Table of Contents

Volume III

NWT Diamonds Project

Appendices

VOLUME III. ENVIRONMENTAL MANAGEMENT
LIST OF APPENDICES

APPENDIX III-A

Water Management Plan

NWT Diamonds Project

Appendix III-A1

Project site

OVERALL SITE WATER BALANCE

	Annual flow (m^3) 9K tpd	18K tpd	Source
TAILINGS POND			
Water In			
Net precipitation	7.15	7.15	<<EBAE>>
Tailings	3.21	6.42	<<FDWS>>
Treated sewage	0.04	0.04	<<FDWS>>
Water Out			
Raw water	3.02	6.04	<<FDWS>>
Seepage losses	0.00	0.00	<<EBAE>>
Release	3.46	2.21	<<EBAE>>
Change in Storage	3.92	5.36	<<CALC>>
PLANT SITE			
Water In			
Raw water	3 02	6 04	<<FDWS>>
Net precipitation to mill site	0 39	0.39	<<RESC>>
Ore moisture	0.56	1.15	<<FDWS>>?
Potable water	0 04	0.04	<<FDWS>>
Water Out			
Coarse tailings to waste dumps	0 07	0.17	<<CALC>>
Fine tailings to Long Lake	3.21	6.42	<<FDWS>>
Mill site runoff from sed ponds	0.39	0.39	<<CALC>>
Evaporation/spill losses	0.30	0.60	<<FDWS>>
Treated sewage	0.04	0.04	<<FDWS>>
OPEN PITS			
Water In			
Net precipitation	0 82	1 43	<<RESC>>
Groundwater inflow	0.31	0 53	<<BRUC>>
Water Out			
Ore moisture	0 56	1 15	<<FDWS>>
Waste rock moisture	0 35	0 35	<<BHP>>
Pit water	1 13	1 96	<<CALC>>
Storage Loss	-0 91	-1.50	<<CALC>>
WASTE ROCK DUMPS			
Water In			
Precipitation	2.19	4.39	<<RESC>>
Coarse tailings water	0.07	0.17	<<CALC>>
Waste rock moisture	0.35	0.35	<<BHP>>
Water Out			
Runoff	1.10	2 19	<<EBAE>>
Toe seepage	0 44	0 90	<<EBAE>>
Total out	1.54	3 09	<<CALC>>
Change in Storage	1 07	1 82	<<CALC>>

Legend:
- <<RESC>> Rescan (hydrology/meteorology analyses)
- <<FDWS>> Fluor Daniel Wright Signet (engineering studies)
- <<EBAE>> EBA Engineering (tailings management)
- <<BRUC>> Bruce Geotechnical
- <<CALC>> Calculated value

Hydrological inputs:

Precip. =	310	mm
Runoff =	180	mm
Max daily melt rate =	20	mm
Wind blown snow factor =	1.1	(apply to pit area)

Component	Panda	Koala	Pit Leslie	Fox	Misery
Groundwater inflow (m3/h).	17	7	32	21	3.1
Surface areas (m2)					
Catchment incl. pit	1 377 074	2 147 050	2 420 372	1 890 738	305 881
Max. pit area	465 940	355 342	843 930	578 622	305 881
Catchment excl. pit	911 134	1 791 708	1 576 442	1 312 116	0
Annual inflow (m3).					
Direct precip.	158 886	121 172	287 780	197 310	104 305
Runoff	164 004	322 507	283 760	236 181	0
Net precip	322 890	443 679	571 540	433 491	104 305
Groundwater seepage	148 920	61 320	280 320	183 960	27 156
Total inflow	471 810	504 999	851 860	617 451	131 461
Max daily inflow (m3)	27 541	42 941	48 407	37 815	6 118
Max daily inflow (USgpm)·	5 060	7 889	8 893	6 947	1 124

Total net precip	1 875 905
Total seepage	701 676
Total pit water	2 577 581
% net precip	72.8
% seepage	27.2

Yrs	Net pre.	Seepage

0-9	820 175	306 784
10-25	1 423 627	532 503

Dewatering flows by year

					Yr.	Total
471 810	0	0	0	0	0	471 810
471 810	0	0	0	0	1	471 810
471 810	0	0	0	131 461	2	603 271
471 810	0	0	0	131 461	3	603 271
471 810	504 999	0	0	131 461	4	1 108 270
471 810	504 999	0	0	131 461	5	1 108 270
471 810	504 999	0	617 451	131 461	6	1 725 721
471 810	504 999	0	617 451	131 461	7	1 725 721
471 810	504 999	0	617 451	131 461	8	1 725 721
471 810	504 999	0	617 451	131 461	9	1 725 721
471 810	504 999	851 860	617 451	131 461	10	2 577 581
471 810	504 999	851 860	617 451	0	11	2 446 119
471 810	504 999	851 860	617 451	0	12	2 446 119
471 810	504 999	851 860	617 451	0	13	2 446 119
471 810	504 999	851 860	617 451	0	14	2 446 119
471 810	504 999	851 860	617 451	0	15	2 446 119
471 810	504 999	851 860	617 451	0	16	2 446 119
471 810	504 999	851 860	617 451	0	17	2 446 119
471 810	504 999	851 860	617 451	0	18	2 446 119
471 810	504 999	851 860	617 451	0	19	2 446 119
471 810	504 999	851 860	617 451	0	20	2 446 119
0	0	851 860	0	0	21	851 860
0	0	851 860	0	0	22	851 860
0	0	851 860	0	0	23	851 860
0	0	851 860	0	0	24	851 860
0	0	851 860	0	0	25	851 860
				Avg. Yrs 0-9	=	1 126 959
				Avg Yrs 10-25	=	1 956 130

of Co

Rock movement by pit
All figures in 10^3 tonnes

	Ore						Waste					Totals		
Year	Panda	Misery	Koala	Fox	Leslie	UG	Panda	Misery	Koala	Fox	Leslie	Ore	Waste	Rock
0							5112						5112	5112
1	1917						26336					1917	26336	28253
2	3285						30674	8200				3285	38874	42159
3	3285						30674	9800				3285	40474	43759
4	2738	547					10906	12000	12652			3285	35558	38843
5	1833	548	904				1779	12050	23297			3285	37126	40411
6		548	1824			913		12100	8875	16443		3285	37418	40703
7		547	1826			912		12200	5094	20000		3285	37294	40579
8		547	1825			913		12100	3078	23001		3285	38179	41464
9		547	2546			730		7300	980	24999		3823	33279	37102
10		159	923	3854	904	730		20	88	20000	17500	6570	37608	44178
11				2774	2701	1095				20000	18500	6570	38500	45070
12				2500	2975	1095				20000	18500	6570	38500	45070
13				2500	2975	1095				20000	18500	6570	38500	45070
14				2500	2975	1095				20000	18500	6570	38500	45070
15				2500	2975	1095				19999	18500	6570	38499	45069
16				3285	2372	913				19999	18500	6570	38499	45069
17				3285	2373	912				20000	18500	6570	38500	45070
18				3285	2372	913				11558	26943	6570	38501	45071
19				3285	2373	912				5288	32000	6570	37288	43858
20				482	5428	660					35000	6570	35000	41570
21					6570						23557	6570	23557	30127
22					6570						30000	6570	30000	36570
23					6570						25000	6570	25000	31570
24					6570							6570		6570
25					5666							5666		5666
Totals	13058	3443	9848	30250	62369	13983	105481	85770	54064	261287	319500	132951	826102	959053

WATERMAN.XLS
Ore & waste

Ore moisture = 15 %
Waste moisture = 1 %

Water movement by pit
All figures in 10^3 m3

Year	Ore						Waste					Totals		
	Panda	Misery	Koala	Fox	Leslie	UG	Panda	Misery	Koala	Fox	Leslie	Ore	Waste	Rock
0	0	0	0	0	0	0	52	0	0	0	0	0	52	52
1	338	0	0	0	0	0	266	0	0	0	0	338	266	604
2	580	0	0	0	0	0	310	83	0	0	0	580	393	972
3	580	0	0	0	0	0	310	99	0	0	0	580	409	989
4	483	97	0	0	0	0	110	121	128	0	0	580	359	939
5	323	97	160	0	0	0	18	122	235	0	0	580	375	955
6	0	97	322	0	0	161	0	122	90	166	0	580	378	958
7	0	97	322	0	0	161	0	123	51	202	0	580	377	956
8	0	97	322	0	0	161	0	122	31	232	0	580	386	965
9	0	97	449	0	0	129	0	74	10	253	0	675	336	1011
10	0	28	163	680	160	129	0	0	1	202	177	1159	380	1539
11	0	0	0	490	477	193	0	0	0	202	187	1159	389	1548
12	0	0	0	441	525	193	0	0	0	202	187	1159	389	1548
13	0	0	0	441	525	193	0	0	0	202	187	1159	389	1548
14	0	0	0	441	525	193	0	0	0	202	187	1159	389	1548
15	0	0	0	441	525	193	0	0	0	202	187	1159	389	1548
16	0	0	0	580	419	161	0	0	0	202	187	1159	389	1548
17	0	0	0	580	419	161	0	0	0	202	187	1159	389	1548
18	0	0	0	580	419	161	0	0	0	117	272	1159	389	1548
19	0	0	0	580	419	161	0	0	0	53	323	1159	377	1536
20	0	0	0	85	958	116	0	0	0	0	354	1159	354	1513
21	0	0	0	0	1159	0	0	0	0	0	238	1159	238	1397
22	0	0	0	0	1159	0	0	0	0	0	303	1159	303	1462
23	0	0	0	0	1159	0	0	0	0	0	253	1159	253	1412
24	0	0	0	0	1159	0	0	0	0	0	0	1159	0	1159
25	0	0	0	0	1000	0	0	0	0	0	0	1000	0	1000
Total	2304	608	1738	5338	11006	2468	1065	866	546	2639	3227	23462	8344	31806
Avg	461	87	290	485	688	165	178	96	78	189	231	938	348	1223
Yrs	5	7	6	11	16	15	6	9	7	14	14	25	24	26

Hydrological inputs:

Precip. = 310 mm

Component	Dump				Totals	
	PandaKoala	Leslie	Fox	Misery	(9K tpd)	(18K tpd)
Dump area (m2)	5 015 987	2 812 423	4 276 320	2 054 623	707	1416
Perimeter zone (m2)	1 633 140	1 276 352	1 675 920	1 198 863		
Central core (m2)	3 382 847	1 536 071	2 600 400	855 760		
Total incident precip	1 554 956	871 851	1 325 659	636 933	2 191 889	4 389 399
Surface runoff (50% precip)	777 478	435 926	662 830	318 467	1 095 945	2 194 700
Toe seepage from perimeter zone	253 137	197 835	259 768	185 824	438 960	896 563
Water frozen in core	524 341	238 091	403 062	132 643	656 984	1 298 137
Runoff + toe seepage	1 030 615	633 760	922 597	504 290	1 534 905	3 091 262

Total = 3.09 X10^6 m3 (18000 tpd; all dumps)
= 1.53 X10^6 m3 (9000 tpd; P/K & Misery only)

PLANT WATER BALANCE

Plant availability = 85%
Mine tonnage = 9000 t/d, 365 d/y

Flow	% water	Hourly Solids t/h	Water m^3/h	Yearly Solids t/y	Water m^3/y	
Plant feed						
Ore	15%	441	78	3,285,000	579,706	
Raw water	100%	0	406	0	3,019,725	
Plant outflows						
Evap/spill	100%	0	40	0	297,840	
Fine tails	55%	353	431	2,628,000	3,212,000	(80% of tails)
Coarse tails	12%	88	12	657,000	89,591	(20% of tails)

APPENDIX III-B

Materials Management Plan

NWT Diamonds Project

Appendix III-B1

APPENDIX III-B1

Ammonium Nitrate Storage and Emulsion Manufacturing Plant

B1.1 Introduction

The following report was written to address the criteria outlined by the Explosives Branch of Natural Resources Canada prior to licence issuance under EARP guidelines For the proposed mine development project, an explosives supply and distribution company with experience at large-scale mining operations in northern conditions will be contracted to provide the required blasting services and meet all regulatory approval conditions. Two prospective companies, Dyno Nobel Ltd. and Bulk Explosives Ltd , were contacted to provide the information included in this report based on their existing Canadian operations.

Most blasting will be done with ANFO at an estimated annual consumption of 10,000 to 12,000 tonnes The selected contractor will be responsible for supplying process equipment, operating the emulsion plant; providing staff for all stages of transportation, storage, reclaim and blending of explosives; delivering explosive agents to the pit; and blasthole loading.

B1.2 Location

The NWT Diamonds Project is located in the Coppermine River basin of northern Canada, approximately 300 km northeast of Yellowknife and 200 km south of the Arctic Circle. The mineral claims are northwest of Lac de Gras, in a remote region accessible only by airplane or winter road. The nearest community, Snare Lakes, is 180 km to the west Yellowknife is the closest urban centre.

As can be seen on Figure B1-1, the proposed mine site lies above the treeline in an area characterized by low relief and continuous permafrost The surface is covered by numerous lakes, the nearest of which is less than 500 m from the AN storage and emulsion plant.

Most of the proposed mine development will be centred around Koala Lake, with a satellite development at Misery Lake, approximately 29 km to the southeast. The project will involve five open pit mining operations - Panda, Misery, Koala, Fox and Leslie - and further underground mining of Panda and Koala.

