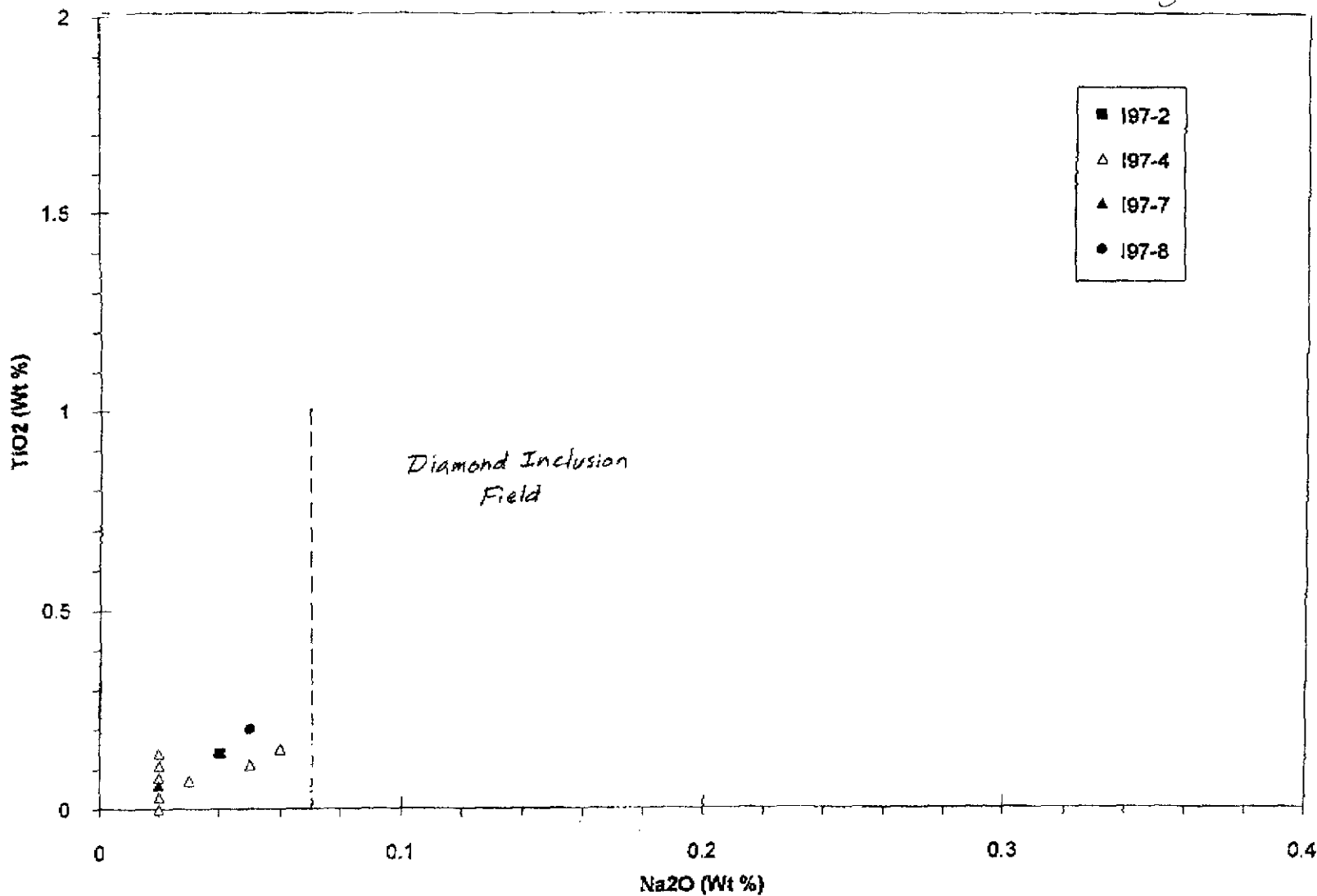
Piv.

Cr2O3:CaO (wt %) plot of garnets recovered from Quest samples.

*[Handwritten signature]*

### Quest Eclogitic Garnets

Figure 2



TiO<sub>2</sub>:Na<sub>2</sub>O (wt %) plot of garnets recovered from Quest samples.

### QUEST Clinopyroxenes

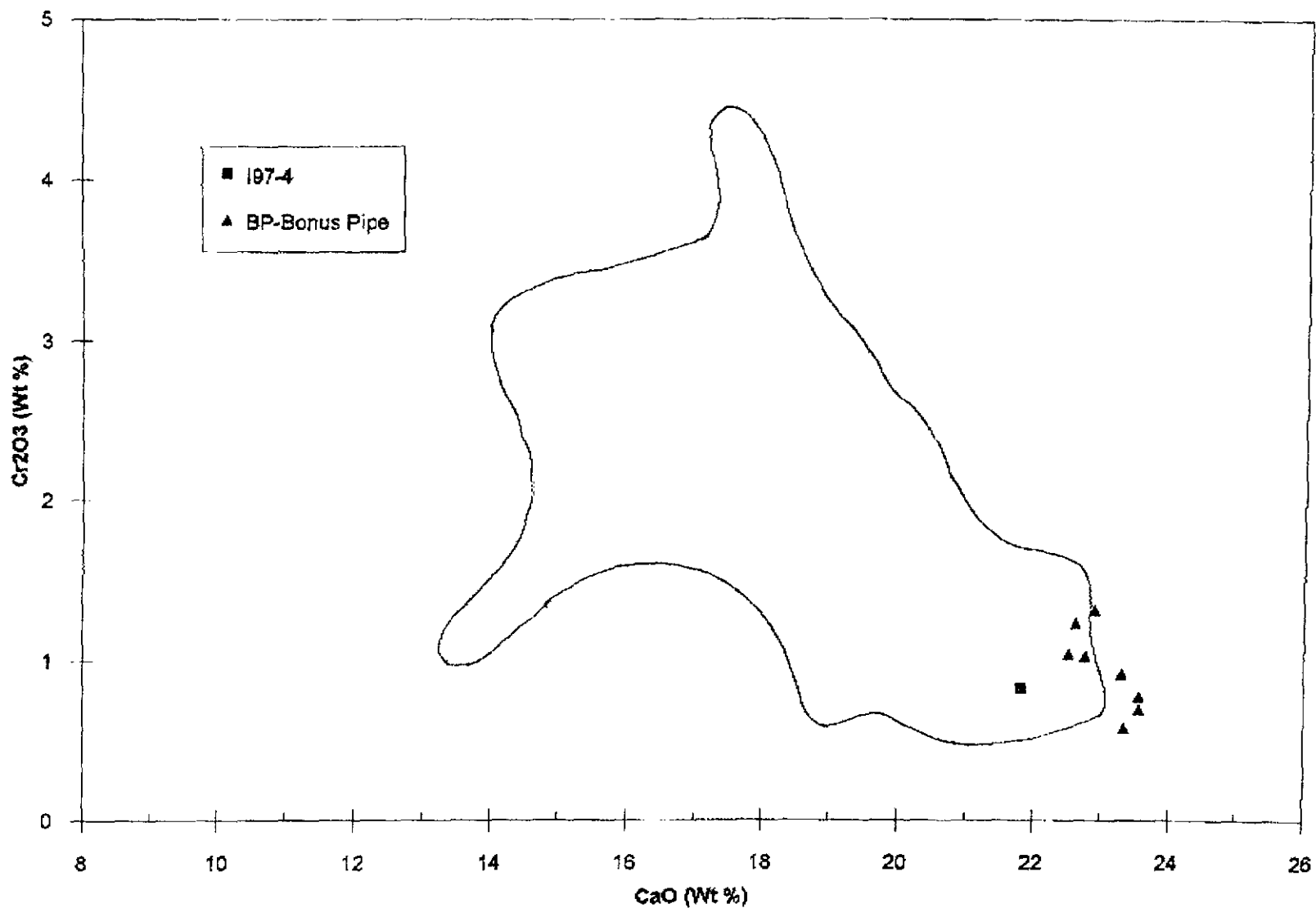


Figure 1. Cr<sub>2</sub>O<sub>3</sub>:CaO plot (wt %) of Quest Bovin Creek and Bonus Pipe clinopyroxenes (enclosed area is eclogitic diamond inclusion field).