B1.3 Description of Process

Of the five primary stages of explosives processing - transportation, storage, retrieval, emulsion manufacturing and blasthole delivery - three will be based at the AN storage and emulsion plant site These stages are discussed below in

◎ Table of Contents

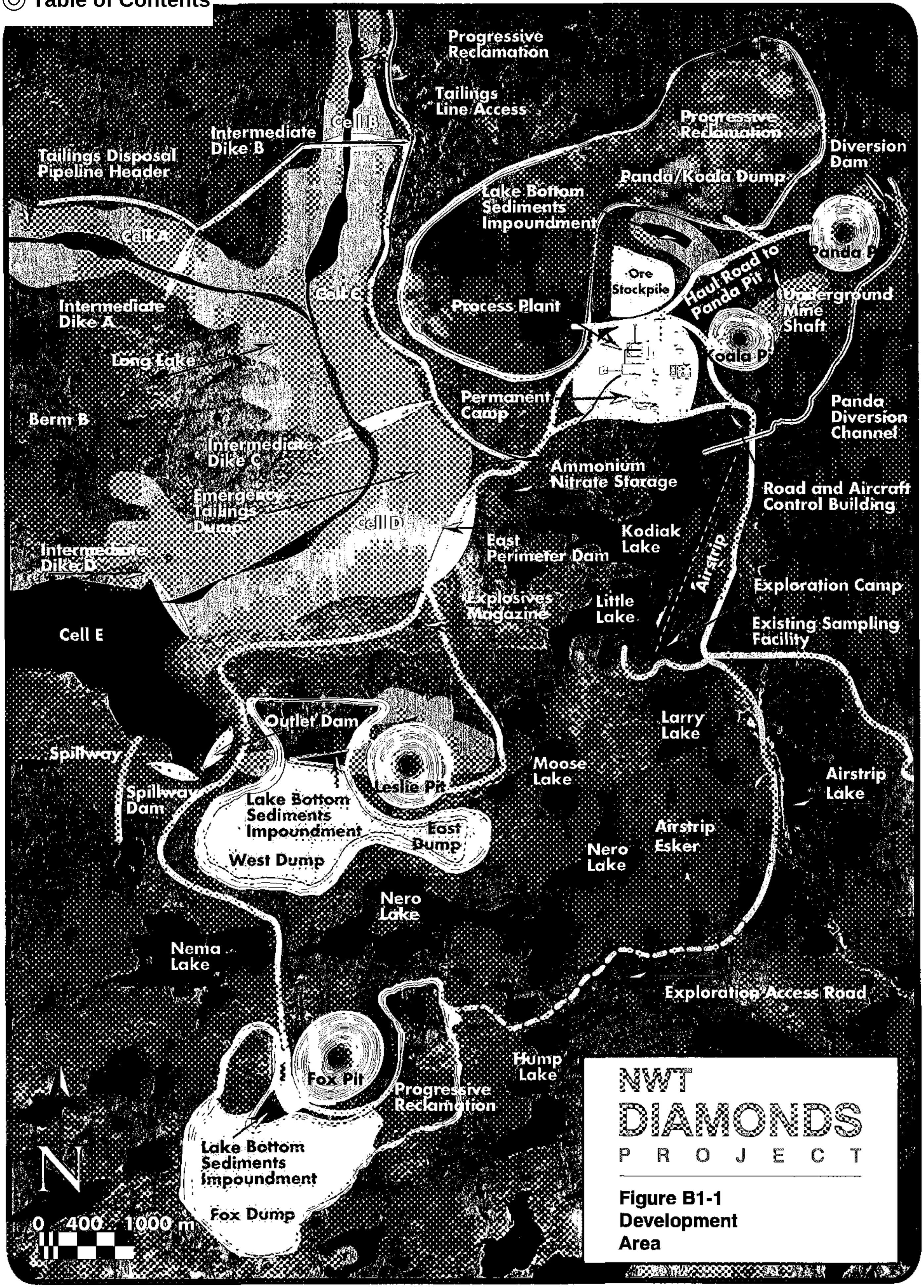


Figure B1-1
Development
Area

conjunction with Figure B1-2, which details the various stages of explosives processing

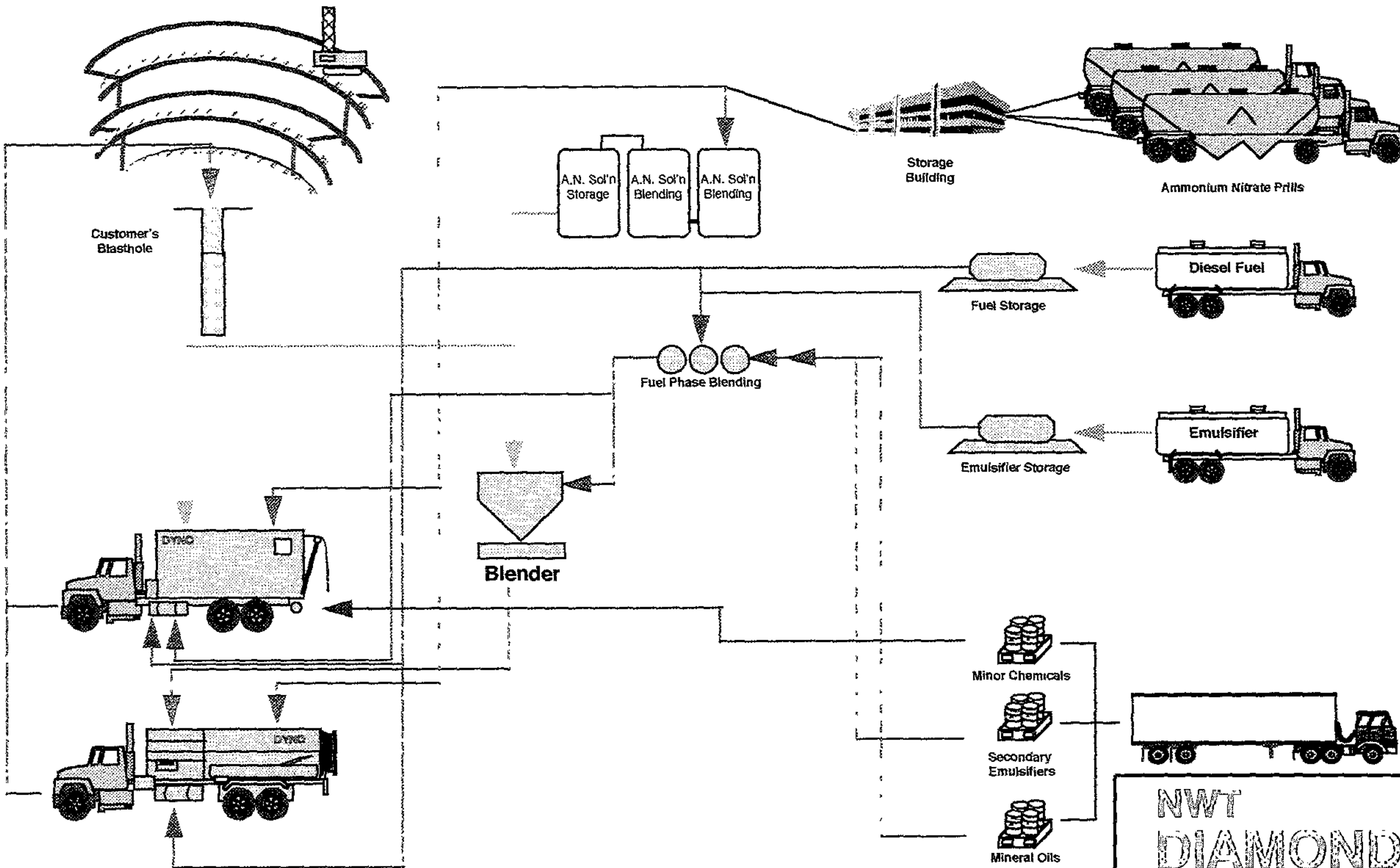
For this project, the transportation, storage, manufacture and detonation of explosives used in both open pit and underground mining operations will be carried out in full compliance with the following government acts and regulations

- Canadian Labour Code
- Federal Controlled Products Act
- Fedeıal Environmental Protection Act.
- Federal Explosives Act
- Federal Government Organization Act - EARP Guidelines Order
- Federal Hazardous Products Act
- Federal National Fire Code
- Federal Transportation of Dangerous Goods Act
- GNWT Mining Safety Act
- Territorial Fire Prevention Act
- Territorial Industrial Health and Safety Regulations
- Territorial Labour Standards Act
- Territorial Workers Compensation Act

B1.3.1 Transportation

The annual ammonium nitrate requirements, estimated to be 12,000 tonnes, will be delivered in the form of prills by bottom-dump highway trucks over the winter road and stored 1 1 km southwest of the process plant in a facility built solely for this purpose

At the storage facility, the AN prill will be dumped into one of two inground hoppers, after which it will be elevated by bucket elevator and gravity fed into the storage building. Covered unloading areas with concrete flooring will provide shelter from the elements and contain the AN dust This will aid in clean up and reduce fugitive AN migration



NWT DIAMONDS PROJECT

Figure B1-2
Explosives Process Block Flowsheet

Some ingredients will be transported in drums on pallets. Emulsifier and wax will be transported in bulk tanks. The estimated annual consumption of bulk explosive ingredients is provided on Table B1-1

B1.3.2 Storage

The bulk explosives to be stored and manufactured on site will consist of two basic products the primary blasting agent will be bulk ANFO, which is a combination of prilled ammonium nitrate and fuel oil. The other product, bulk emulsion, is a highly water resistant explosive manufactured from liquid ammonium nitrate.

Table B1-1
Annual Consumption of
Bulk Explosive Ingredients

Ingredient	Estimated Annual Consumption
Ammonium Nitrate Prill	12,000 t
Fuel Dye	500 L
Fuel Oil	840,000 kg
Granular Aluminum	12,000 kg
Emulsion Minor Ingredient	24,000 kg
Organic Emulsifier	175,000 kg
Soda Ash	2,000 kg
Sodium Nitrite	12,000 kg
Sulphuric Acid	1,000 L
Slack Wax	75,000 kg
Zinc Nitrate	70,000 kg

Drum storage will be located in a designated section of the AN storage building. Emulsifier and wax, transported in bulk tanks, will be stored in a bermed tank farm located in the emulsion plant. Because permanent solid waste and container handling is reduced, bulk tankage is more efficient and reduces negative environmental impacts.

B1.3.3 Retrieval

Inside the AN storage building, the prill will be moved by front-end loader into a bucket elevator and lifted to an overhead storage silo. From the silo, the prill can be loaded directly into explosives delivery trucks or fed to the AN solution tank for melting into AN liquor. This liquor will be pumped through a pipeline to the emulsion manufacturing plant, located 76 m away.

B1.3.4 Emulsion Manufacturing

The AN liquor, after being pumped from the AN storage building, is then stored in a heated solution tank and used as required in the manufacture of emulsion matrix. The fuel and emulsifiers are also piped directly from storage tanks and mixed with the AN liquor in proper amounts to form the emulsion matrix. The emulsion matrix will subsequently be pumped into an overhead storage tank to allow gravity loading of the bulk explosives delivery vehicles

Underground mining operations will also be supplied with bulk explosives from the explosives manufacturing plant. A separate system encompassing the manufacture, distribution and loading of repumpable bulk emulsion will be available when the underground work begins.

Quality Control

An explosives manufacturing laboratory in the plant will ensure that rigid quality control standards are met during all aspects of the manufactuing process. From the receipt of raw materials to the final discharge of finished product down the borehole, equipment and procedures will be maintained in full compliance with government standards All bulk storage tanks will be constructed in compliance with the National Fire Code requirements. Tanks, pumps and hoses used in the transfer and/or storage of deleterious liquids will be securely contained.

The selected manufacturing system will provide a plant-manufactured emulsion for the blasting products as opposed to a truck-manufactured product on the bench. There are several advantages to this choice, which are as follows·

- superior quality of finished product as a result of better quality control
- ability to monitor both the raw ingredients and the emulsion matrix before it is loaded in a borehole
- extremely cold temperatures during winter months can create hydiaulic and mechanical problems that will not be experienced by a manufacturing system housed in a heated plant
- ability to manufacture and store emulsion ahead of time for use in sudden demand or high demand situations
- less chance of human error in plant-manufactured product due to the controlled plant environment
- large batches can be manufactured as opposed to small truck-manufactured batches This generates less waste and produces a superior product as a result of less starting/stopping of equipment

B1.3.5 Blasthole Delivery and Loading

Depending on the type of explosives required, loading fiom overhead storage tanks will be from the AN silo or the emulsion tank Overhead truck loading greatly reduces both turn-around and loading times. After loading, the explosives product will be delivered to the open pit blastholes in dedicated, contractor-provided trucks.

Blasthole delivery trucks will have a capacity of 22 tonnes and be capable of mixing and distributing straight ANFO for dry holes and any ratio of ANFO/emulsion mix for wet holes. The ANFO/emulsion mix series of products are auger delivered and can be loaded into boreholes at rates up to 1000 kg pei minute. Straight emulsion products will be pumped into boieholes at approximately 300 kg to 500 kg per minute

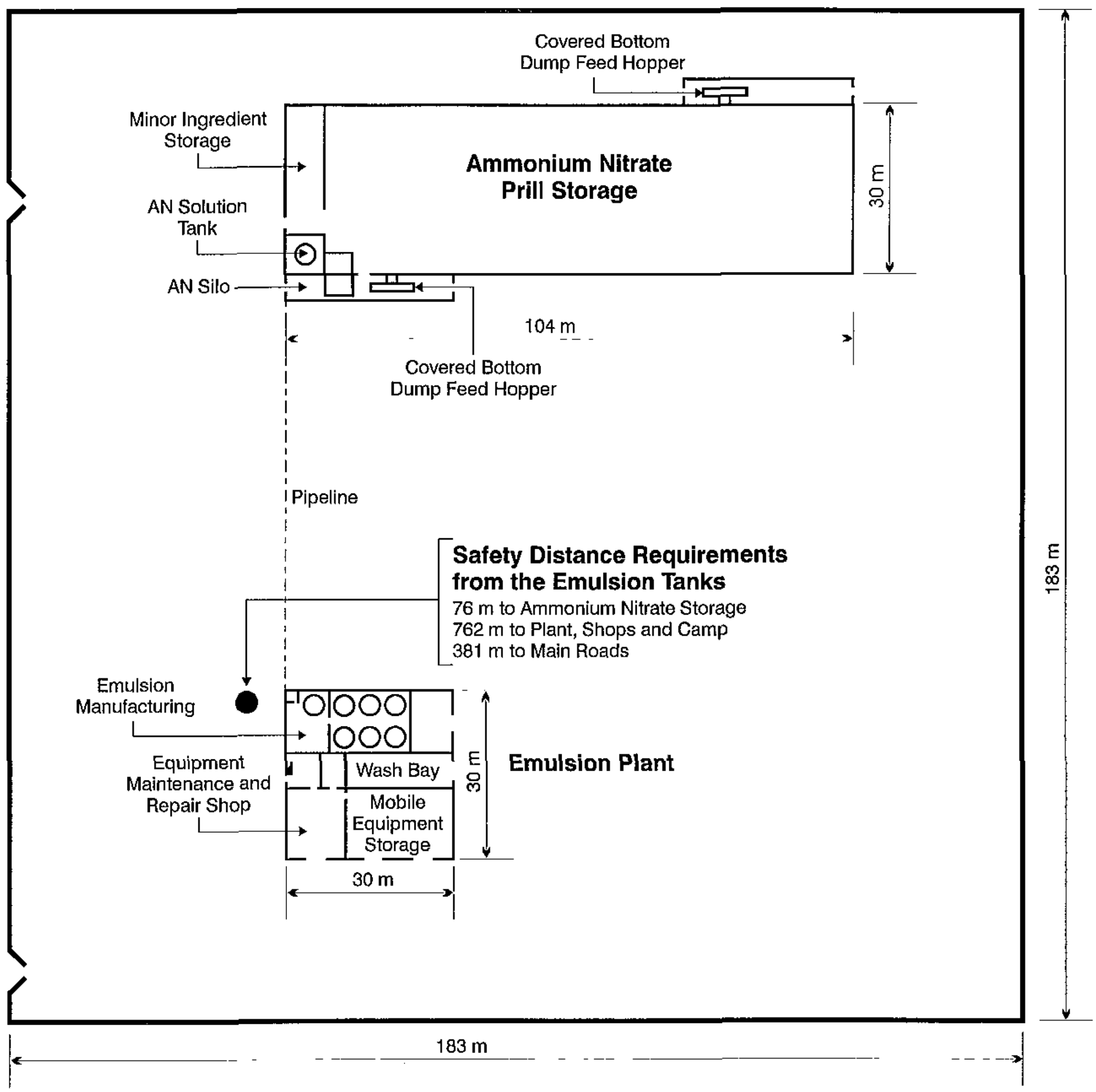
Explosives product delivery trucks are considered to be the most suitable type of delivery vehicle for use at this location due to their ability to deliver product mix for any situation that may arise. This will improve prill quality, facilitate safe handling and reduce environmental risk.

B1.3.6 Infrastructure

At a distance of 1.1 km west of the permanent plant, a site has been allocated for ANFO storage and manufacturing facilities. The plots will be leveled and graded to drain to a perimeter ditch and catchment basin The facilities will be serviced with power, water, telephone, sewage and diesel fuel systems Figure B1-3 details the site plan for the AN storage and emulsion plant.

The ammonium nitrate and storage building will be a minimum of 76 m away from the emulsion plant, 762 m from the main plant, shops and camp, and 381 m from the main roads in accordance with the British Table of Distance specifications for explosive storage sites of this capacity The storage building will have concrete flooring and be 30 m x 100 m in size in order to withhold up to 15,000 tonnes of ammonium nitrate (AN) prill.

A manufacturing and emulsion plant will be constructed adjacent to the AN storage facility in compliance with safe distance regulations. The manufacturing plant will have sufficient space to accommodate tanks, a mixing system, transfer bins and delivery vehicles for the future underground explosives requirements. A typical plant layout of this size would require, at any given time, 5 employees (1 supervisor, 1 plant operator and 3 operators) and 8 units of mobile equipment (four 22-tonne explosive mix transport trucks, one front-end loader, one forklift, one crew cab pickup truck and one standard cab pickup truck) Included in this building will be mix units, an office, lunch room, wash bay and boiler room, as well as heated parking and a repair facility for the trucks.



Utility Requirements

Electrical Power	600 Volts 400 Amps
Product Fuel	1 1 million L/a
Truck Fuel	18 L/h
Boiler Fuel	900 L/d
Water Intake	4 3 m^3/d
Water Discharge	1 5 m^3/d

Mobile Equipment

4 x Explosives Mix & Transport Trucks 22 t
1 x Front-end Loader
1 x Forklift
1 x Crew Cab 4x4 P.U
1 x Standard Cab 4x4 P.U

Manpower

1 x Supervisor
1 x Plant Operator
3 x Operators

NWT DIAMONDS PROJECT

Figure B1-3
Ammonium Nitrate Storage Area Site Plan

Source Modified from Bulk Explosives Ltd

Because the project's life expectancy is approximately 25 years, the plant has been designed for long-term use, high efficiency in materials handling to minimize work force requirements and high output for peak demand The plant will meet all current and anticipated environmental regulations. Comparable structural designs have been successfully used in the past at other remote locations.

As shown on Figure B1-1, a separate explosives magazine site for packaged products such as cartridge explosives, primers and detonating cord will be located 1 km southwest of the AN storage building and emulsion plant. These materials will be stored in 2.5 m wide x 6.0 m long shipping containers that stand 1.3 m off the ground. Detonator storage houses for non-electric detonators and blasting caps will also be provided at a minimum and safe distance of 50 m from the magazines

B1.4 Waste, Effluents and Emissions

The primary explosives plant effluent - washdown water - will be collected in a sump at the plant and periodically disposed of in the tailings pond containment. The actual volume of waste water handled per year is estimated to be 720,000 L (60 L/t of explosive produced)

There is typically an AN concentration of 500 mg/L in washdown water, although this figure can be subject to seasonal fluctuation. The total range of generated ammonium nitrate in plant effluent is 0.15 kg/t to 0.33 kg/t of produced explosive. Based on this average, a plant producing 12,000 tonnes of explosives per year will produce 2,862 kg of ammonium nitrate in the waste water A small amount of hydrocarbon is also present in waste water It is estimated that a rate of 7 2 kg/a of hydrocarbons will be produced for a plant of this size.

Clean waste oils of various quantities from plant and operations equipment will either be used as fuel for the incinerators and warming shed heaters or consumed in the ANFO emulsions. All waste oil collection tanks will be stored in bermed containments.

Waste management at the explosives manufacturing site will be reviewed and improved continuously through point-of-source segregation, better storage, on-site recycling and reduced consumption by applying innovative manufacturing technologies. A waste generation permit to dispose of nitrate waste will be obtained and kept up to date.

B1.4.1 Water Supply and Distribution

All water will be obtained and distributed through heat traced pipelines from the potable water system at the main plant. Water collection in sumps at the plant site will be periodically pumped out and disposed of in the tailings pond.

B1.5 Plans and Audits

B1.5.1 Construction Plans and Scheduling

The construction phase can be divided into the following stages:

Year 1 (1996)

- obtain all licences and permits prior to commencing site work
- acquire or fabricate the silo, all tanks and the explosives trucks in southern Canada
- purchase two bucket elevators, a boiler, forklift and front-end loader
- purchase electrical supplies and all building components
- fabricate building components for assembly on site
- marshal and ship all material on winter road.

On-site construction will commence at the beginning of the 3rd quarter 1996, with site preparation, concrete footings and building erection The construction period will last approximately 24 weeks assuming no time delays occur due to equipment shortages, unavailability of concrete, etc. The construction crew size will initially consist of 10 men and one supervisor, build to 16 men and one supervisor and then decrease as the buildings are erected and only interior construction remains.

Raw materials can be accommodated in the structure by the 4th quarter of 1996.

B1.5.2 Operational Procedures

Well-established operational, emergency and quality control procedures will be used at all on-site explosives operations. The contractor will provide clearly defined specifications for all raw materials, in-process solutions and finished products that are delivered to the borehole. Laboratory testing equipment will be provided at the plant site to ensure that the finished product meets specifications, the equipment will be calibrated regularly. Product samples will be retained until the relevant blast has been shot. Results of all quality control tests, equipment calibrations and product analyses will be recorded and kept on file

To this end, operating manuals will be provided by the contractor containing raw material storage and handling requirements, safety, emergency and operating procedures, formulations, quality control specifications and testing procedures.

B1.5.3 Emergency Procedures

The explosives contractor selected for the project will be required to provide a comprehensive safety, health, and environmental compliance program, which will be strictly enforced in the execution of contract obligations A typical program would cover, but not be limited to: 1) safety, health and the environment, 2) safe work practice, 3) environmental responsibility and 4) the process of developing environmental procedures Proposed emergency procedures will adhere to federal Licensing and Government of the Northwest Territories (GNWT) Mining Safety regulations. Training and reviews of Safe Work Procedures, WHMIS, the Transportation of Dangerous Goods Act and Regulation, Spill Reporting and Environmental Responsibility will be conducted continuously throughout the year. This will include safety meetings, monthly inspections and quarterly management audits.

Based on information provided by explosives contractors, responsible care for the health and safety of employees and the environment will be reinforced with the implementation of site-specific Emergency Response Plans (ERP), which cover communication protocol, fire fighting, spill abatement and cleanup, and evacuation plans. A second emergency plan, the Transportation Emergency Response Plan (TERP), would be in place to coordinate a response to an emergency situation outside the mine property This plan would be registered with Transport Canada under the Transportation of Dangerous Goods Act and Regulations.

A plan and procedure will be in place for handling all environmental releases, including storage tank failure, spills from product delivery trucks, spills from raw material delivery trucks, process spills and fire. The following materials will be covered by this procedure:

- Nitrate Solution
- Ammonium Nitrate and Sodium Nitrate Prill
- Mineral Oil
- Sodium Nitrite
- Emulsifier Agents
- Emulsion
- Fuel Oil
- ANFO
- Nitric Acid
- Sodium Thiocyanate
- Granular Aluminum

All spill procedures will specify method of cleanup, protective clothing and method of disposal Cleanup equipment will include, but not be limited to, the following

- absorbent pads for oil spills
- 5 and 45 gallon drums for liquid waste or contaminated soil
- sand
- two overpak drums for leaking drums
- soda ash
- inert adsorbent material

A station containing equipment for the containment and cleanup of any oil, lubricant and glycol spills will be established in the plant site area. All staff involved in fuel handling will be trained in fuel transfer, handling and storage, spill response and reporting procedures

Preventive Measures

Practical training in overall safety and environmental programs will be conducted by plant supervisors and foremen. The following list is a sample of topics that will be taught to all employees:

- Safe practices at the blast site - this involves vehicle safety and mix truck operation as well as personalized procedure training.
- Workplace hazardous materials information system (WHMIS) - this will address chemical hazard awareness, personal protective equipment and occupational hygiene.
- Transportation of Dangerous Goods (TDG) - manuals, classroom instruction and examination and review of emergency procedures will be taught.
- Emergency Response Preparedness (ERP) - individuals will be instructed in spill response procedures and practical drills
- Confined space entry - education will include regulations and safe entry; practical drills will be conducted.
- Lock-out procedures - this will address procedures and practical drills.
- General safety education - this will include chemical, eye, hearing, back and driving safety, shop safety, safe work permits, respiratory protection, equipment guards and welding and grinding safety

B1.5.4 Decommissioning Plans

Decommissioning plans, which will be developed in conjunction with the selected contractor, will comply with all the CCME National Guidelines for Decommissioning Industrial Sites as well as GNWT regulations.

B1.5.5 Environmental Audit

The explosives contractor is expected to develop an environmental planning and implementation process through which potential problems will be identified and mitigative action taken on a site-specific basis An environmental assessment audit will be conducted to identify areas for possible improvement. Information retrieved from the audit will help to implement a productive program for establishing environmental guidelines and procedures

Accountability will be achieved through ongoing education and by monitoring all work procedures involved in the efficient delivery of products Equipment and procedural standards will be maintained in full compliance with government standards from the receipt of raw materials to the final discharge of finished product down the borehole

APPENDIX III-C

Waste Management Plan

Appendix III-C1

PROJECT: NWT Diamonds Project
CLIENT. BHP Diamonds Inc.
DATA TYPE: ABA Data for Koala Pipe Rock Samples
ROCK TYPE: Koala Pipe - Granite
COMMENTS: Analyses were performed by Brenda Process Technology, Kelowna , BC.

Sample	Paste pH	% S Total (%)	% S SO(4) (%)	% S Sulphide (%)	TAP (CaCO(3) t/1000 tonne	SAP (CaCO(3) t/1000 tonne	% CO(2) Inorganic (%)	NP (CaCO(3) t/1000 tonne	CaNP (CaCO(3) t/1000 tonne	% (CaNP/NP)	NNP (CaCO(3) t/1000 tonne	RNNP (CaCO(3) t/1000 tonne	SNNP (CaCO(3) t/1000 tonne	NPR	SNPR	CaNP/ SAP
Upper Limit	14	100.00	100.00	100.00	N/A	N/A	100	1000.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Detection Limit	0	0.01	0.01	0.01	N/A	N/A	0.2	-1000.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
KDC - 03 - 60@	9.68	0.070	*0.005*	0.065	2	2		13.5			11		12	6.19	6.66	
KDC - 03 - 480	10.16	0.070	*0.005*	0.065	2	2		14.6			12		13	6.69	7.21	
KDC - 04 - 180	9.73	0.030	*0.005*	0.025	0	0		14.4			14		14	100.00	100.00	
KDC - 05 - 50	9.39	0.040	*0.005*	0.035	0	0		9.2			9		9	100.00	100.00	
KDC - 05 - 328	9.57	0.070	*0.005*	0.065	2	2		14.4			12		12	6.57	7.07	
Maximum Value	10.16	0.070	*0.005*	0.065	2	2	0	14.6	0	0	14	0	14	100.00	100.00	0
Minimum	9.39	0.030	*0.005*	0.025	0	0	0	9.2	0	0	9	0	9	6.19	6.66	0
Average Value	9.71	0.056	*0.005*	0.051	1	1	0	13.2	0	0	12	0	12	43.89	44.19	0
Standard Deviation	0.26	0.017	0.000	0.017	1	1	0	2.1	0	0	2	0	2	45.81	45.57	0
Count	5	5	5	5	5	5	0	5	0	0	5	0	5	5	5	0

TAP = % S (Total) * 31.25
Note: TAP = 0 if % S (Total) < 0.05
% S (Sulphide) = % S (Total) - % S (SO(4))
HAP = (% S (Sulphide) + % S (del if > 0)) * 31.25
SAP = % S (Sulphide) * 31.25
Note: SAP = 0 if % S (Sulphide) < 0.05
CaNP = (% CO(2) / 44.01) * 100.09 * 10

NNP = NP - TAP
RNNP = CaNP - SAP
SNNP = NP - SAP
NPR = NP / TAP = +100 if S < 0.05 %
SNPR = NP / SAP = +100.0 if S < 0.05 %

@ = short term leach test results available

NOTE: ***If a result was reported to be less than the detection limit, a value of half the detection limit is shown in italics and used in subsequent calculations.***

Revised May 8, 1995

PROJECT: NWT Diamonds Project
CLIENT: BHP Diamonds Inc.
DATA TYPE: ABA Data for Koala Pipe Rock Samples
ROCK TYPE: Koala Pipe - Kimberlite
COMMENTS: Analyses were performed by Brenda Process Technology, Kelowna. BC.

Sample	Paste pH	% S Total (%)	% S SO(4) (%)	% S Sulphide (%)	TAP (CaCO(3) t/1000 tonne	SAP (CaCO(3) t/1000 tonne	% CO(2) Inorganic (%)	NP (CaCO(3) t/1000 tonne	CaNP (CaCO(3) t/1000 tonne	% (CaNP/NP)	NNP (CaCO(3) t/1000 tonne	RNNP (CaCO(3) t/1000 tonne	SNNP (CaCO(3) t/1000 tonne	NPR	SNPR	CaNP/ SAP
Upper Limit	14	100.00	100.00	100.00	N/A	N/A	100	1000.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Detection Limit	0	0.01	0.01	0.01	N/A	N/A	0.2	-1000.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Koala K-2 50	7.70	0.330	0.130	0.200	10	6		319.9			310		314	31.02	51.19	
Koala K-2 52	7.65	0.380	0.110	0.270	12	8		323.4			312		315	27.24	38.33	
Koala K-2 72@	8.29	0.210	0.040	0.170	7	5		210.4			204		205	32.07	39.61	
Koala K-2 80	8.12	0.230	0.070	0.160	7	5		212.1			205		207	29.51	42.41	
Koala K-2 82	8.20	0.200	0.050	0.150	6	5		218.7			212		214	34.99	46.65	
Koala K-2 96	8.26	0.170	0.030	0.140	5	4		173.6			168		169	32.68	39.68	
Koala K-2 98	7.97	0.320	0.120	0.200	10	6		343.1			333		337	34.31	54.90	
Koala K-2 100	8.05	0.290	0.080	0.210	9	7		290.3			281		284	32.03	44.23	
Koala K-2 104	8.38	0.260	0.040	0.220	8	7		203.7			196		197	25.07	29.63	
Koala K-2 110	8.37	0.150	0.010	0.140	5	4		218.0			213		214	46.51	49.88	
Koala K-2 114	8.06	0.230	0.027	0.203	7	6		351.0	43.4	12.36	344	37	345	48.83	55.34	6.84
Koala K-2 126	8.27	0.130	0.014	0.116	4	4		339.1			335		335	83.46	93.15	
Koala K-2 128	8.30	0.160	0.010	0.150	5	5		378.3			373		374	75.66	80.78	
Koala K-2 130	8.31	0.130	0.010	0.120	4	4		432.3			428		429	106.40	115.40	
Koala K-2 132	8.36	0.100	0.010	0.090	3	3		378.3			375		375	121.06	134.51	
Koala K-2 148	8.40	0.110	0.007	0.103	3	3		379.0			376		376	110.27	117 49	
Koala K-2 152	8.36	0.110	0.007	0.103	3	3		345.8			342		343	100.61	107.20	
Koala K-2 156@	8.24	0.210	0.017	0.193	7	6		354.2			348		348	53.98	58.70	
Koala K-2 158	8.36	0.140	0.007	0.133	4	4		362.3			358		358	82.81	87.01	
Koala K-2 160	8.36	0.130	0.007	0.123	4	4		396.3			392		392	97.56	102.91	
Koala K-2 162	8.28	0.110	0.007	0.103	3	3		328.1			325		325	95.45	101.70	
Koala K-2 168	7.64	0.570	0.085	0.486	18	15		342.2			324		327	19.21	22.55	
Koala K-2 170	7.73	0.470	0.068	0.402	15	13		319.9			305		307	21.78	25.44	
Koala K-2 172	7.68	0.580	0.064	0.516	18	16		322.3			304		306	17.78	20.00	
Koala K-2 174	7.77	0.520	0.057	0.463	16	14		312.5			296		298	19.23	21.62	
Koala K-2 180	8.05	0.270	0.020	0.250	8	8		296.5			288		289	35.14	38.00	
Koala K-2 188	8.01	0.380	0.080	0.300	12	9		183.3			171		174	15.44	19.55	
Koala K-2 192	8.10	0.330	0.050	0.280	10	9		196.1			186		187	19.02	22.41	
Koala K-2 202	8.16	0.200	0.014	0.186	6	6		231.9			226		226	37.10	39.79	
Koala K-2 204	8.13	0.280	0.017	0.263	9	8		330.2	44.7	13.54	321	36	322	37.73	40.16	5.44
Koala K-2 208	7.62	0.480	0.130	0.350	15	11		280.2			265		269	18.68	25.62	
Koala K-2 212	7.87	0.490	0.037	0.453	15	14		270.1			255		256	17.64	19.09	
Koala K-2 216	8.05	0.210	0.017	0.193	7	6		97.0			90		91	14.77	16.07	