March 7, 1998

### Quest Clinopyroxenes

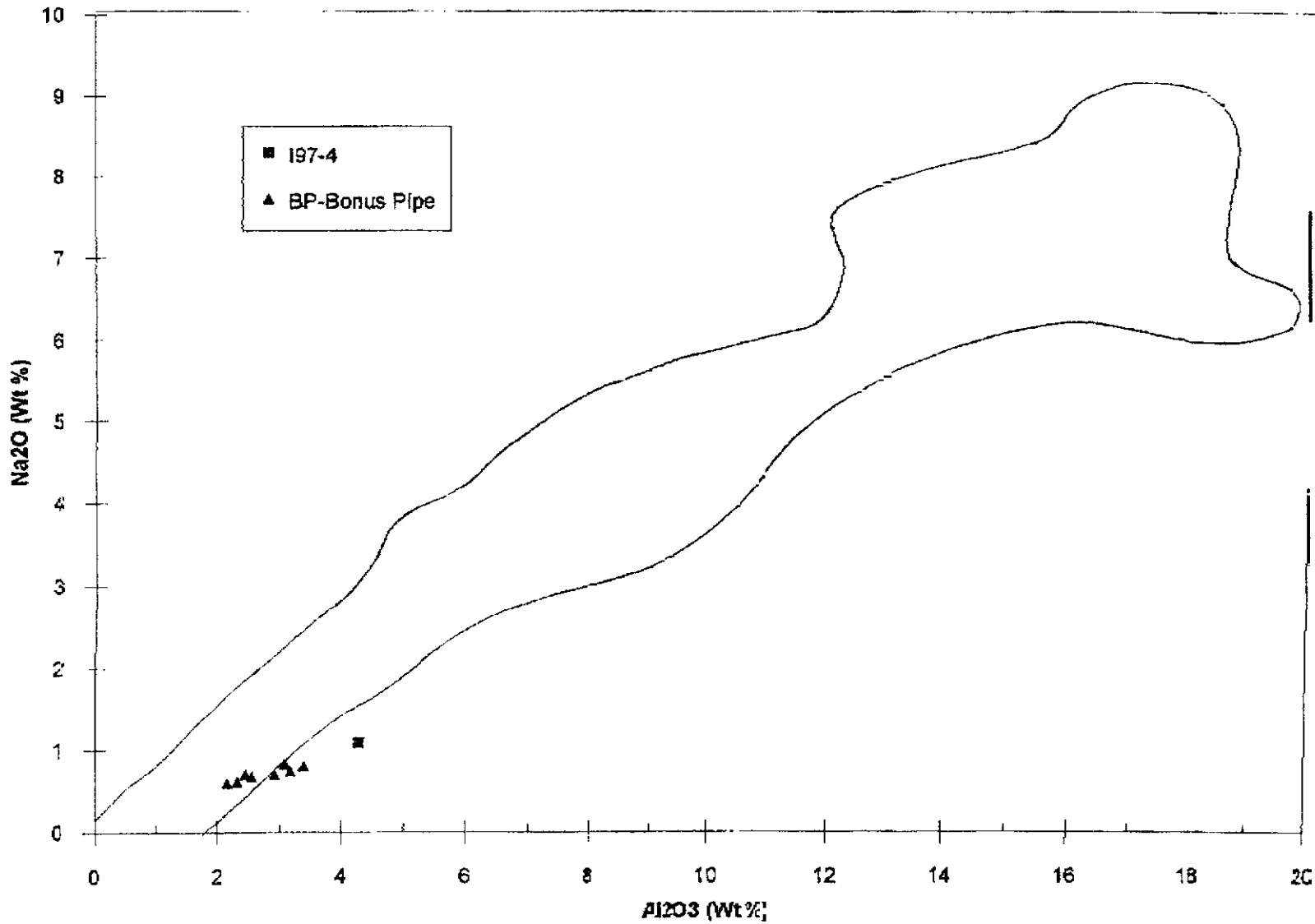
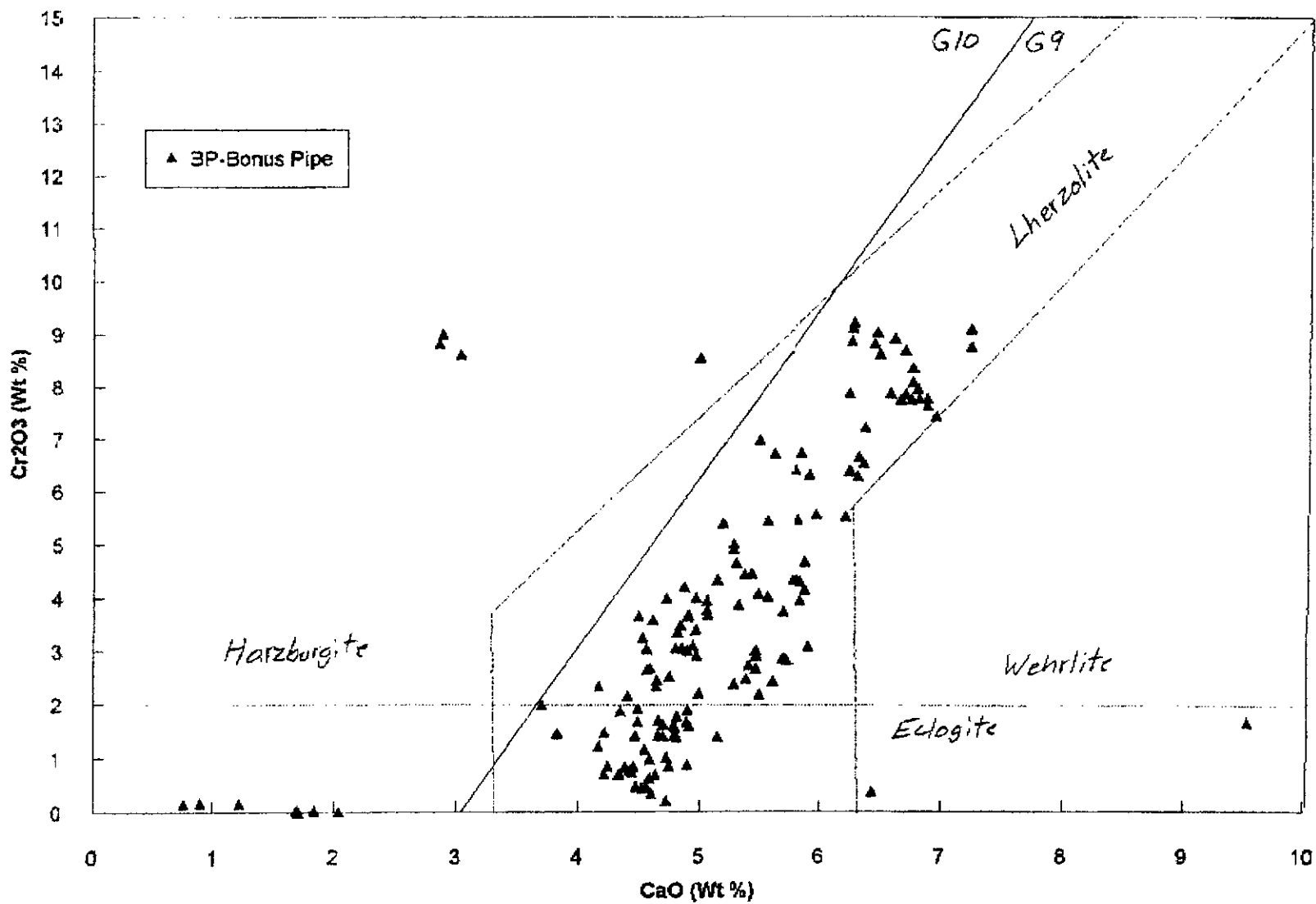


Fig 2  
X

Figure 2. Na<sub>2</sub>O:Al<sub>2</sub>O<sub>3</sub> plot (wt %) of Quest Bovin Creek and Bonus Pipe clinopyroxenes (enclosed area is eclogitic diamond inclusion field).

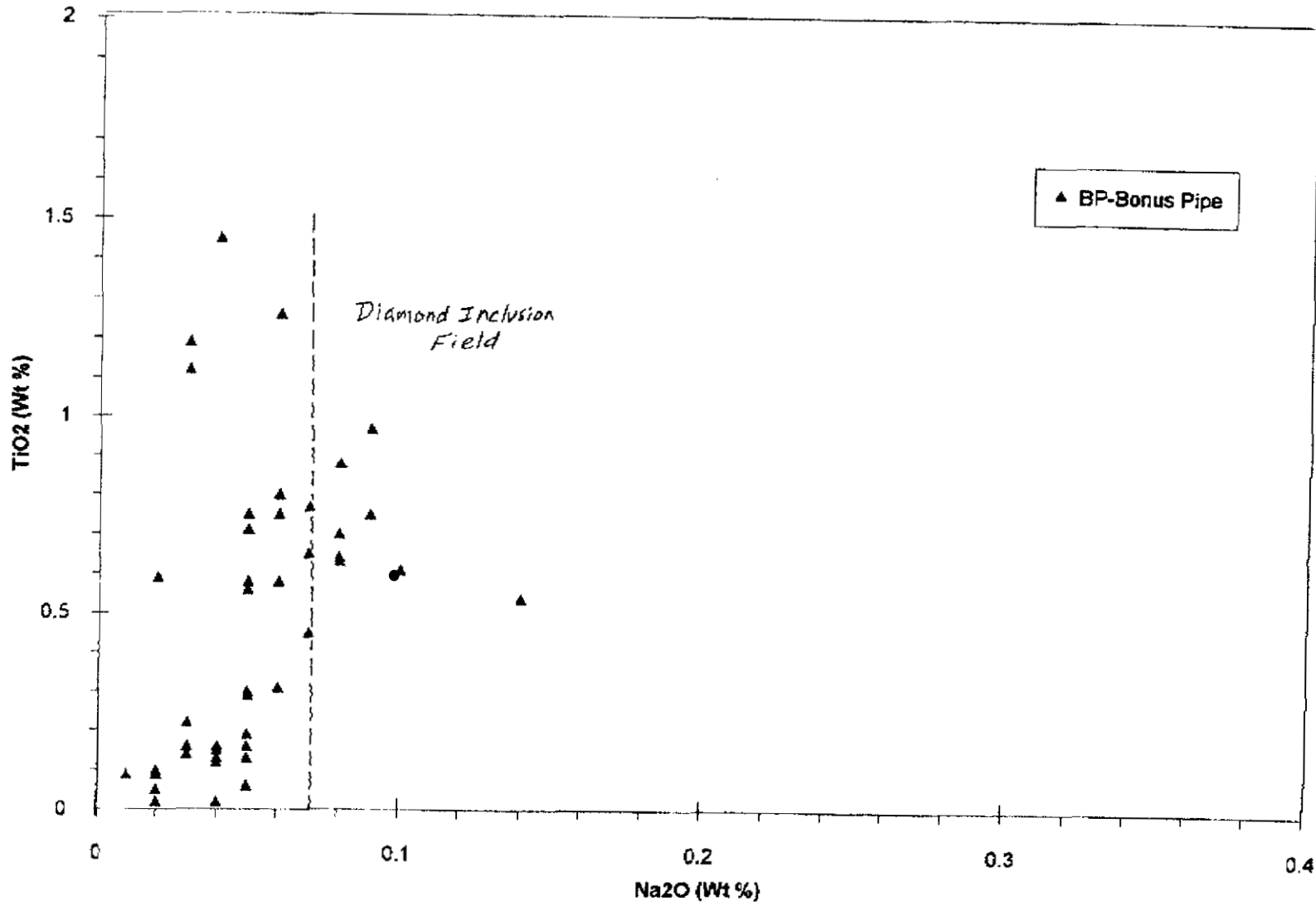
### QUEST GARNETS



Cr<sub>2</sub>O<sub>3</sub>:CaO (wt %) plot of garnets recovered from Quest Bonus Pipe samples.

Fig 5

### Quest Eclogitic Garnets

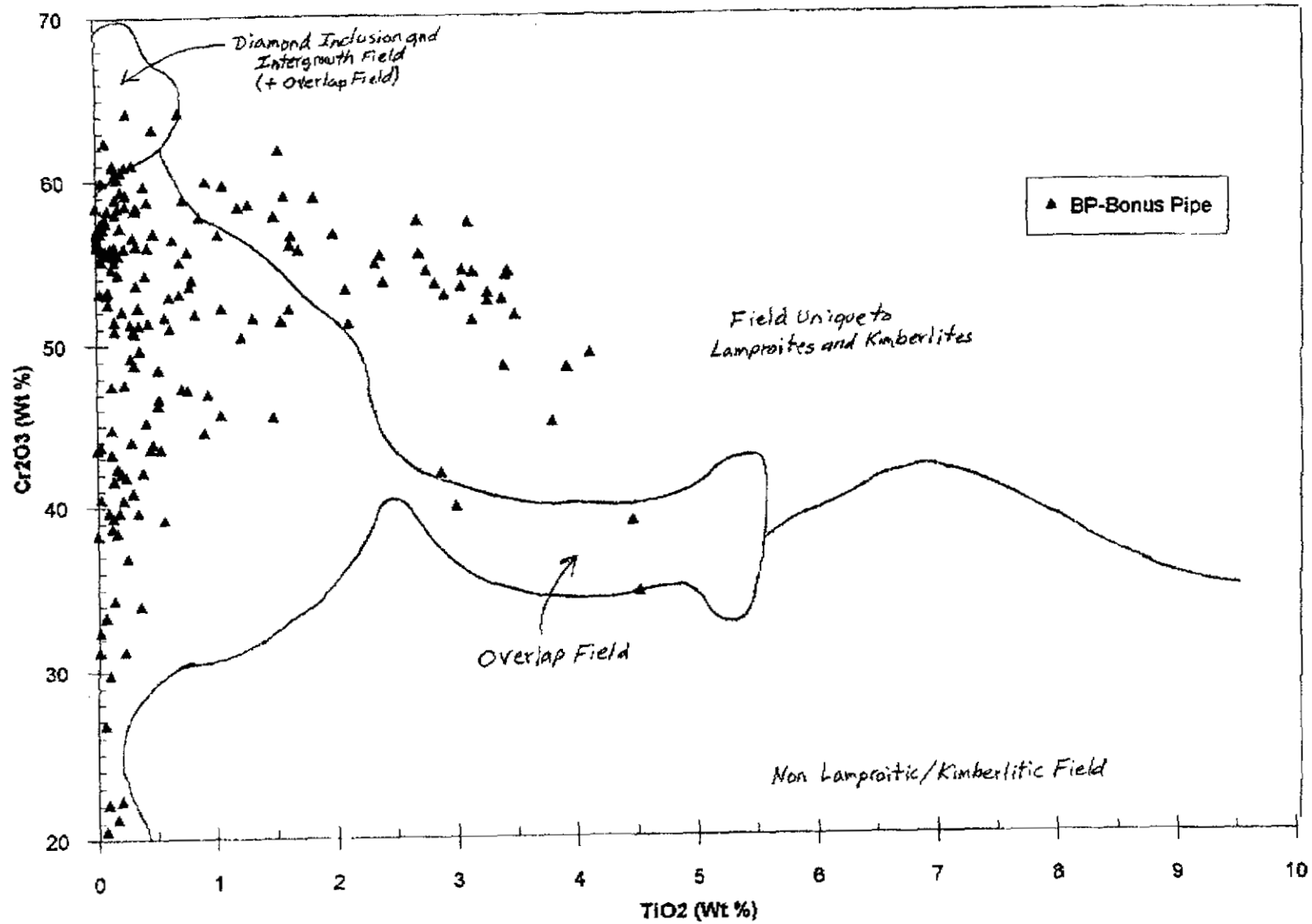


TiO<sub>2</sub>:Na<sub>2</sub>O (wt %) plot of garnets recovered from Quest Bonus Pipe samples.

Fig 6

MHK-11-78 MEU 10:11 HMN Laboratories 310 667 5813 P.08

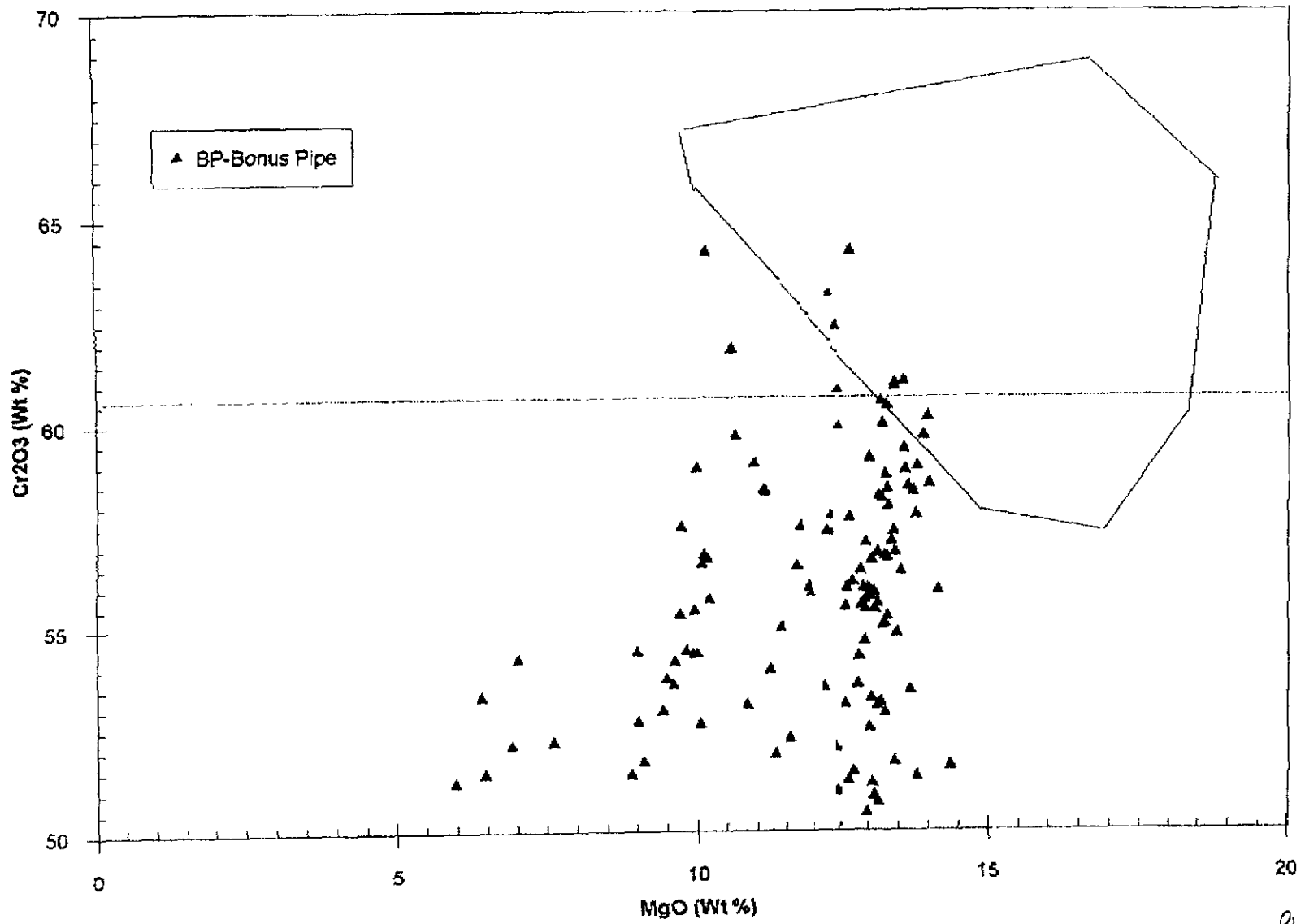
### Quest Chromites



Cr<sub>2</sub>O<sub>3</sub>:TiO<sub>2</sub> (wt%) plot of chromites.



### Quest Chromites



Cr<sub>2</sub>O<sub>3</sub>:MgO plot (wt %) of chromites (enclosed area is peridotitic diamond inclusion field).

Fig 8

LINE 11 20 MEG 10.18 HDN LUBRIC OILS 710 667 3313 P.04

Quest Clinopyroxenes

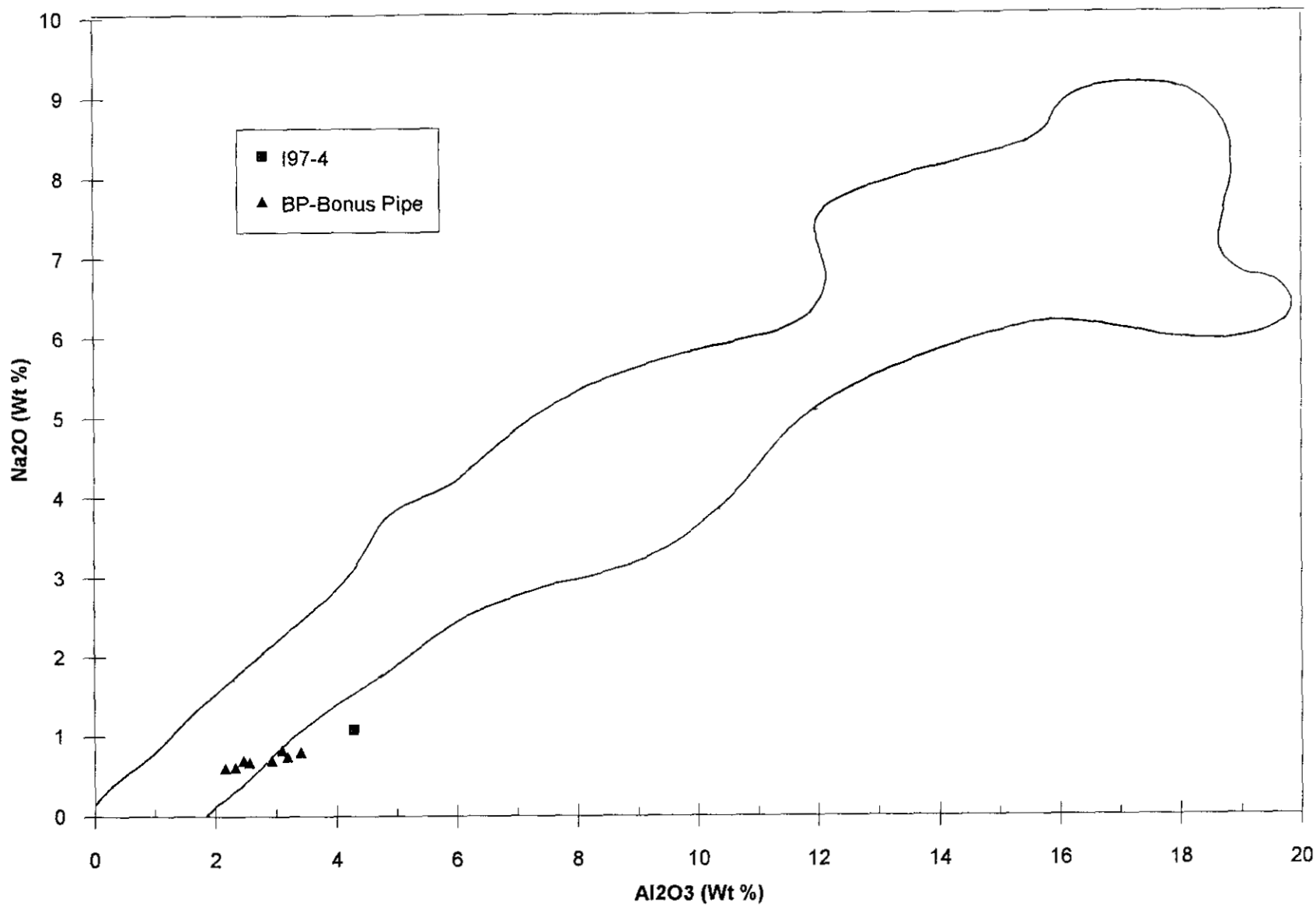


Figure 4. Na<sub>2</sub>O:Al<sub>2</sub>O<sub>3</sub> plot (wt %) of Quest Bovin Creek and Boni Pipe clinopyroxenes (enclosed area is eclogitic diamond inclusion).