PROJECT.	NWT Diamonds Project
CLIENT	BHP Diamonds Inc.
DATA TYPE:	ABA Data for Koala Pipe Rock Samples (Continued)
ROCK TYPE:	Koala Pipe - Kimberlite (Continued)
COMMENTS:	Analyses were performed by Brenda Process Technology, Kelowna, BC.

Sample	Paste pH	% S Total (%)	% S SO(4) (%)	% S Sulphide (%)	TAP (CaCO(3) t/1000 tonne	SAP (CaCO(3) t/1000 tonne	% CO(2) Inorganic (%)	NP (CaCO(3) t/1000 tonne	CaNP (CaCO(3) t/1000 tonne	% (CaNP/NP)	NNP (CaCO(3) t/1000 tonne	RNNP (CaCO(3) t/1000 tonne	SNNP (CaCO(3) t/1000 tonne	NPR	SNPR	CaNP/ SAP
Upper Limit	14	100.00	100.00	100.00	N/A	N/A	100	1000.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Detection Limit	0	0.01	0.01	0.01	N/A	N/A	0.2	-1000.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Koala K-7 222@	7.90	0.350	0.070	0.280	11	9		110.8			100		102	10.13	12.66	
Koala K-7 224	8.08	0.210	0.050	0.160	7	5		110.3			104		105	16.80	22.05	
Koala K-7 230	7.96	0.420	0.090	0.330	13	10		56.0			43		46	4.27	5.43	
Maximum Value	8.4	0.580	0.130	0.516	18	16	0	432.3	44.7	13.5	428	37	429	121.06	134.51	6.84
Minimum	7.62	0.100	0.007	0.090	3	3	0	56.0	43.4	12.4	43	36	46	4.27	5.43	5.44
Average Value	8.08	0.274	0.046	0.228	9	7	0	278.3	44.1	13.0	270	37	271	44.62	51.14	6.14
Standard Deviation	0.24	0.138	0.037	0.116	4	4	0	92.2	0.6.	0.6	93	0	93	32.66	34.08	0.70
Count	36	36	36	36	36	36	0	36	2	2	36	2	36	36	36	2

TAP = % S (Total) * 31.25
Note: TAP = 0 if % S (Total) < 0.05
% S (Sulphide) = % S (Total) - % S (SO(4))
HAP = (% S (Sulphide) + % S (del if > 0)) * 31.25
SAP = % S (Sulphide) * 31.25
Note: SAP = 0 if % S (Sulphidel) < 0.05
CaNP = (% CO(2) / 44.01) * 100.09 * 10

NNP = NP - TAP
RNNP = CaNP - SAP
SNNP = NP - SAP
NPR = NP / TAP = +100 if S < 0.05 %
SNPR = NP / SAP = +100.0 if S < 0.05 %

@ = short term leach test results available

NOTE: ***If a result was reported to be less than the detection limit, a value of half the detection limit is shown in italics and used in subsequent calculations.***

Revised May 8, 1995

PROJECT: NWT Diamonds Project
CLIENT: BHP Diamonds Inc.
DATA TYPE: ABA Data for Panda Pipe Rock Samples
ROCK TYPE: Panda Pipe - Granite
COMMENTS: Analyses were performed by Brenda Process Technology, Kelowna , BC and Chemex Labs, Vancouver, BC.

Sample	Paste pH	% S Total (%)	% S SO(4) (%)	% S Sulphide (%)	TAP (CaCO(3) t/1000 tonne	SAP (CaCO(3) t/1000 tonne	% CO(2) Inorganic (%)	NP (CaCO(3) t/1000 tonne	CaNP (CaCO(3) t/1000 tonne	% (CaNP/NP)	NNP (CaCO(3) t/1000 tonne	RNNP (CaCO(3) t/1000 tonne	SNNP (CaCO(3) t/1000 tonne	NPR	SNPR	CaNP/ SAP
Upper Limit	14	100.00	100.00	100.00	N/A	N/A	100	1000.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Detection Limit	0	0.01 / 0.00	0.01	0.01	N/A	N/A	0.2	-1000.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
PDC - 02 - 145	9.79	*0.005*	*0.005*	0.000	0	0		9.8			10		10	100.00	100.00	
PDC - 02 - 395	9.80	0.050	*0.005*	0.045	2	0		14.3			13		14	9.18	100.00	
PDC - 03 130	9.92	*0.005*	*0.005*	0.000	0	0		10.1			10		10	100.00	100.00	
PDC - 04 166	9.94	0.020	*0.005*	0.015	0	0		11.7			12		12	100.00	100.00	
PDC - 06 200@	9.91	0.050	*0.005*	0.045	2	0		13.5	2.5	18.45	12	3	14	8.67	100.00	0.00
PUC 1-5 197	9.98	0.050	*0.005*	0.045	2	0		21.5			20		21	13.75	100.00	
PANDA #1 60.5 m	9.40	0.050	0.070	*0.005*	2	0	*0.1*	4.0	2.3	56.86	2	2	4	2.56	100.00	0.00
PANDA #2 96.5 m	9.20	0.017	*0.005*	0.020	0	0	*0.1*	11.0	2.3	20.68	11	2	11	100.00	100.00	0.00
PANDA #3 147.0 m	9.70	0.006	*0.005*	*0.005*	0	0	*0.1*	14.0	2.3	16.24	14	2	14	100.00	100.00	0.00
PANDA #4 195.2 m	8.60	0.006	*0.005*	0.020	0	0	*0.1*	6.0	2.3	37.90	6	2	6	100.00	100.00	0.00
PANDA #5 245.2 m	9.40	0.006	*0.005*	*0.005*	0	0	*0.1*	12.0	2.3	18.95	12	2	12	100.00	100.00	0.00
PANDA #6 297.8 m	9.70	*0.0005*	*0.005*	*0.005*	0	0	*0.1*	10.0	2.3	22.74	10	2	10	100.00	100.00	0.00
Maximum Value	9.98	0.050	*0.070*	0.045	2	0	*0.1*	21.5	2.5	56.9	20	3	21	100.00	100.00	0
Minimum	8.6	*0.0005*	*0.005*	0.000	0	0	*0.1*	4.0	2.3	16.2	2	2	4	2.56	100.00	0
Average Value	9.61	0.022	0.010	0.018	1	0	*0.1*	11.5	2.3	27 4	11	2	11	69.51	100.00	0
Standard Deviation	0.39	0.020	0.018	0.017	1	0	0.0	4.2	0.1	13.7	4	0	4	43.18	0.00	0
Count	12	12	12	12	12	12	6	12	7	7	12	7	12	12	12	7

TAP = % S (Total) * 31.25
Note: TAP = 0 if % S (Total) < 0.05
% S (Sulphide) = % S (Total) - % S (SO(4))
HAP = (% S (Sulphide) + % S (del if > 0)) * 31.25
SAP = % S (Sulphide) * 31.25
Note: SAP = 0 if % S (Sulphidel) < 0.05
CaNP = (% CO(2) / 44.01) * 100.09 * 10

NNP = NP - TAP
RNNP = CaNP - SAP
SNNP = NP - SAP
NPR = NP / TAP = +100 if S < 0.05 %
SNPR = NP / SAP = +100.0 if S < 0.05 %

@ = short term leach test results available

PANDA #1 through #6 are reported as metres from portal

NOTE: ***If a result was reported to be less than the detection limit, a value of half the detection limit is shown in italics and used in subsequent calculations.***

Revised May 8, 1995

of Co

PROJECT:	NWT Diamonds Project
CLIENT:	BHP Diamonds Inc.
DATA TYPE:	ABA Data for Panda Pipe Rock Samples
ROCK TYPE:	Panda Pipe - Kimberlite
COMMENTS:	Analyses were performed by Brenda Process Technology, Kelowna, BC.

Sample	Paste pH	% S Total (%)	% S SO(4) (%)	% S Sulphide (%)	TAP (CaCO(3) t/1000 tonne	SAP (CaCO(3) t/1000 tonne	% CO(2) Inorganic (%)	NP (CaCO(3) t/1000 tonne	CaNP (CaCO(3) t/1000 tonne	% (CaNP/NP)	NNP (CaCO(3) t/1000 tonne	RNNP (CaCO(3) t/1000 tonne	SNNP (CaCO(3) t/1000 tonne	NPR	SNPR	CaNP/ SAP
Upper Limit	14	100.00	100.00	100.00	N/A	N/A	100	1000.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Detection Limit	0	0.01	0.01	0.01	N/A	N/A	0.2	-1000.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Panda P - 7 38	8.16	0.670	0.090	0.580	21	18		273.1			252		255	13.04	15.07	
Panda P - 7 44	8.39	0.420	0.060	0.360	13	11		280.8			268		270	21.40	24.96	
Panda P - 7 48	8.46	0.210	0.030	0.180	7	6		294.8			288		289	44.92	52.41	
Panda P - 7 52	8.35	0.430	0.030	0.400	13	13		319.5			306		307	23.78	25.56	
Panda P - 7 58	8.44	0.180	0.050	0.130	6	4		309.8			304		306	55.07	76.25	
Panda P - 7 62@	8.41	0.340	0.020	0.320	11	10		296.1			285		286	27.87	29.61	
Panda P - 7 66	8.52	0.270	0.080	0.190	8	6		315.4			307		309	37.38	53.12	
Panda P - 7 70	8.35	0.500	0.040	0.460	16	14		273.5			258		259	17.50	19.03	
Panda P - 7 74	8.38	0.770	0.060	0.710	24	22		269.3	26.5	9.84	245	4	247	11.19	12.14	1.19
Panda P - 7 80	8.48	0.330	0.020	0.310	10	10		278.7			268		269	27.02	28.77	
Panda P - 7 86	8.21	0.600	0.050	0.550	19	17		264.9			246		248	14.13	15.41	
Panda P - 7 108	8.31	0.920	0.040	0.880	29	28		223.7			195		196	7.78	8.13	
Panda P - 7 114	8.32	1.070	0.040	1.030	33	32		244.7			211		213	7.32	7.60	
Panda P - 7 118	8.18	0.530	0.070	0.460	17	14		237.6			221		223	14.34	16.53	
Panda P - 7 122	8.24	0.730	0.050	0.680	23	21		263.8			241		243	11.56	12.41	
Panda P - 7 128	8.11	0.210	0.090	0.120	7	4		287.9			281		284	43.87	76.77	
Panda P - 7 148	8.35	0.350	0.030	0.320	11	10		310.6			300		301	28.40	31.06	
Panda P - 7 152	8.52	0.430	0.010	0.420	13	13		129.2			116		116	9.61	9.84	
Panda P - 7 156	8.51	0.350	0.030	0.320	11	10		126.0	37.0	29.37	115	27	116	11.52	12.60	3.70
Panda P - 7 218	8.46	0.500	0.020	0.480	16	15		136.3			121		121	8.73	9.09	
Panda P - 7 236	8.41	0.410	0.020	0.390	13	12		129.9			117		118	10.14	10.66	
Panda P - 7 238	8.60	0.410	0.030	0.380	13	12		473.3			461		461	36.94	39.86	
Panda P - 7 240@	8.56	0.490	0.020	0.470	15	15		115.6			100		101	7.55	7.87	
Panda P - 7 244	8.62	0.200	0.010	0.190	6	6		107.4			101		102	17.19	18.10	

PROJECT: NWT Diamonds Project
CLIENT: BHP Diamonds Inc.
DATA TYPE: ABA Data for Panda Pipe Rock Samples (Continued)
ROCK TYPE: Panda Pipe - Kimberlite (Continued)
COMMENTS: Analyses were performed by Brenda Process Technology, Kelowna, BC.

Sample	Paste pH	% S Total (%)	% S SO(4) (%)	% S Sulphide (%)	TAP (CaCO(3) t/1000 tonne	SAP (CaCO(3) t/1000 tonne	% CO(2) Inorganic (%)	NP (CaCO(3) t/1000 tonne	CaNP (CaCO(3) t/1000 tonne	% (CaNP/NP)	NNP (CaCO(3) t/1000 tonne	RNNP (CaCO(3) t/1000 tonne	SNNP (CaCO(3) t/1000 tonne	NPR	SNPR	CaNP/ SAP
Upper Limit	14	100.00	100.00	100.00	N/A	N/A	100	1000.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Detection Limit	0	0.01	0.01	0.01	N/A	N/A	0.2	-1000.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Maximum Value	8.62	1.070	0.090	1.030	33	32	0	473.3	37.0	29.4	461	27	461	55.07	76.77	3.70
Minimum	8.11	0.180	0.010	0.120	6	4	0	107 4	26.5	9.8	100	4	101	7.32	7.60	1.19
Average Value	8.39	0.472	0.041	0.430	15	13	0	248.4	31.8	19.6	234	16	235	21.18	25.54	2.45
Standard Deviation	0.14	0.223	0.023	0.221	7	7	0	84.7	5.3	9.8	85	11	86	13.42	19.93	1.25
Count	24	24	24	24	24	24	0	24	2	2	24	2	24	24	24	2

TAP = % S (Total) * 31.25
Note: TAP = 0 if % S (Total) < 0.05
% S (Sulphide) = % S (Total) - % S (SO(4))
HAP = (% S (Sulphide) + % S (del if > 0)) * 31.25
SAP = % S (Sulphide) * 31.25
Note: SAP = 0 if % S (Sulphidel) < 0.05
CaNP = (% CO(2) / 44.01) * 100.09 * 10

NNP = NP - TAP
RNNP = CaNP - SAP
SNNP = NP - SAP
NPR = NP / TAP = +100 if S < 0.05 %
SNPR = NP / SAP = +100.0 if S < 0.05 %

@ = short term leach test results available

NOTE: If a result was reported to be less than the detection limit, a value of half the detection limit is shown in italics and used in subsequent calculations.