QUEST Clinopyroxenes

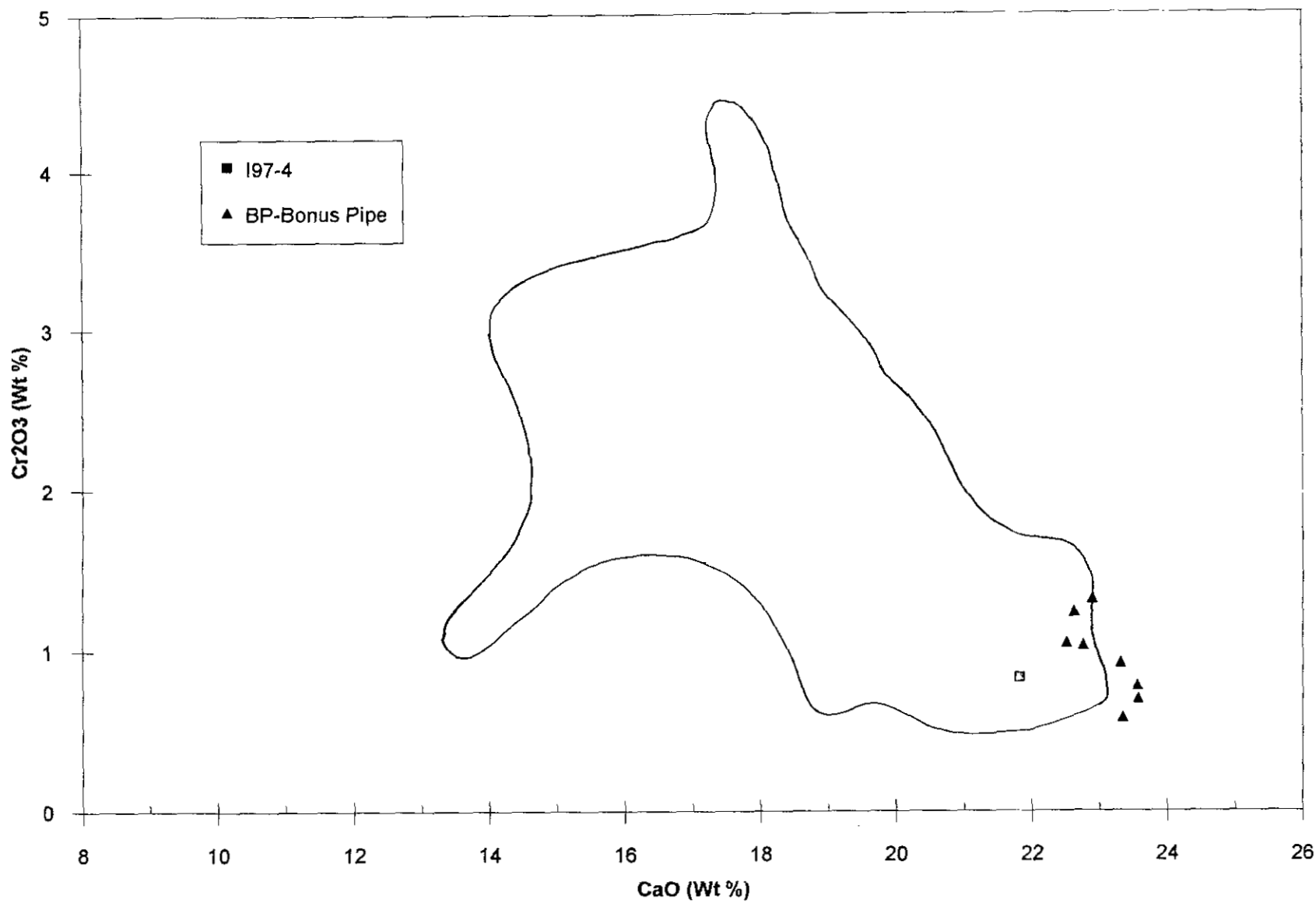


Figure 3. Cr<sub>2</sub>O<sub>3</sub>:CaO plot (wt %) of Quest Bovin Creek and Bonus Pipe clinopyroxenes (enclosed area is eclogitic diamond inclusion field)

### Quest Eclogitic Garnets

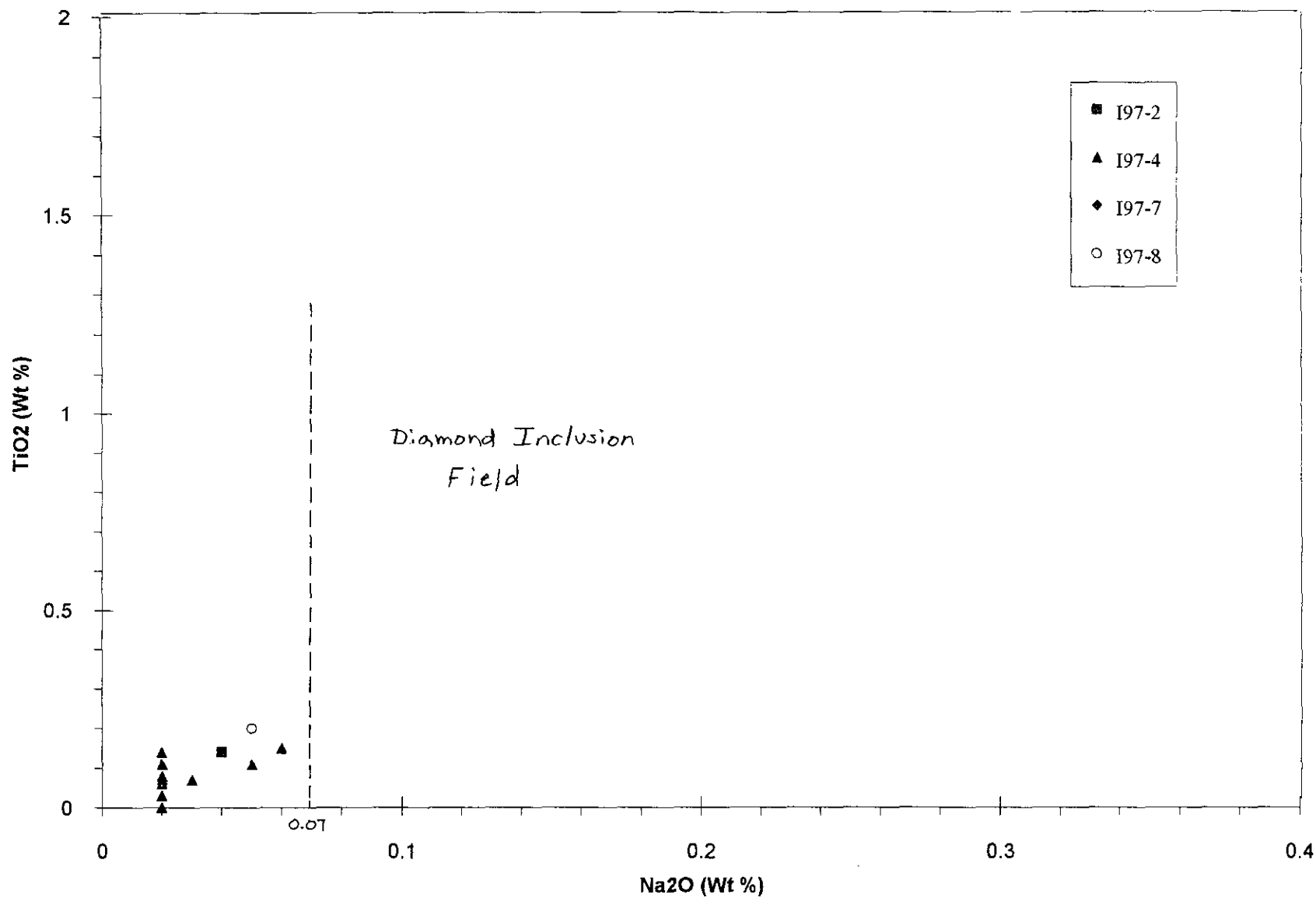


Figure TiO<sub>2</sub>:Na<sub>2</sub>O (wt %) plot of garnets recovered from Quest Bovin Cr samples.