Revised May 8, 1995

of Co

PROJECT: NWT Diamonds Project
CLIENT BHP Diamonds Inc.
DATA TYPE: ABA Data for Fox Pipe Rock Samples
ROCK TYPE: Fox Pipe - Granite
COMMENTS: Analyses were performed by Brenda Process Technology, Kamloops, BC and Chemex Labs, Vancouver, BC..

Sample	Paste pH	% S Total (%)	% S SO(4) (%)	% S Sulphide (%)	TAP (CaCO(3) t/1000 tonne	SAP (CaCO(3) t/1000 tonne	% CO(2) Inorganic (%)	NP (CaCO(3) t/1000 tonne	CaNP (CaCO(3) t/1000 tonne	% (CaNP/NP)	NNP (CaCO(3) t/1000 tonne	RNNP (CaCO(3) t/1000 tonne	SNNP (CaCO(3) t/1000 tonne	NPR	SNPR	CaNP/ SAP
Upper Limit	14	100.00	100.00	100.00	N/A	N/A	100	1000.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Detection Limit	0	0.01 / 0.00	0.01	0.01	N/A	N/A	0.2	-1000.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
FDC - 02B 56	9.98	0.030	*0.005*	0.025	0	0		17.7			18		18	100.00	100.00	
FUC 3-3 30	8.78	0.080	*0.005*	0.075	3	2		267.1			265		265	106.86	113.98	
FUC 3-3 35	9.19	0.050	*0.005*	0.045	2	0		32.4			31		32	20.72	100.00	
FUC 3-3 40	8.99	0.070	*0.005*	0.065	2	2		50.7			49		49	23.17	24.96	
FUC 3-3 45	9.54	0.150	*0.005*	0.145	5	5		14.5			10		10	3.09	3.20	
FUC 3-3 50	9.61	0.150	*0.005*	0.145	5	5		25.1			20		21	5.36	5.54	
FUC 3-3 55	9.69	0.070	*0.005*	0.065	2	2		17.9			16		16	8.20	8.83	
FUC 3-3 60	9.41	0.100	*0.005*	0.095	3	3		18.8			16		16	6.01	6.33	
FUC 3-3 65	8.68	1.330	0.040	1.290	42	40		67.2			26		27	1.62	1.67	
FUC 3-3 66 **	8.76	1.030	0.010	1.020	32	32		29.6	10.7	36.20	-3	-21	-2	0.92	0.93	0.34
FUC 3-3 ~67	8.78	0.500	0.030	0.470	16	15		9.6			-6		-5	0.61	0.65	
FUC 3-3 70	8.52	0.430	0.030	0.400	13	13		8.5			-5		-4	0.63	0.68	
FUC 3-3 75	8.68	0.650	0.030	0.620	20	19		75.8			55		56	3.73	3.91	
FUC 3-3 80	8.71	0.100	*0.005*	0.095	3	3		22.8			20		20	7.31	7.70	
FUC 3-3 85	8.77	0.090	*0.005*	0.085	3	3		18.4			16		16	6.55	6.94	
FUC 3-3 90	8.58	0.200	0.010	0.190	6	6		21.1			15		15	3.38	3.56	
FUC 3-3 95	8.47	0.860	0.060	0.800	27	25		62.3			35		37	2.32	2.49	
FUC 4 - 3 144	9.86	0.030	*0.005*	0.025	0	0		15.8			16		16	100.00	100.00	
FUC 4 - 4 128	9.90	0.030	*0.005*	0.025	0	0		18.0			18		18	100.00	100.00	
FUC 4 - 5 173	9.79	0.110	*0.005*	0.105	3	3		15.8			12		13	4.60	4.82	
FX 4 -1 188@	9.91	0.040	*0.005*	0.035	0	0		19.0			19		19	100.00	100.00	
Granite Core 5.5	9.50	0.037			0	0		12.0			12		12	100.00	100.00	
#1a	9.20	0.035	0.020	0.040	0	0	*0.1*	15.0	2.3	15.16	15	2	15	100.00	100.00	0.00
#1b	9.70	0.028	0.030	0.010	0	0	*0.1*	19.0	2.3	11.97	19	2	19	100.00	100.00	0.00
Koala 1 113093 SW wall @ 69m	9.40	0.014	0.030	*0.005*	0	0	*0.1*	13.0	2.3	17 49	13	2	13	100.00	100.00	0.00
Koala 2 113093 SW wall @ 200m	9.00	0.069	0.030	0.010	2	0	*0.1*	6.0	2.3	37.90	4	2	6	2.78	100.00	0.00
Koala 3 113093 SW wall @ 245m	9.60	0.015	0.030	*0.005*	0	0	*0.1*	15.0	2.3	15.16	15	2	15	100.00	100.00	0.00
Koala 4 113093 SW wall @ 296m	9.60	0.014	0.020	*0.005*	0	0	*0.1*	16.0	2.3	14.21	16	2	16	100.00	100.00	0.00
Koala 5 113093 SW wall @ 365m	9.40	0.063	0.040	0.020	2	0	*0.1*	9.0	2.3	25.27	7	2	9	4.57	100.00	0.00
ABAKoala 6 121796 NW wall @ 372m	7.80	0.019	*0.005*	0.020	0	0	*0.1*	12.0	2.3	18.95	12	2	12	100.00	100.00	0.00
ABAKoala 7 121796 NW wall @ 377m	9.20	0.003	*0.005*	*0.005*	0	0	*0.1*	4.0	2.3	56.86	4	2	4	100.00	100.00	0.00
ABAKoala 8 121796 face @ 447m	9.30	0.010	*0.005*	0.010	0	0	*0.1*	13.0	2.3	17 49	13	2	13	100.00	100.00	0.00
#9 020194 North Rib @ 500m	9.20	0.048	0.020	0.030	0	0	*0.1*	21.0	2.3	10.83	21	2	21	100.00	100.00	0.00

of Co

PROJECT.	NWT Diamonds Project
CLIENT:	BHP Diamonds Inc.
DATA TYPE:	ABA Data for Fox Pipe Rock Samples (Continued)
ROCK TYPE:	Fox Pipe - Granite (Continued)
COMMENTS:	Analyses were performed by Brenda Process Technology, Kelowna, BC and Chemex Labs, Vancouver, BC..

Sample	Paste pH	% S Total (%)	% S SO(4) (%)	% S Sulphide (%)	TAP (CaCO(3) t/1000 tonne	SAP (CaCO(3) t/1000 tonne	% CO(2) Inorganic (%)	NP (CaCO(3) t/1000 tonne	CaNP (CaCO(3) t/1000 tonne	% (CaNP/NP)	NNP (CaCO(3) t/1000 tonne	RNNP (CaCO(3) t/1000 tonne	SNNP (CaCO(3) t/1000 tonne	NPR	SNPR	CaNP/ SAP
Upper Limit	14	100.00	100.00	100.00	N/A	N/A	100	1000.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Detection Limit	0	0.01 / 0.00	0.01	0.01	N/A	N/A	0.2	-1000.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
#10 020194 South Rib @ 552m	9.60	0.026	0.030	*0.005*	0	0	*0.1*	18.0	2.3	12.63	18	2	18	100.00	100.00	0.00
#11 020194 South Rib @ 610m	9.10	0.019	0.020	*0.005*	0	0	*0.1*	15.0	2.3	15.16	15	2	15	100.00	100.00	0.00
Koala 12-022494 North Rib @ 660m	9.40	0.085	0.020	0.030	3	0	0.5	18.0	11.4	63.17	15	11	18	6.78	100.00	0.00
Koala 13-022494 North Rib @ 712m	9.30	0.043	0.010	0.040	0	0	0.3	17.0	6.8	40.13	17	7	17	100.00	100.00	0.00
Koala 14-022494 North Rib @ 764m	9.40	0.033	*0.005*	0.050	0	2	*0.1*	16.0	2.3	14.21	16	1	14	100.00	10.24	1.46
Koala 15-022494 South Rib @ 809m	9.40	0.022	0.010	0.040	0	0	0.4	19.0	9.1	47.88	19	9	19	100.00	100.00	0.00
Koala 15a-022494 North Rib @ 822m	8.30	0.043	*0.005*	0.070	0	2	*0.1*	17.0	2.3	13.38	17	0	15	100.00	7.77	1.04
Koala 16-022494 South Rib @ 851m	9.30	0.017	*0.005*	0.030	0	0	*0.1*	19.0	2.3	11.97	19	2	19	100.00	100.00	0.00
Koala 17-032594 South Rib @ 901m	9.60	0.030			0			20.0			20	0	20	100.00	100.00	
Koala 18-032594 North Rib @ 951m	9.30	0.031			0			18.0			18	0	18	100.00	100.00	
Koala 19-032594 South Rib @ 1001m	9.50	0.016			0			19.0			19	0	19	100.00	100.00	
Koala 20-032594 South Rib @ 1051m	9.50	0.023			0			17.0			17	0	17	100.00	100.00	
#21 - 1106.2m NRIB	9.30	0.032	*0.005*	0.020	0	0	*0.1*	16.0	2.3	14.21	16	2	16	100.00	100.00	0.00
#22 - 1168.8m NRIB	9.10	0.008	0.010	*0.005*	0	0	*0.1*	4.0	2.3	56.86	4	2	4	100.00	100.00	0.00
#23 - 1202.2m NRIB	8.60	0.050	*0.005*	0.050	2	2	*0.1*	16.0	2.3	14.21	14	1	14	10.24	10.24	1.46
#24 - 1276.1m NRIB	9.50	0.015	*0.005*	0.020	0	0	0.3	18.0	6.8	37.90	18	7	18	100.00	100.00	0.00
#25 - North Rib @ 1326.1m	9.10	0.056	*0.005*	0.060	2	2	*0.1*	15.0	2.3	15.16	13	0	13	8.57	8.00	1.21
Maximum Value	9.98	1.330	0.060	1.290	42	40	0.5	267.1	11.4	63.2	265	11	265	106.86	113.98	1.46
Minimum	7.8	0.003	*0.005*	0.005	0	0	*0.1*	4.0	2.3	10.8	-6	-21	-5	0.61	0.65	0.00
Average Value	9.22	0.140	0.014	0.142	4	4	*0.1*	25.3	3.6	25.4	21	2	22	60.76	64.65	0.22
Standard Deviation	0.46	0.270	0.013	0.273	9	9	*0.1*	37.3	2.8	16.2	36	5	36	46.55	45.89	0.48
Count	50	50	45	45	50	46	24	50	25	25	50	29	50	50	50	25

TAP = % S (Total) * 31.25
Note: TAP = 0 if % S (Total) < 0.05
% S (Sulphide) = % S (Total) - % S (SO(4))
HAP = (% S (Sulphide) + % S (del if > 0)) * 31.25
SAP = % S (Sulphide) * 31.25
Note: SAP = 0 if % S (Sulphidel) < 0.05
CaNP = (% CO(2) / 44.01) * 100.09 * 10

NNP = NP - TAP
RNNP = CaNP - SAP
SNNP = NP - SAP
NPR = NP / TAP = +100 if S < 0.05 %
SNPR = NP / SAP = +100.0 if S < 0.05 %

@ = short term leach test results available

**** = placed in a humidity cell (4 cells operating at this time: 3 at Chemex (M19 samples) and 1 at Brenda (FUC 3-3 66m)**

NOTE: If a result was reported to be less than the detection limit, a value of half the detection limit is shown in italics and used in subsequent calculations.

Revised May 8, 1995

of Co

PROJECT: NWT Diamonds Project
CLIENT: BHP Diamonds Inc.
DATA TYPE: ABA Data for Fox Pipe Rock Samples
ROCK TYPE: Fox Pipe - Kimberlite
COMMENTS: Analyses were performed by Brenda Process Technology, Kelowna BC.

Sample	Paste pH	% S Total (%)	% S SO(4) (%)	% S Sulphide (%)	TAP (CaCO(3) t/1000 tonne	SAP (CaCO(3) t/1000 tonne	% CO(2) Inorganic (%)	NP (CaCO(3) t/1000 tonne	CaNP (CaCO(3) t/1000 tonne	% (CaNP/NP)	NNP (CaCO(3) t/1000 tonne	RNNP (CaCO(3) t/1000 tonne	SNNP (CaCO(3) t/1000 tonne	NPR	SNPR	CaNP/ SAP
Upper Limit	14	100.00	100.00	100.00	N/A	N/A	100	1000.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Detection Limit	0	0.01	0.01	0.01	N/A	N/A	0.2	-1000.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Fox F1 - 1 66-1	7.91	0.240	0.070	0.170	8	5		117.1			110		112	15.61	22.04	
Fox F1 - 1 66-2	7.83	0.370	0.070	0.300	12	9		356.0			344		347	30.79	37.97	
Fox F1 - 1 72@	7.80	0.260	0.040	0.220	8	7		317 1			309		310	39.03	46.12	
Fox F1 - 1 94	8.43	0.270	0.060	0.210	8	7		342.1			334		336	40.55	52.13	
Fox F1 - 1 110	8.55	0.170	0.020	0.150	5	5		372.5	10.2	2.74	367	6	368	70.12	79.62	2.18
Fox F1 - 1 116	8.82	0.230	0.020	0.210	7	7		354.5			347		348	49.32	54.09	
Fox F1 - 1 122	8.27	0.220	0.017	0.203	7	6		137.6			131		131	20.02	21.68	
Fox F1 - 1 158	9.00	0.170	0.024	0.146	5	5		330.7			325		326	62.24	72.31	
Fox F1 - 1 160	8.87	0.190	0.030	0.160	6	5		268.3			262		263	45.19	53.81	
Fox F1 - 1 184	9.26	0.130	0.024	0.106	4	3		355.6			351		352	87.52	107.00	
Fox F1 - 1 186	9.04	0.120	0.020	0.100	4	3		354.3			351		351	94.47	113.36	
Fox F1 - 1 196	9.54	0.130	0.027	0.103	4	3		350.1	49.7	14.20	346	46	347	86.18	108.81	15.45
Fox F1 - 1 210	9.70	0.060	0.010	0.0499	2	0		264.0			262		264	140.82	100.00	
Fox F1 - 1 216@	9.61	0.040	*0.005*	0.035	0	0		339.4			339		339	100.00	100.00	
Maximum Value	9.7	0.370	0.070	0.300	12	9	0	372.5	49.7	14.2	367	46	368	140.82	113.36	15.45
Minimum	7.8	0.040	*0.005*	0.035	0	0	0	117.1	10.2	2.7	110	6	112	15.61	21.68	2.18
Average Value	8.76	0.186	0.031	0.154	6	5	0	304.2	30.0	8.5	299	26	300	62.99	69.21	8.81
Standard Deviation	0.63	0.085	0.020	0.069	3	2	0	78.5	19.8	5.7	79	20	79	34.14	31.29	6.63
Count	14	14	14	14	14	14	0	14	2	2	14	2	14	14	14	2

TAP = % S (Total) * 31.25
Note: TAP = 0 if % S (Total) < 0.05
% S (Sulphide) = % S (Total) - % S (SO(4))
HAP = (% S (Sulphide) + % S (del if > 0)) * 31.25
SAP = % S (Sulphide) * 31.25
Note: SAP = 0 if % S (Sulphidel) < 0.05
CaNP = (% CO(2) / 44.01) * 100.09 * 10

NNP = NP - TAP
RNNP = CaNP - SAP
SNNP = NP - SAP
NPR = NP / TAP = +100 if S < 0.05 %
SNPR = NP / SAP = +100.0 if S < 0.05 %

@ = short term leach test results available

NOTE: ***If a result was reported to be less than the detection limit, a value of half the detection limit is shown in italics and used in subsequent calculations.***

Revised May 8, 1995

of Co

PROJECT: NWT Diamonds Project
CLIENT BHP Diamonds Inc.
DATA TYPE: ABA Data for Leslie Pipe Rock Samples
ROCK TYPE: Leslie Pipe - Granite
COMMENTS: Analyses were performed by Brenda Process Technology, Kelowna , BC.