QUEST GARNETS

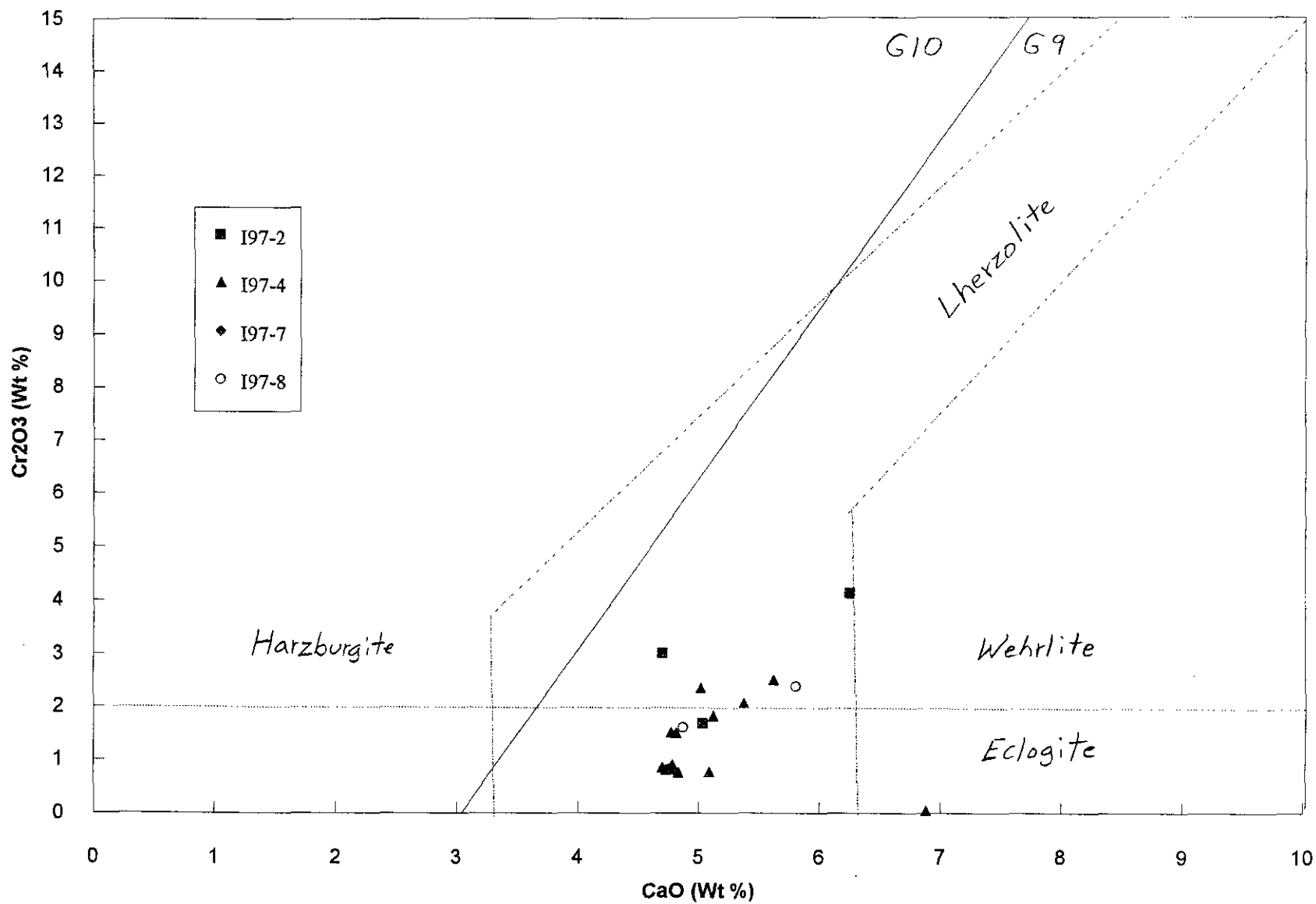
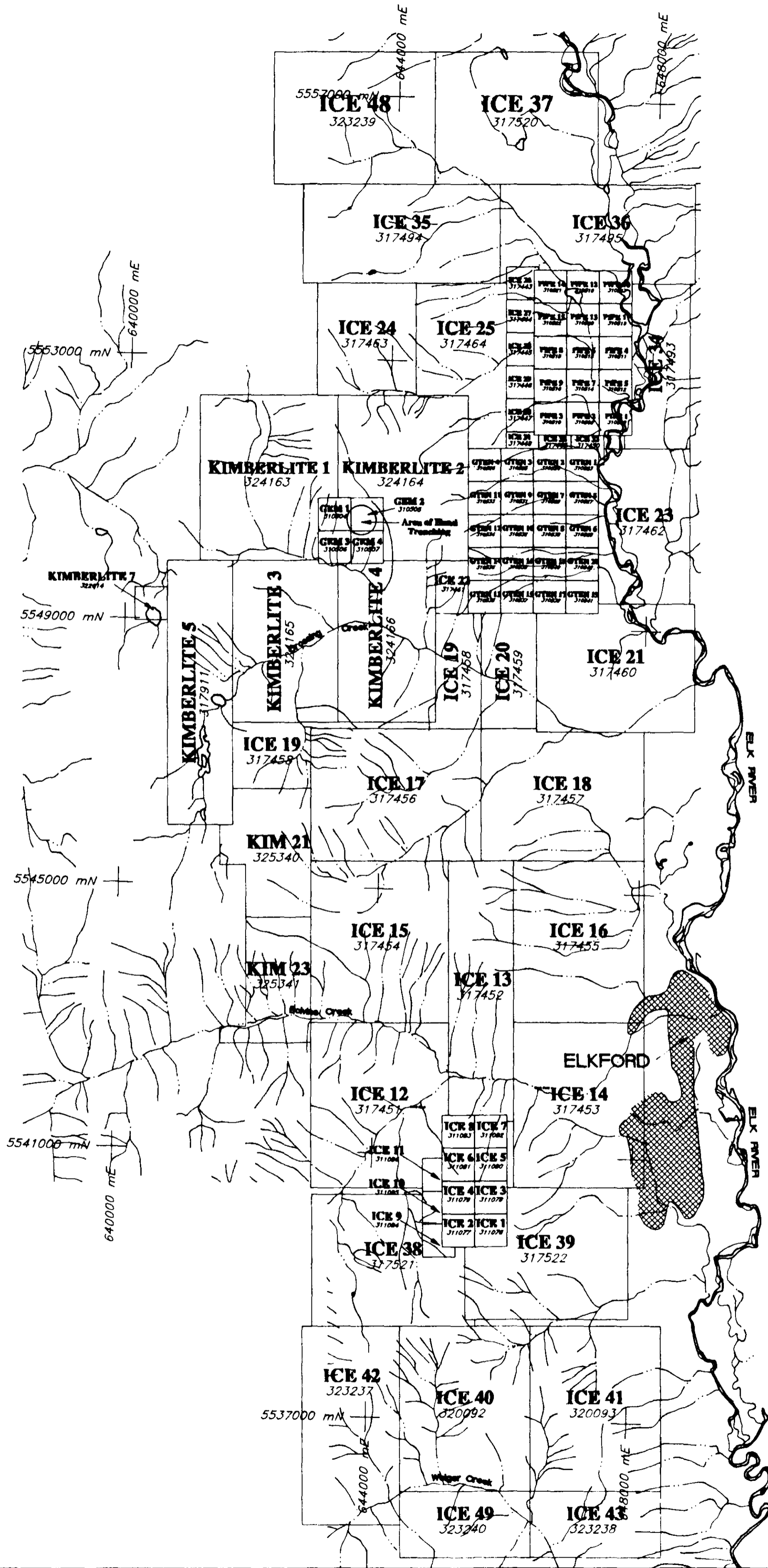


Figure Cr2O3:CaO (wt %) plot of garnets recovered from Quest Bovin C. samples.