Sample	Paste pH	% S Total (%)	% S SO(4) (%)	% S Sulphide (%)	TAP (CaCO(3) t/1000 tonne	SAP (CaCO(3) t/1000 tonne	% CO(2) Inorganic (%)	NP (CaCO(3) t/1000 tonne	CaNP (CaCO(3) t/1000 tonne	% (CaNP/NP)	NNP (CaCO(3) t/1000 tonne	RNNP (CaCO(3) t/1000 tonne	SNNP (CaCO(3) t/1000 tonne	NPR	SNPR	CaNP/ SAP
Upper Limit	14	100.00	100.00	100.00	N/A	N/A	100	1000.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Detection Limit	0	0.01	0.01	0.01	N/A	N/A	0.2	-1000.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LDC - 01 285	10.00	0.020	*0.005*	0.015	0	0		12.0			12		12	100.00	100.00	
LDC - 02 136	9.64	0.080	*0.005*	0.075	3	2		201.7			199		199	80.68	86.06	
LDC - 05 80@	9.58	*0.005*	*0.005*	0.000	0	0		48.7			49		49	100.00	100.00	
LDC - 06 200	9.82	*0.005*	*0.005*	0.000	0	0		76.6			77		77	100.00	100.00	
LDC - 07 312	9.87	0.030	0.010	0.020	0	0		56.3			56		56	100.00	100.00	
LDC - 08 167	9.87	*0.005*	*0.005*	0.000	0	0		19.8			20		20	100.00	100.00	
Maximum Value	10	0.080	0.010	0.075	3	2	0	201.7	0	0	199	0	199	100.00	100.00	0
Minimum	9.58	*0.005*	*0.005*	0.000	0	0	0	12.0	0	0	12	0	12	80.68	86.06	0
Average Value	9.80	0.024	0.006	0.018	0	0	0	69.2	0	0	69	0	69	96.78	97.68	0
Standard Deviation	0.14	0.027	0.002	0.027	1	1	0	63.1	0	0	62	0	62	7.20	5.19	0
Count	6	6	6	6	6	6	0	6	0	0	6	0	6	6	6	0

TAP = % S (Total) * 31.25
Note: TAP = 0 if % S (Total) < 0.05
% S (Sulphide) = % S (Total) - % S (SO(4))
HAP = (% S (Sulphide) + % S (del if > 0)) * 31.25
SAP = % S (Sulphide) * 31.25
Note: SAP = 0 if % S (Sulphidel) < 0.05
CaNP = (% CO(2) / 44.01) * 100.09 * 10

NNP = NP - TAP
RNNP = CaNP - SAP
SNNP = NP - SAP
NPR = NP / TAP = +100 if S < 0.05 %
SNPR = NP / SAP = +100.0 if S < 0.05 %

@ = short term leach test results available

NOTE: ***If a result was reported to be less than the detection limit, a value of half the detection limit is shown in italics and used in subsequent calculations.***

Revised May 8, 1995

PROJECT. NWT Diamonds Project
CLIENT. BHP Diamonds Inc.
DATA TYPE: ABA Data for Leslie Pipe Rock Samples
ROCK TYPE: Leslie Pipe - Kimberlite
COMMENTS: Analyses were performed by Brenda Process Technology, Kelowna , BC.

Sample	Paste pH	% S Total (%)	% S SO(4) (%)	% S Sulphide (%)	TAP (CaCO(3) t/1000 tonne	SAP (CaCO(3) t/1000 tonne	% CO(2) Inorganic (%)	NP (CaCO(3) t/1000 tonne	CaNP (CaCO(3) t/1000 tonne	% (CaNP/NP)	NNP (CaCO(3) t/1000 tonne	RNNP (CaCO(3) t/1000 tonne	SNNP (CaCO(3) t/1000 tonne	NPR	SNPR	CaNP/ SAP
Upper Limit	14	100.00	100.00	100.00	N/A	N/A	100	1000.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Detection Limit	0	0.01	0.01	0.01	N/A	N/A	0.2	-1000.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Leslie F 2 - 4 36	9.67	0.040	0.020	0.020	0	0		490.6			491		491	100.00	100.00	
Leslie F 2 - 4 60	9.65	0.060	0.010	0.050	2	2		457.9			456		456	244.20	293.04	
Leslie F 2 - 4 88	9.90	0.160	0.020	0.140	5	4		451.3	10.0	2.22	446	6	447	90.25	103.14	2.29
Leslie F 2 - 4 110	10.00	0.050	*0.005*	0.045	2	0		558.6			557		559	357.52	100.00	
Leslie F 2 - 4 124	10.01	0.060	0.010	0.050	2	2		505.4			504		504	269.57	323.49	
Leslie F 2 - 4 132	10.03	0.070	*0.005*	0.065	2	2		525.2			523		523	240.10	258.57	
Leslie F 2 - 4 146	9.86	0.060	0.010	0.050	2	2		557.8			556		556	297 49	356.99	
Leslie F 2 - 4 152	9.87	0.110	0.010	0.100	3	3		520.9			517		518	151.53	166.68	
Leslie F 2 - 4 166@	9.90	0.070	*0.005*	0.065	2	2		574.0	15.3	2.67	572	13	572	262.40	282.59	7.53
Leslie F 2 - 4 170	9.98	0.070	0.010	0.060	2	2		589.2			587		587	269.34	314.23	
Leslie F 2 - 4 186	9.89	0.050	0.010	0.040	2	0		590.0			588		590	377.58	100.00	
Leslie F 2 - 4 216	9.76	0.080	0.010	0.070	3	2		583.2			581		581	233.27	266.60	
Maximum Value	10.03	0.160	0.020	0.140	5	4	0	590.0	15.3	2.7	588	13	590	377.58	356.99	7.53
Minimum	9.65	0.040	*0.005*	0.020	0	0	0	451.3	10.0	2.2	446	6	447	90.25	100.00	2.29
Average Value	9.88	0.073	0.010	0.063	2	2	0	533.7	12.7	2.4	531	9	532	241.11	222.11	4.91
Standard Deviation	0.12	0.031	0.005	0.030	1	1	0	47 4	2.7	0.2	48	4	48	85.72	96.14	2.62
Count	12	12	12	12	12	12	0	12	2	2	12	2	12	12	12	2

TAP = % S (Total) * 31.25
Note: TAP = 0 if % S (Total) < 0.05
% S (Sulphide) = % S (Total) - % S (SO(4))
HAP = (% S (Sulphide) + % S (del if > 0)) * 31.25
SAP = % S (Sulphide) * 31.25
Note: SAP = 0 if % S (Sulphidel) < 0.05
CaNP = (% CO(2) / 44.01) * 100.09 * 10

NNP = NP - TAP
RNNP = CaNP - SAP
SNNP = NP - SAP
NPR = NP / TAP = +100 if S < 0.05 %
SNPR = NP / SAP = +100.0 if S < 0.05 %

@ = short term leach test results available

NOTE: ***If a result was reported to be less than the detection limit, a value of half the detection limit is shown in italics and used in subsequent calculations.***

Revised May 8, 1995

of Co

PROJECT	NWT Diamonds Project
CLIENT.	BHP Diamonds Inc.
DATA TYPE:	ABA Data for Misery North Pipe Rock Samples
ROCK TYPE:	Misery North Pipe - Biotite Schist
COMMENTS:	Analyses were performed by Brenda Process Technology, Kelowna, BC.

Sample	Paste pH	% S Total (%)	% S SO(4) (%)	% S Sulphide (%)	TAP (CaCO(3) t/1000 tonne	SAP (CaCO(3) t/1000 tonne	% CO(2) Inorganic (%)	NP (CaCO(3) t/1000 tonne	CaNP (CaCO(3) t/1000 tonne	% (CaNP/NP)	NNP (CaCO(3) t/1000 tonne	RNNP (CaCO(3) t/1000 tonne	SNNP (CaCO(3) t/1000 tonne	NPR	SNPR	CaNP/ SAP
Upper Limit	14	100.00	100.00	100.00	N/A	N/A	100	1000.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Detection Limit	0	0.01	0.01	0.01	N/A	N/A	0.2	-1000.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MCH3 14-67	7.84	0.160	0.010	0.150	5	5		9.8			5		5	1.97	2.10	
MCH3 67-100	8.44	0.180	*0.005*	0.175	6	5		9.5			4		4	1.70	1.74	
MCH3 100-166	8.67	0.200	*0.005*	0.195	6	6		31.2			25		25	4.99	5.12	
MCH3 166-220	8.97	0.140	*0.005*	0.135	4	4		8.1			4		4	1.85	1.92	
MCH3 220-258 ***	9.12	0.160	*0.005*	0.155	5	5		8.5			3		4	1.69	1.74	
Maximum Value	9.12	0.200	0.010	0.195	6	6	0	31.2	0	0	25	0	25	4.99	5.12	0
Minimum	7.84	0.140	*0.005*	0.135	4	4	0	8.1	0	0	3	0	4	1.69	1.74	0
Average Value	8.61	0.168	0.006	0.162	5	5	0	13.4	0	0	8	0	8	2.44	2.53	0
Standard Deviation	0.45	0.020	0.002	0.021	1	1	0	8.9	0	0	8	0	8	1.28	1.30	0
Count	5	5	5	5	5	5	0	5	0	0	5	0	5	5	5	0

TAP = % S (Total) * 31.25
Note: TAP = 0 if % S (Total) < 0.05
% S (Sulphide) = % S (Total) - % S (SO(4))
HAP = (% S (Sulphide) + % S (del if > 0)) * 31.25
SAP = % S (Sulphide) * 31.25
Note: SAP = 0 if % S (Sulphidel) < 0.05
CaNP = (% CO(2) / 44.01) * 100.09 * 10

NNP = NP - TAP
RNNP = CaNP - SAP
SNNP = NP - SAP
NPR = NP / TAP = +100 if S < 0.05 %
SNPR = NP / SAP = +100.0 if S < 0.05 %

@ = short term leach test results available

*** Note this interval is in "feet" not "metres"

NOTE: ***If a result was reported to be less than the detection limit, a value of half the detection limit is shown in italics and used in subsequent calculations.***

Revised May 8, 1995

of Co

PROJECT	NWT Diamonds Project
CLIENT.	BHP Diamonds Inc.
DATA TYPE:	ABA Data for Misery North Pipe Rock Samples
ROCK TYPE:	Misery North Pipe - Granite
COMMENTS:	Analyses were performed by Brenda Process Technology, Kelowna , BC.

Sample	Paste pH	% S Total (%)	% S SO(4) (%)	% S Sulphide (%)	TAP (CaCO(3) t/1000 tonne	SAP (CaCO(3) t/1000 tonne	% CO(2) Inorganic (%)	NP (CaCO(3) t/1000 tonne	CaNP (CaCO(3) t/1000 tonne	% (CaNP/NP)	NNP (CaCO(3) t/1000 tonne	RNNP (CaCO(3) t/1000 tonne	SNNP (CaCO(3) t/1000 tonne	NPR	SNPR	CaNP/ SAP
Upper Limit	14	100.00	100.00	100.00	N/A	N/A	100	1000.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Detection Limit	0	0.01	0.01	0.01	N/A	N/A	0.2	-1000.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MCH3 264-348	9.17	*0.005*	*0.005*	0.000	0	0		5.3			5		5	100.00	100.00	
MCH3 348-458	9.33	0.010	*0.005*	0.005	0	0		7.9			8		8	100.00	100.00	
MCH3 476-540	9.53	*0.005*	*0.005*	0.000	0	0		3.9			4		4	100.00	100.00	
MCH3 552-618	9.35	*0.005*	*0.005*	0.000	0	0		6.3			6		6	100.00	100.00	
MCH3 618-728	9.56	*0.005*	*0.005*	0.000	0	0		6.7			7		7	100.00	100.00	
MCH3 728-807	9.35	*0.005*	*0.005*	0.000	0	0		7.7			8		8	100.00	100.00	
Maximum Value	9.56	0.010	*0.005*	0.005	0	0	0	7.9	0	0	8	0	8	100.00	100.00	0
Minimum	9.17	*0.005*	*0.005*	0.000	0	0	0	3.9	0	0	4	0	4	100.00	100.00	0
Average Value	9.38	0.006	*0.005*	0.001	0	0	0	6.3	0	0	6	0	6	100.00	100.00	0
Standard Deviation	0.13	0.002	0.000	0.002	0	0	0	1.4	0	0	1	0	1	0.00	0.00	0
Count	6	6	6	6	6	6	0	6	0	0	6	0	6	6	6	0

TAP = % S (Total) * 31.25
Note: TAP = 0 if % S (Total) < 0.05
% S (Sulphide) = % S (Total) - % S (SO(4))
HAP = (% S (Sulphide) + % S (del if > 0)) * 31.25
SAP = % S (Sulphide) * 31.25
Note: SAP = 0 if % S (Sulphidel) < 0.05
CaNP = (% CO(2) / 44.01) * 100.09 * 10

NNP = NP - TAP
RNNP = CaNP - SAP
SNNP = NP - SAP
NPR = NP / TAP = +100 if S < 0.05 %
SNPR = NP / SAP = +100.0 if S < 0.05 %

@ = short term leach test results available

NOTE: ***If a result was reported to be less than the detection limit, a value of half the detection limit is shown in italics and used in subsequent calculations.***

Revised May 8, 1995

PROJECT. NWT Diamonds Project
CLIENT: BHP Diamonds Inc.
DATA TYPE: ABA Data for Misery North Pipe Rock Samples
ROCK TYPE: Misery North Pipe - Kimberlite
COMMENTS: Analyses were performed by Brenda Process Technology, Kelowna, BC.