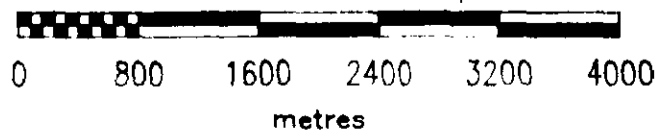


ULUPOOLUK SUKUTULI BRANCH  
 ASSESSMENT REPORT

25,576



**Quest International**  
RESOURCES CORPORATION

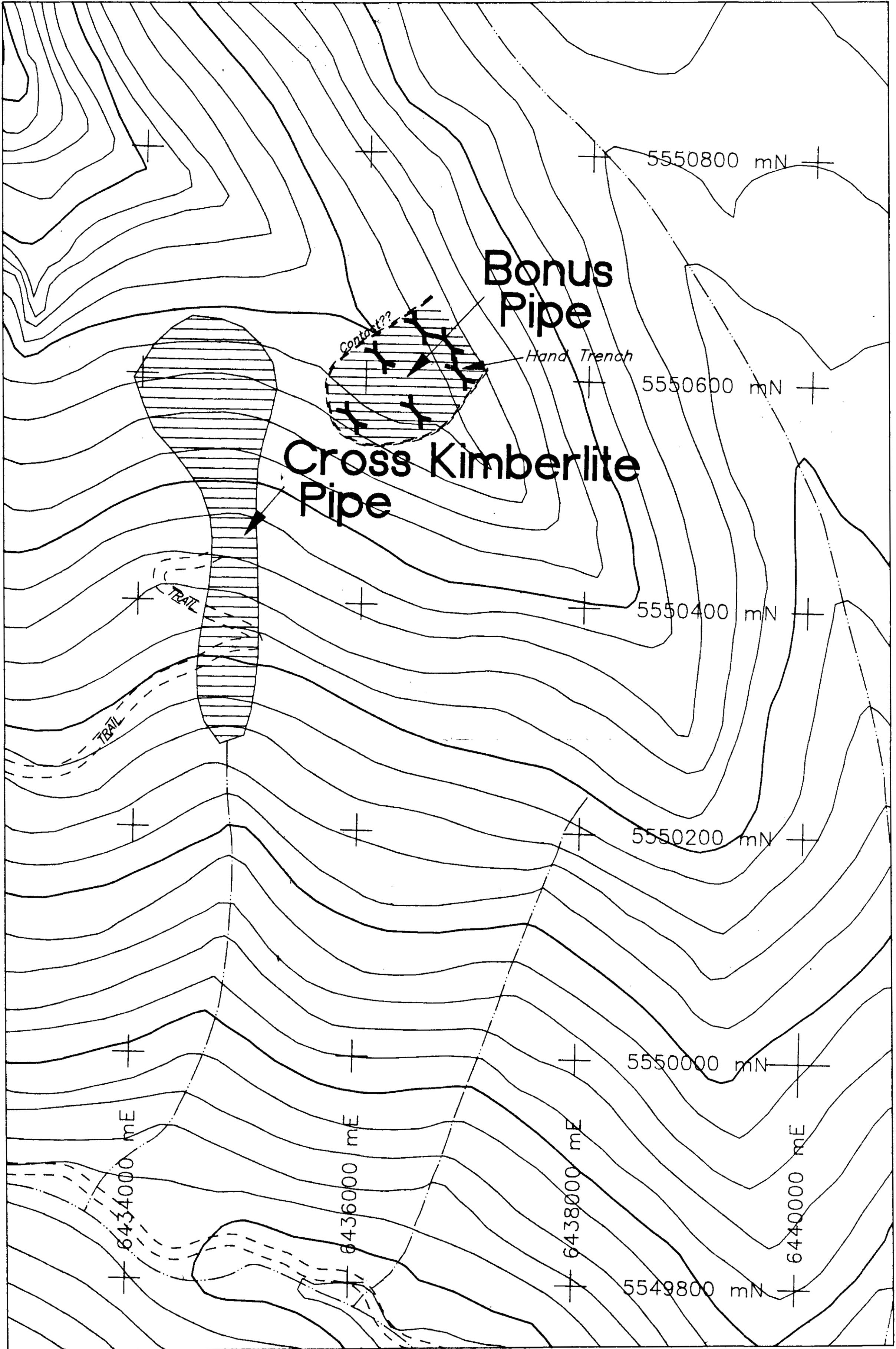


**ICE PROPERTY**  
CLAIM MAP  
Showing Location of  
1997 Hand Trenches

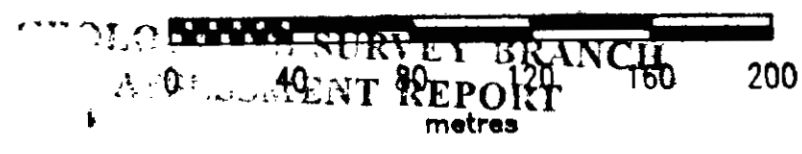
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Map Reference: NTS 82G14E, 82G15W, 82J02W, 82J03E

ICE PROPERTY/ICE/ISSUES/08  
 Leaf 25,576 of 29  
 8/21/1997

SCHEDULE A



**Quest International**  
RESOURCES CORPORATION



<b>ICE PROPERTY</b>	
Bonus Pipe Plan Showing Hand Trenchs Schedule B	
Created by: Rene Pighin 06/18/1998	Scale: 1:2500
Map Reference: TRIM 82J016, 82J006	

25,576

Last Update: 07/04/98 09:21/1998

ICE PROPERTY/QUEST

# Quest Clinopyroxenes

MINERALOGICAL SURVEY BRANCH  
MEMORANDUM REPORT

25,576

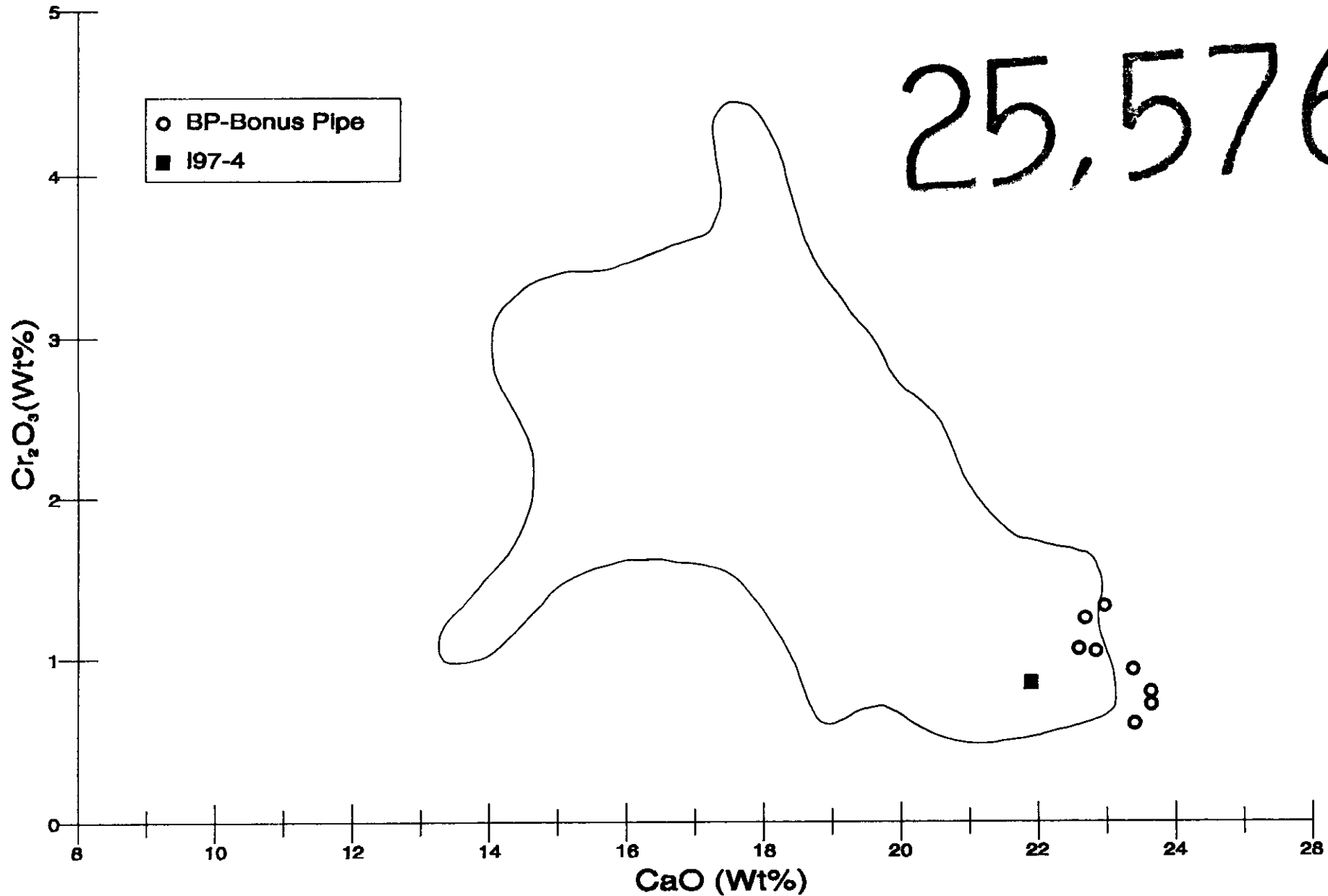
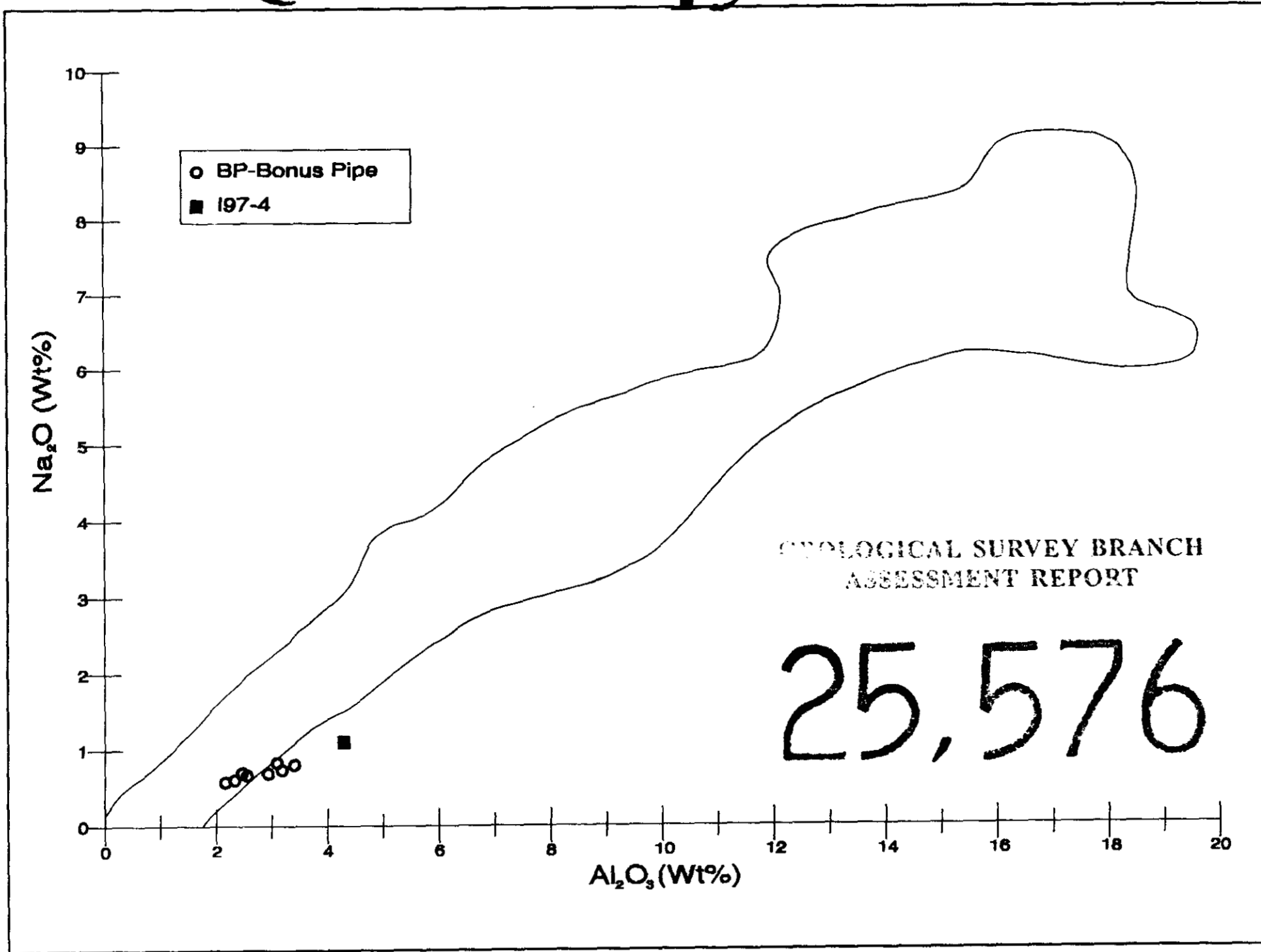


Figure 3

Cr<sub>2</sub>O<sub>3</sub>:CaO (wt %) plot of Quest Bovin Creek and Bonus Pipe clinopyroxenes (enclosed area is eclogitic diamond inclusion field)



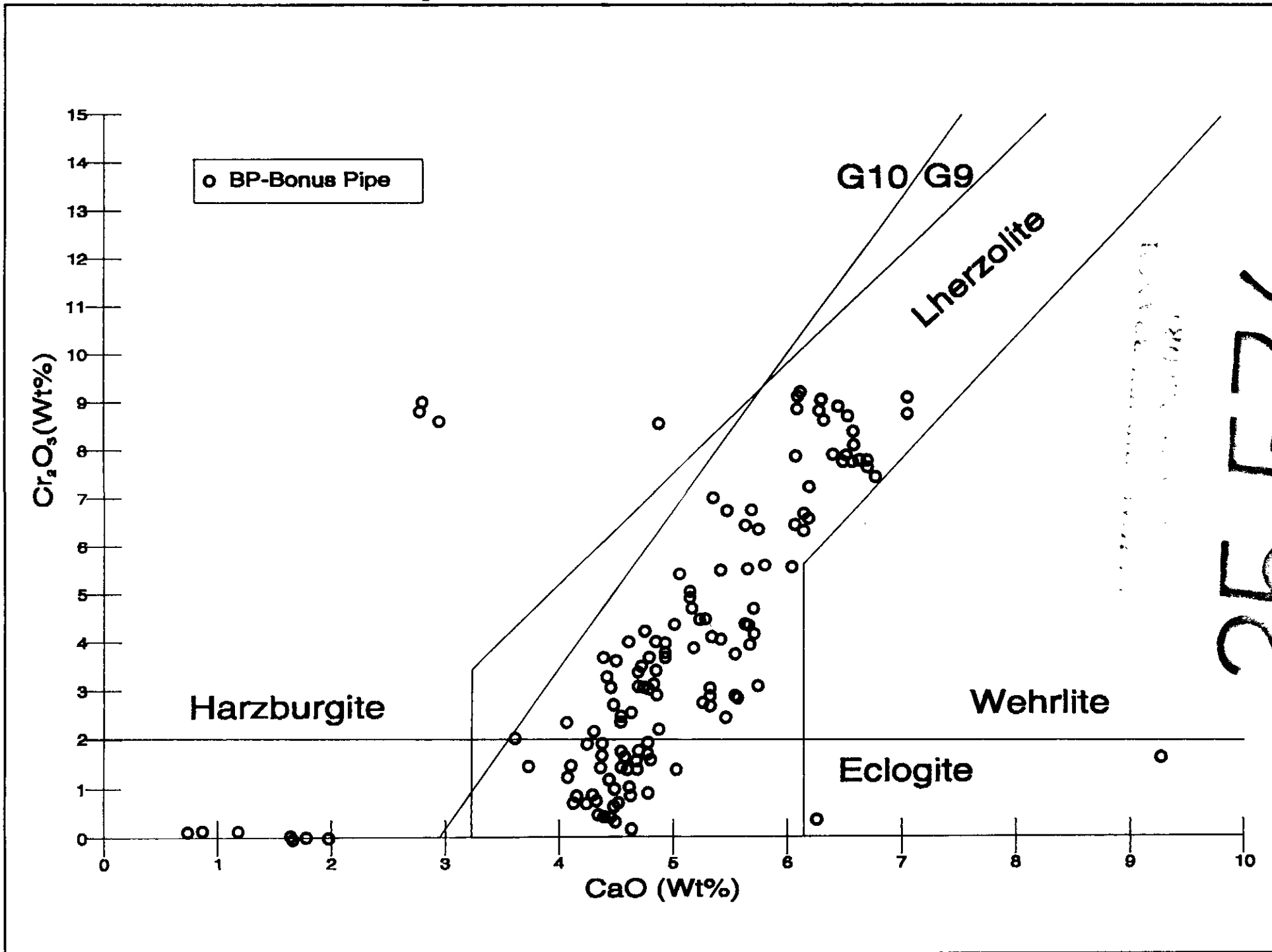
# Quest Clinopyroxenes



Na<sub>2</sub>O : Al<sub>2</sub>O<sub>3</sub> (wt %) plot of Quest Bovin Creek and Bonus Pipe clinopyroxenes (enclosed area is ecloitic diamond inclusion field)

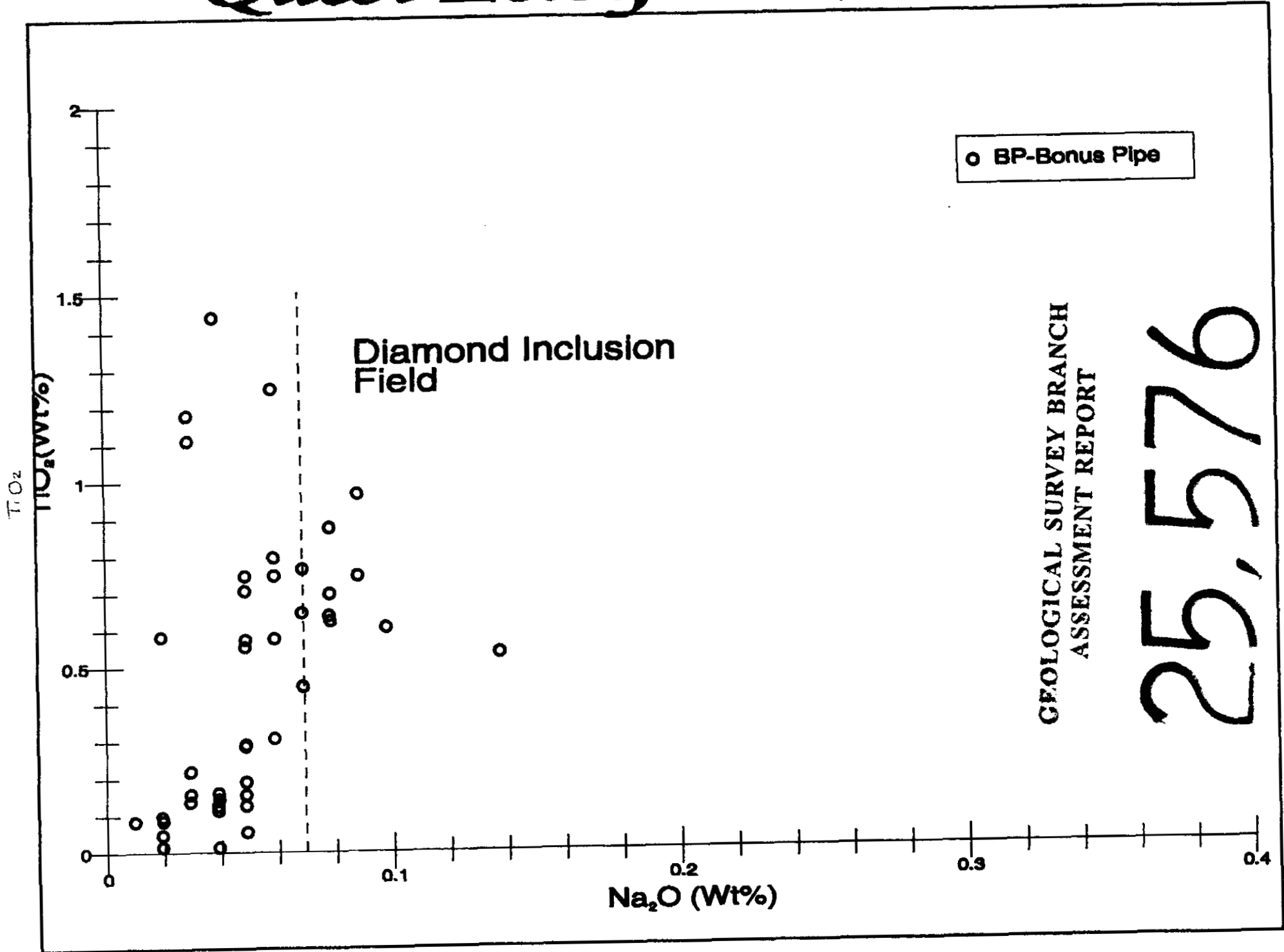
Figure 4

# Quest Garnets



Cr<sub>2</sub>O<sub>3</sub>: CaO (wt %) plot of garnets recovered from Quest Bonus Pipe samples