Sample	Paste pH	% S Total (%)	% S SO(4) (%)	% S Sulphide (%)	TAP (CaCO(3) t/1000 tonne	SAP (CaCO(3) t/1000 tonne	% CO(2) Inorganic (%)	NP (CaCO(3) t/1000 tonne	CaNP (CaCO(3) t/1000 tonne	% (CaNP/NP)	NNP (CaCO(3) t/1000 tonne	RNNP (CaCO(3) t/1000 tonne	SNNP (CaCO(3) t/1000 tonne	NPR	SNPR	CaNP/ SAP
Upper Limit	14	100.00	100.00	100.00	N/A	N/A	100	1000.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Detection Limit	0	0.01	0.01	0.01	N/A	N/A	0.2	-1000.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
M8 - 27	6.41	0.960	0.230	0.730	30	23		38.9			9		16	1.30	1.70	
M8 - 31	6.19	0.890	0.350	0.540	28	17		49.2			21		32	1.77	2.92	
M8 - 40	8.13	0.470	0.070	0.400	15	13		307.6			293		295	20.94	24.61	
M8 - 48@	8.10	0.410	0.120	0.290	13	9		336.0			323		327	26.22	37.07	
M8 - 52	8.10	0.410	0.120	0.290	13	9		336.0			323		327	26.22	37.07	
M8 - 62	8.19	0.340	0.070	0.270	11	8		379.9			369		371	35.76	45.03	
M8 - 66	8.16	0.860	0.140	0.720	27	23		334.6			308		312	12.45	14.87	
M8 - 96	8.32	0.160	0.040	0.120	5	4		350.2			345		346	70.04	93.38	
M8 - 124	8.24	0.400	0.050	0.350	13	11		361.5	8.5	2.35	349	-2	351	28.92	33.05	0.78
M8 - 128	8.26	0.310	0.050	0.260	10	8		372.7			363		365	38.47	45.87	
M8 - 132	8.11	0.430	0.060	0.370	13	12		377.2			364		366	28.07	32.62	
M8 - 134	7.93	0.760	0.090	0.670	24	21		356.5			333		336	15.01	17.03	
M8 - 140	8.24	0.650	0.050	0.600	20	19		380.0			360		361	18.71	20.27	
M8 - 142	8.22	0.360	0.040	0.320	11	10		387.5			376		377	34.44	38.75	
M8 - 156@	8.20	0.490	0.070	0.420	15	13		348.4			333		335	22.76	26.55	
M8 - 158	8.08	0.550	0.080	0.470	17	15		376.9			360		362	21.93	25.66	
M8 - 160	8.01	0.140	0.070	0.070	4	2		355.1			351		353	81.16	162.33	
M8 - 164	8.43	0.360	0.050	0.310	11	10		375.0			364		365	33.34	38.71	
M8 - 176	8.21	0.650	0.090	0.560	20	18		368.6			348		351	18.15	21.06	
M8 - 178	8.25	0.620	0.080	0.540	19	17		289.4	11.4	3.94	270	-5	273	14.94	17 15	0.68
M8 - 182	8.15	0.770	0.130	0.640	24	20		354.6			331		335	14.74	17.73	
M8 - 188	8.37	0.550	0.090	0.460	17	14		374.1			357		360	21.77	26.02	
M8 - 206	8.41	0.500	0.110	0.390	16	12		382.4			367		370	24.47	31.38	
M8 - 208	8.30	0.440	0.070	0.370	14	12		400.9			387		389	29.16	34.68	
M8 - 210	8.25	0.400	0.080	0.320	13	10		410.6			398		401	32.84	41.06	
M8 - 214	8.43	0.420	0.060	0.360	13	11		402.3			389		391	30.65	35.76	
M8 - 220	8.31	0.630	0.080	0.550	20	17		394.7			375		377	20.05	22.96	
M8 - 236	8.42	0.460	0.110	0.350	14	11		211.6			197		201	14.72	19.35	
M19 - 76 **	8.70	0.560	0.070	0.500	18	16	0.9	193.0	20.5	10.61	176	5	177	11.03	12.35	1.31
M19 - 100 **	8.60	0.749	0.080	0.670	23	21	0.4	180.0	9.1	5.05	157	-12	159	7.69	8.60	0.43
M19 - 106 **	8.70	0.589	0.080	0.510	18	16	0.5	199.0	11.4	5.71	181	-5	183	10.81	12.49	0.71
M34 - 210E	8.78	0.320	0.050	0.270	10	8		405.0			395		397	40.50	48.00	

PROJECT: NWT Diamonds Project
CLIENT: BHP Diamonds Inc.
DATA TYPE: ABA Data for Misery North Pipe Rock Samples (Continued)
ROCK TYPE: Misery North Pipe - Kimberlite (Continued)
COMMENTS: Analyses were performed by Brenda Process Technology, Kelowna, BC.

Sample	Paste pH	% S Total (%)	% S SO(4) (%)	% S Sulphide (%)	TAP (CaCO(3) t/1000 tonne	SAP (CaCO(3) t/1000 tonne	% CO(2) Inorganic (%)	NP (CaCO(3) t/1000 tonne	CaNP (CaCO(3) t/1000 tonne	% (CaNP/NP)	NNP (CaCO(3) t/1000 tonne	RNNP (CaCO(3) t/1000 tonne	SNNP (CaCO(3) t/1000 tonne	NPR	SNPR	CaNP/ SAP
Upper Limit	14	100.00	100.00	100.00	N/A	N/A	100	1000.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Detection Limit	0	0.01	0.01	0.01	N/A	N/A	0.2	-1000.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Maximum Value	8.78	0.960	0.350	0.730	30	23	0.9	410.6	20.5	10.6	398	5	401	81.16	162.33	1.31
Minimum	6.19	0.140	0.040	0.070	4	2	0.4	38.9	8.5	2.4	9	-12	16	1.30	1.70	0.43
Average Value	8.16	0.519	0.092	0.428	16	13	0.60	324.7	12.2	5.5	308	-4	311	25.28	32.69	0.78
Standard Deviation	0.52	0.194	0.059	0.162	6	5	0.22	95.3	4.3	2.8	99	5	98	16.33	28.66	0.29
Count	32	32	32	32	32	32	3	32	5	5	32	5	32	32	32	5

TAP = % S (Total) * 31.25
  Note: TAP = 0 if % S (Total) < 0.05
% S (Sulphide) = % S (Total) - % S (SO(4))
HAP = (% S (Sulphide) + % S (del if > 0)) * 31.25
SAP = % S (Sulphide) * 31.25
  Note: SAP = 0 if % S (Sulphidel) < 0.05
CaNP = (% CO(2) / 44.01) * 100.09 * 10

NNP = NP - TAP
RNNP = CaNP - SAP
SNNP = NP - SAP
NPR = NP / TAP = +100 if S < 0.05 %
SNPR = NP / SAP = +100.0 if S < 0.05 %

@ = short term leach test results available

** = placed in a humidity cell (4 cells operating at this time: 3 at Chemex (M19 samples) and 1 at Brenda (FUC 3-3 66m)

NOTE: *If a result was reported to be less than the detection limit, a value of half the detection limit is shown in italics and used in subsequent calculations.*

Revised May 8, 1995

of Co

PROJECT: NWT Diamonds Project
CLIENT: BHP Diamonds Inc.
DATA TYPE: ABA Data for Lake Sediment Samples
ROCK TYPE: Till Samples
COMMENTS: Analyses were performed by Brenda Process Technology, Kelowna BC.

Sample	Paste pH	% S Total (%)	% S SO(4) (%)	% S Sulphide (%)	TAP (CaCO(3) t/1000 tonne	SAP (CaCO(3) t/1000 tonne	% CO(2) Inorganic (%)	NP (CaCO(3) t/1000 tonne	CaNP (CaCO(3) t/1000 tonne	% (CaNP/NP)	NNP (CaCO(3) t/1000 tonne	RNNP (CaCO(3) t/1000 tonne	SNNP (CaCO(3) t/1000 tonne	NPR	SNPR	CaNP/ SAP
Upper Limit	14	100.00	100.00	100.00	N/A	N/A	100	1000.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Detection Limit	0	0.01	0.01	0.01	N/A	N/A	0.2	-1000.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
P-3, 17, 5-30m, Panda Area	7.3	0.740	0.250	0.490	23	15		26.0			3		11	1.12	1.70	
P-4, 25-36m, Panda Area	8.86	0.080	*0.020*	0.060	3	2		21.0			19		19	8.40	11.20	
K-1, 20-55m, Koala Area	9.22	0.030	*0.020*	0.010	0	0		8.0			8		8	100.00	100.00	
K-3, 14-52m, Koala Area	8.96	0.030	*0.010*	0.020	0	0		7.0			7		7	100.00	100.00	
K-6, 10-51m, Koala Area	9.30	0.030	0.030	0.000	0	0		10.0			10		10	100.00	100.00	
F1-1, 22-46m, Fox Area	9.41	0.020	0.020	0.000	0	0		6.0			6		6	100.00	100.00	
F1-4, 11-34m, Fox Area	9.16	0.040	0.020	0.020	0	0		15.0			15		15	100.00	100.00	
F1-8, 27.5-54m, Fox Area	9.41	0.030	0.020	0.010	0	0		11.0			11		11	100.00	100.00	
F1-3, Fox Area	9.06	0.020	0.020	0.000	0	0		6.0			6		6	100.00	100.00	
F2-1 = L1, Fox Area	7.98	0.030	*0.005*	0.025	0	0		8.0			8		8	100.00	100.00	
F2-3 = L3, Fox Area	9.70	0.050	0.030	0.020	2	0		2.0			0		2	1.28	100.00	
F2-4 = L4, Fox Area	9.88	0.030	0.020	0.010	0	0		242.0			242		242	100.00	100.00	
Maximum Value	9.88	0.740	0.250	0.490	23	15	0	242.0	0	0	242	0	242	100.00	100.00	0
Minimum	7.3	0.020	*0.005*	0.000	0	0	0	2.0	0	0	0	0	2	1.12	1.70	0
Average Value	9.02	0.094	0.039	0.055	2	1	0	30.2	0	0	28	0	29	75.90	84.41	0
Standard Deviation	0.69	0.195	0.064	0.132	6	4	0	64.2	0	0	65	0	64	41.78	34.92	0
Count	12	12	12	12	12	12	0	12	0	0	12	0	12	12	12	0

TAP = % S (Total) * 31.25
Note: TAP = 0 if % S (Total) < 0.05
% S (Sulphide) = % S (Total) - % S (SO(4))
HAP = (% S (Sulphide) + % S (del if > 0)) * 31.25
SAP = % S (Sulphide) * 31.25
Note: SAP = 0 if % S (Sulphidel) < 0.05
CaNP = (% CO(2) / 44.01) * 100.09 * 10

NNP = NP - TAP
RNNP = CaNP - SAP
SNNP = NP - SAP
NPR = NP / TAP = +100 if S < 0.05 %
SNPR = NP / SAP = +100.0 if S < 0.05 %

NOTE: ***If a result was reported to be less than the detection limit, a value of half the detection limit is shown in italics and used in subsequent calculations.***

Revised May 8, 1995

of Co

PROJECT	NWT Diamonds Project
CLIENT.	BHP Diamonds Inc.
DATA TYPE:	ABA Data for Lake Sediment Samples
ROCK TYPE:	Lake Sediments - Soil
COMMENTS:	Analyses were performed by Brenda Process Technology, Kelowna, BC.

Sample	Paste pH	% S Total (%)	% S SO(4) (%)	% S Sulphide (%)	TAP (CaCO(3) t/1000 tonne	SAP (CaCO(3) t/1000 tonne	% CO(2) Inorganic (%)	NP (CaCO(3) t/1000 tonne	CaNP (CaCO(3) t/1000 tonne	% (CaNP/NP)	NNP (CaCO(3) t/1000 tonne	RNNP (CaCO(3) t/1000 tonne	SNNP (CaCO(3) t/1000 tonne	NPR	SNPR	CaNP/ SAP
Upper Limit	14	100.00	100.00	100.00	N/A	N/A	100	1000.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Detection Limit	0	0.01	0.01	0.01	N/A	N/A	0.2	-1000.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Site 17, 11 m, Leslie Area	5.24	0.180	0.100	0.080	6	3		7.5			2		5	1.34	3.01	
Site 27b, 10 m, Koala Area	6.35	0.100	*0.005*	0.095	3	3		23.9			21		21	7.64	8.05	
Site 7, 21 m, Fox Area	NA	0.150	*0.005*	0.145	5	5		2.5			-2		-2	0.54	0.56	
Site 48, 5 m, Misery Area	5.46	0.150	*0.005*	0.145	5	5		10.3			6		6	2.19	2.27	
Site 48, 22 m, Misery Area	5.50	0.140	0.070	0.070	4	2		13.9			10		12	3.17	6.35	
Site 48, 5 m, Misery Area	5.51	0.100	*0.005*	0.095	3	3		2.4			-1		-1	0.76	0.80	
Maximum Value	6.35	0.180	0.100	0.145	6	5	0	23.9	0	0	21	0	21	7.64	8.05	0
Minimum	5.24	0.100	*0.005*	0.070	3	2	0	2.4	0	0	-2	0	-2	0.54	0.56	0
Average Value	4.68	0.137	0.032	0.105	4	3	0	10.1	0	0	6	0	7	2.61	3.51	0
Standard Deviation	2.12	0.029	0.039	0.030	1	1	0	7 4	0	0	8	0	8	2.42	2.78	0
Count	6	6	6	6	6	6	0	6	0	0	6	0	6	6	6	6

TAP = % S (Total) * 31.25
Note: TAP = 0 if % S (Total) < 0.05
% S (Sulphide) = % S (Total) - % S (SO(4))
HAP = (% S (Sulphide) + % S (del if > 0)) * 31.25
SAP = % S (Sulphide) * 31.25
Note: SAP = 0 if % S (Sulphidel) < 0.05
CaNP = (% CO(2) / 44.01) * 100.09 * 10

NNP = NP - TAP
RNNP = CaNP - SAP
SNNP = NP - SAP
NPR = NP / TAP = +100 if S < 0.05 %
SNPR = NP / SAP = +100.0 if S < 0.05 %

NOTE: ***If a result was reported to be less than the detection limit, a value of half the detection limit is shown in italics and used in subsequent calculations.***

Revised May 8, 1995

◎ Table of Contents

Harris
EXPLORATION
SERVICES

MINERALOGY AND GEOCHEMISTRY

534 ELLIS STREET, NORTH VANCOUVER, B C , CANADA V7H 2G6 TELEPHONE (604) 929-5867

Report for: Janet Freeth,
Rescan Environmental Services Ltd.,
6th Floor, 1111 West Hastings St.,
VANCOUVER, B.C.
V6J 4V4

Report 95-9

January 24th, 1995

PETROGRAPHIC EXAMINATION OF ROCK SAMPLES FROM THE MISERY PROJECT (No. 455-1)

Introduction:

3 samples of finely comminuted rock, labelled VF 1 Misery 76m., VF 2 Misery 100m., and VF 3 Misery 106m., were received from Chemex Labs (analytical reference A 9431466-1). Small portions of each sample were dispersed in epoxy on glass slides and prepared as polished thin sections (Slides 95-016X, 017X and 018X respectively).