# Quest Eclogitic Garnets



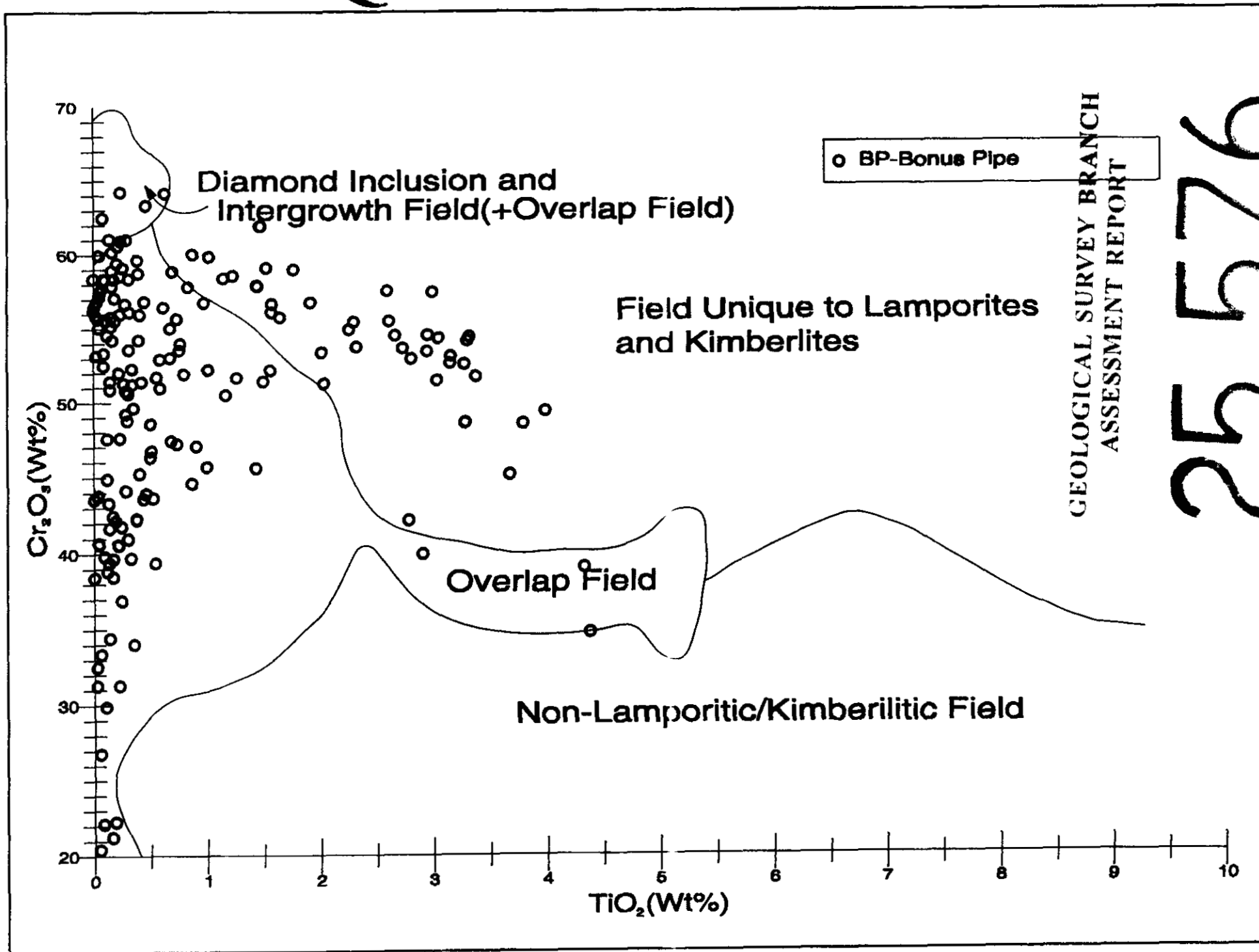
GEOLOGICAL SURVEY BRANCH  
ASSESSMENT REPORT

25,576

TiO<sub>2</sub>:Na<sub>2</sub>O (wt %) plot of garnets recovered from Quest Bonus Pipe samples

Figure 6

# Quest Chromites



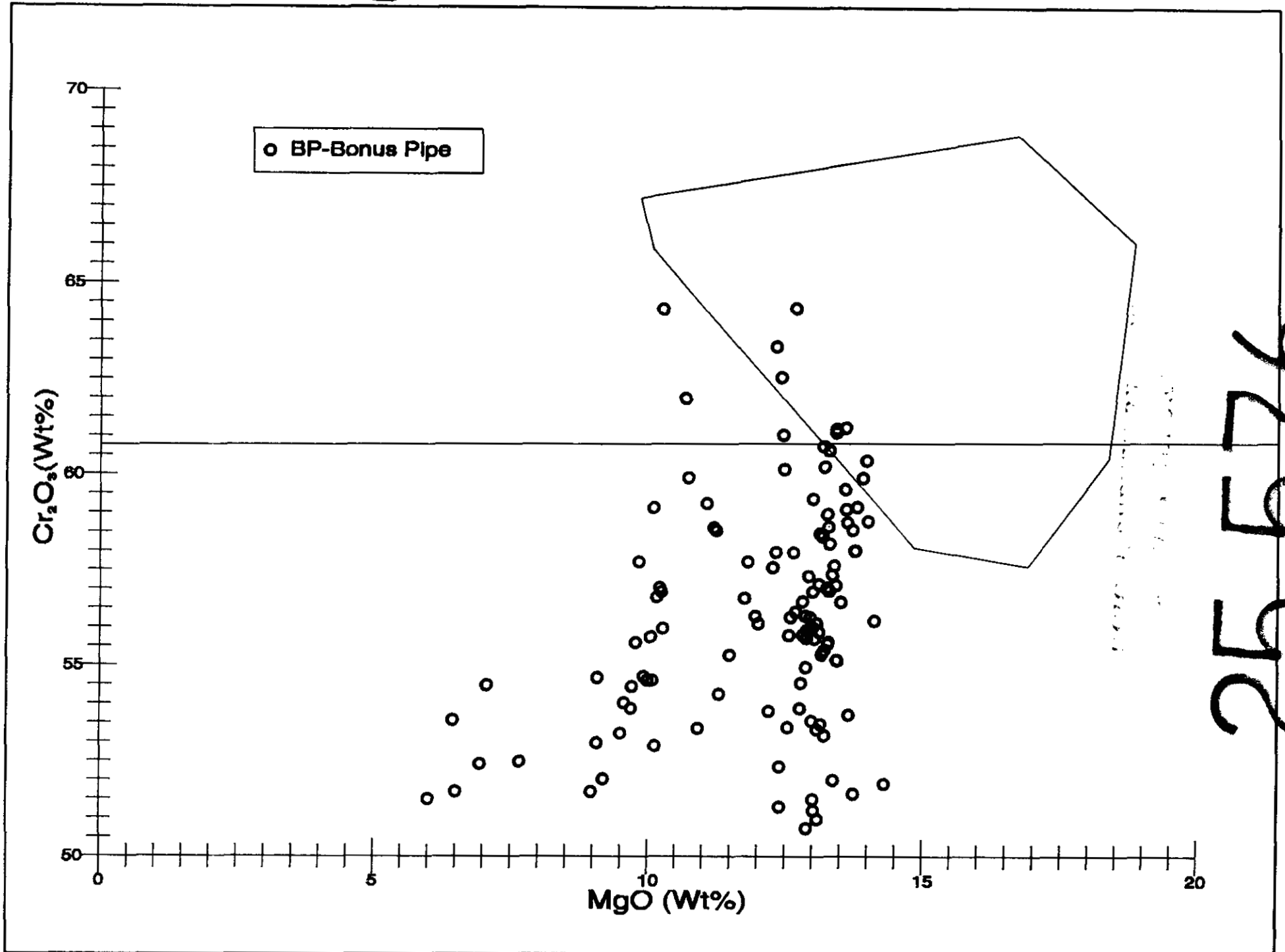
GEOLOGICAL SURVEY BRANCH  
ASSESSMENT REPORT

25,576

$\text{Cr}_2\text{O}_3$ : $\text{TiO}_2$  (wt %) plot of chromites

Figure 7

# Quest Chromites

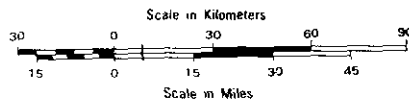


Cr<sub>2</sub>O<sub>3</sub>:MgO (wt %) plot of chromites (enclosed area is peridotitic diamond inclusion field)

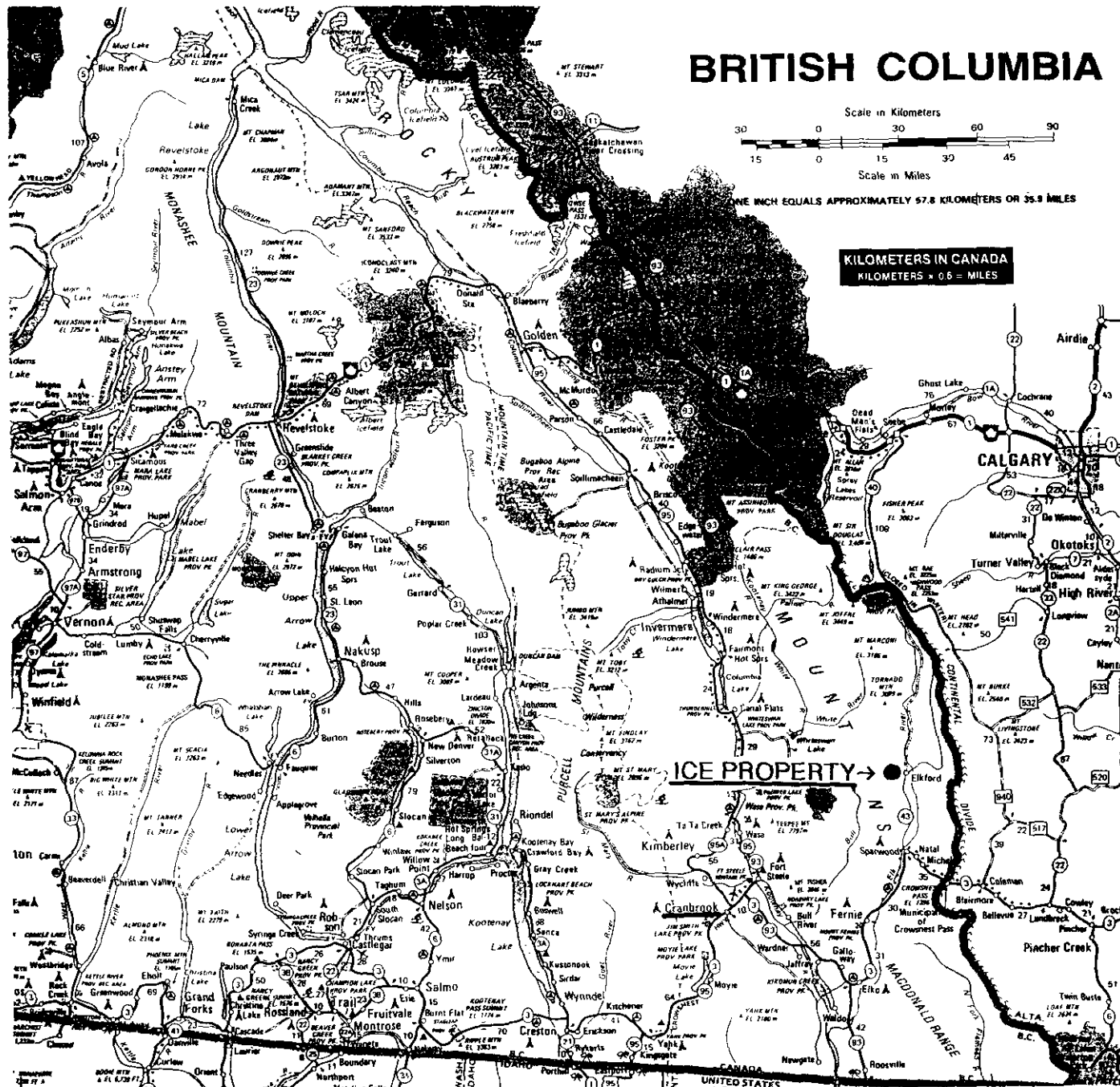
25,576

Figure 8

# BRITISH COLUMBIA



**KILOMETERS IN CANADA**  
KILOMETERS x 0.6 = MILES



## GEOLOGICAL SURVEY BRANCH ASSESSMENT REPORT



**Consolidated Ramrod  
Gold Corporation**

**25 576**  
FORT STEELE M.D.  
N.T.S. 82G/15W, 82J/2W & 3E

**ICE PROPERTY**

PROPERTY LOCATION MAP

Scale: As Shown    Date: MAR/95    Plate: 1