Summary:

The three samples are all very similar in general character, consisting dominantly of small fragments of a fine-grained material of compact argillaceous/micaceous aspect (resembling brown mudstone).

Accessory silicate constituents occur as scattered, liberated mineral particles, ranging up to 200 - 300 microns in size. They include fresh olivine, garnet, serpentine, quartz and/or feldspar,occasional biotite, and indeterminate sub-opaque material.

Note that all the samples appear devoid of carbonate (normally a significant constituent of kimberlite).

Traces of sulfides are present in all three samples at estimated abundances of 0.2 - 0.8%. They consist entirely of pyrite, partly as small fragments of normal crystalline appearance, but mainly as minutely fine-grained individual spheroidal specks (1 - 3 microns in size) within the brown matrix material or disaggregated therefrom; as small framboidal clusters of the above; or as compact aggregates of "dusty" brownish, sometimes colloform appearance. A minor component of intergrown marcasite is occasionally recognizable in the latter.

The attached photomicrographs illustrate the above modes of occurrence.

The dominant textural type of pyrite in these samples resembles that of biogenic sulfides in black shale. This variety is generally considered to be more prone to rapid oxidation than the normal crystalline type. However, the low estimated abundances are in a range below that normally considered significant in terms of acid generation. The absence of carbonate implies minimal natural buffering capacity, but lab testing will provide specific information in this regard.

Individual petrographic descriptions are attached.

J.F. Harris Ph.D.

SAMPLE: VF 1: Misery 76m. (Slide 95-016X)

Estimated mode

Brown matrix	80
Olivine	12
Garnet	3
Quartz	2
Biotite	0.2
Limonite) Rutile)	2
Pyrite	0.8

This sample has a particle size range of 5 - 300 microns.

The principal component is a rather finely comminuted, brownish fine-grained material which appears to consist largely of sericite, and resembles a carbonaceous mudstone. The other constituents occur as disaggregated mineral grains. They include a high relief, colourless silicate showing moderate birefringence, and a high relief, light brownish-pink, isotropic mineral. These are clearly much harder than the brown matrix, and include some relatively large grains. The birefringent mineral is probably olivine, and the isotropic phase is almost certainly garnet.

Other minor constituents are a low-birefringent, low-relief, colourless phase which may be quartz or feldspar, sub-opaque material which is probably secondary Fe-Ti oxides, and rare flakes of red-brown biotite.

The minor sulfide component appears to consist entirely of pyrite. In part this occurs as small grains of "normal" crystalline aspect but, predominantly, it is of a minutely fine-grained framboidal type. This is seen both in compact aggregate form of "dusty", incipiently colloform aspect, and also as individual tiny specks or framboids (in the low micron particle size range), both disaggregated and disseminated in the brown matrix.

SAMPLE VF 2: Misery 100m. (Slide 95-017X)

Estimated mode

Brown matrix	90
Olivine	3.5
Quartz	3
Serpentine	1
Sub-opaques	2
Pyrite	0.3
Marcasite	trace

This sample is essentially similar to VF 1, but with a substantially lower proportion of olivine, and a virtual absence of garnet. Probable quartzose grains are perceptibly more abundant, and there are scattered grains of recognizable serpentine.

Pyrite is of very low abundance (perceptibly less than in VF 1), but shows the same textural range - occurring partly as small grains of normal crystalline appearance, and partly as minutely fine-grained specks and framboids, or aggregates thereof. One particle of compact colloform-textured pyrite has a recognizable component of intergrown marcasite.

SAMPLE VF 3: Misery 106m. (Slide 94-018X)

Estimated mode

Brown matrix	82
Olivine	6
Garnet	3
Quartz) Feldspar)	3
Biotite	1
Serpentine	3
Sub-opaques	1.5
Pyrite	0.4

This sample has a dominant particle size range of 2 - 100 microns, with occasional grains to 200 microns.

It is of essentially identical type to the previous two samples, consisting predominantly of brown, fine-grained material of argillaceous/sericitic aspect.

This sample resembles VF 1 in containing accessory garnet and biotite, and VF 2 in containing recognizable serpentine. The accessory quartzo-feldspathic component includes a proportion of fresh plagioclase.

The pyrite content appears intermediate between that of the other two samples. It consists mainly of dispersed micron-sized specks and tiny framboids, occasionally as compact aggregates up to 80 microns or so in size. There are also occasional small grains of normal crystalline appearance.

PHOTOMICROGRAPHS

All photos are by reflected light, except where otherwise stated

SAMPLE VF 1: Misery 76m.

Neg. 347-16A: Transmitted light. Scale 1cm = 85 microns. Typical field, showing brown matrix component (sub/translucent patches and dispersed flecks); olivine (high relief, colourless; e.g. upper centre, lower left); garnet (high relief, brownish, left and upper left); quartz or feldspar (low-relief, colourless; lower right centre); pyrite (opaque, black; right centre) and limonite (dark brown sub-opaque; adjacent to the pyrite).

Neg. 347-18A: Same field by reflected light. Example of a grain of normal, crystalline pyrite (cream colour).

Neg. 347-19A: Scale 1cm = 85 microns. Example of "dusty", fine-grained, colloform-type pyrite (90 micron grain; left centre). Field also contains a few tiny individual pyrite spheroids (10 micron speck at right centre, and 3 micron speck in fragment of brown matrix at bottom left). Olivine and garnet grains are recognizable by their high relief. Diffuse brownish grains are the mudstone-like matrix material.

Neg. 347-20A: Scale 1cm = 42 microns. Higher magnification to show detail of pyrite as compact framboidal clump. Field also includes pyrite as a smaller, more diffuse framboid (left), and several individual minute spheroids (bright specks).

Neg. 347-22A: Scale 1cm = 42 microns. Examples of compact fine-grained/framboidal pyrite, and individual tiny spheroids (2 - 5 microns in size) in fragments of brown matrix material.

SAMPLE VF 2: Misery 100m.

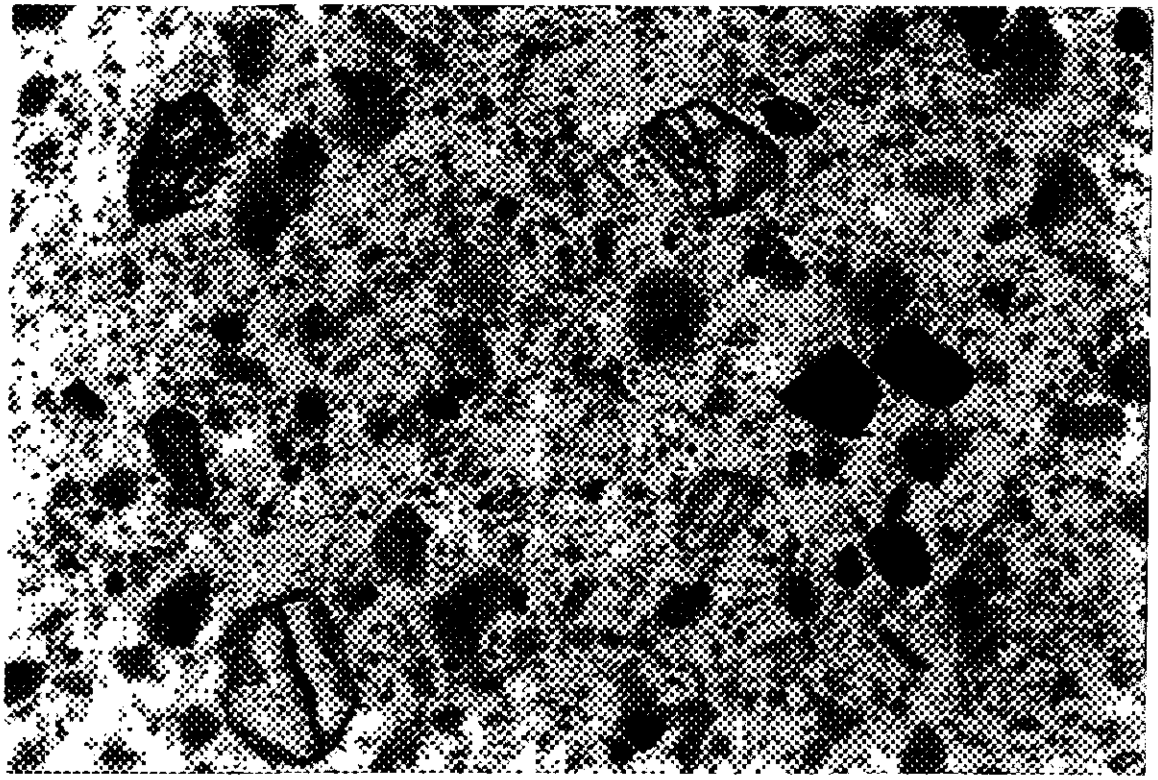
Neg. 347-15: Scale 1cm = 21 microns. Highest magnification, to show detail of porous aggregate of fine-grained pyrite (cream colour) with intergrown marcasite (more greyish).

SAMPLE VF 3: Misery 106m.

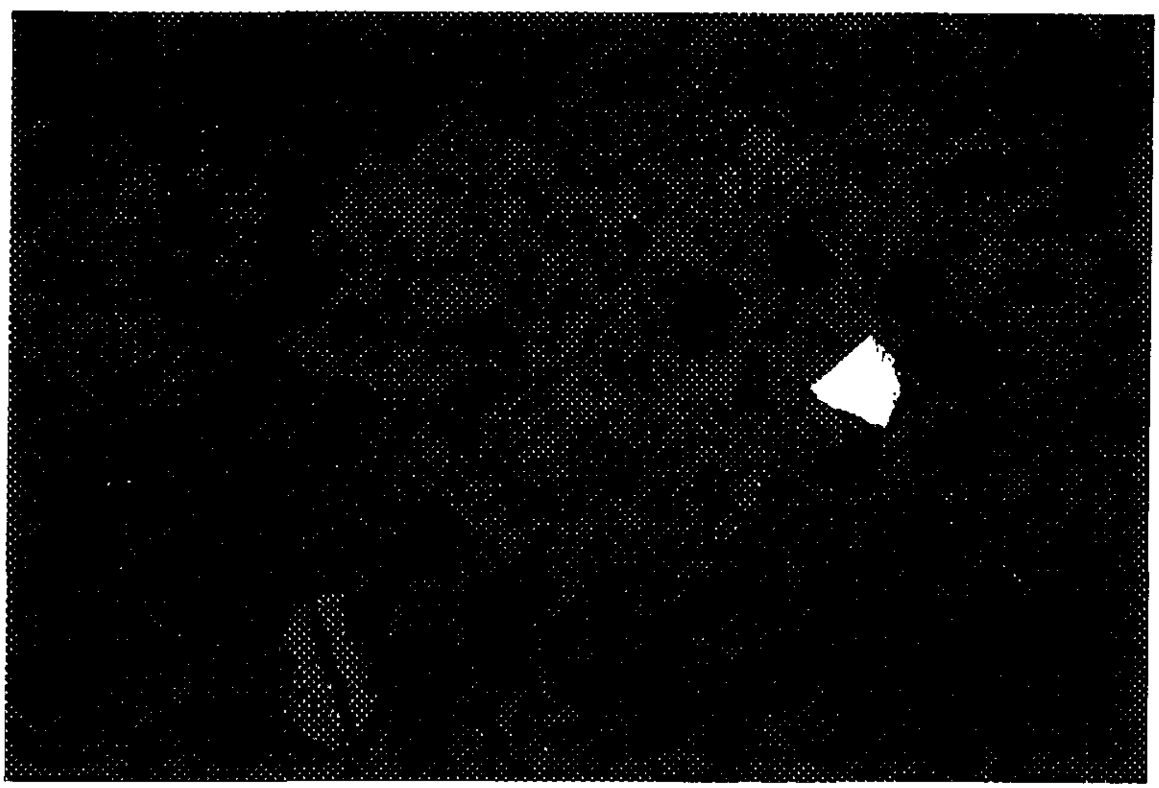
Neg. 347-23A: Scale 1cm = 42 microns. Examples of compact pyrite framboids; individual pyrite spheroids (minute bright specks); and an atoll-form of framboidal pyrite (top).

Neg. 347-24A: Scale 1cm = 42 microns. Another example of the varied mode of occurrence of pyrite in these samples. Field includes two grains of normal crystalline type (angular, cream colour); a small framboid (bottom); and several individual minute spheroids (bright specks).

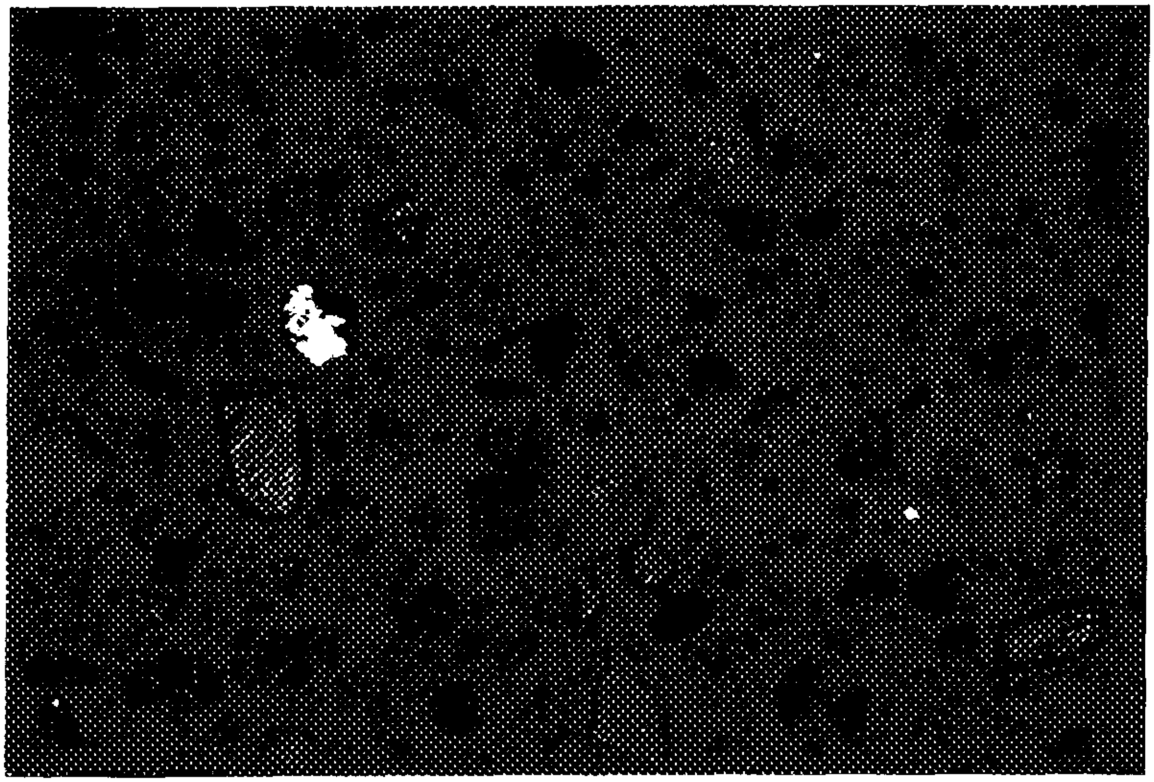
◎ Table of Contents



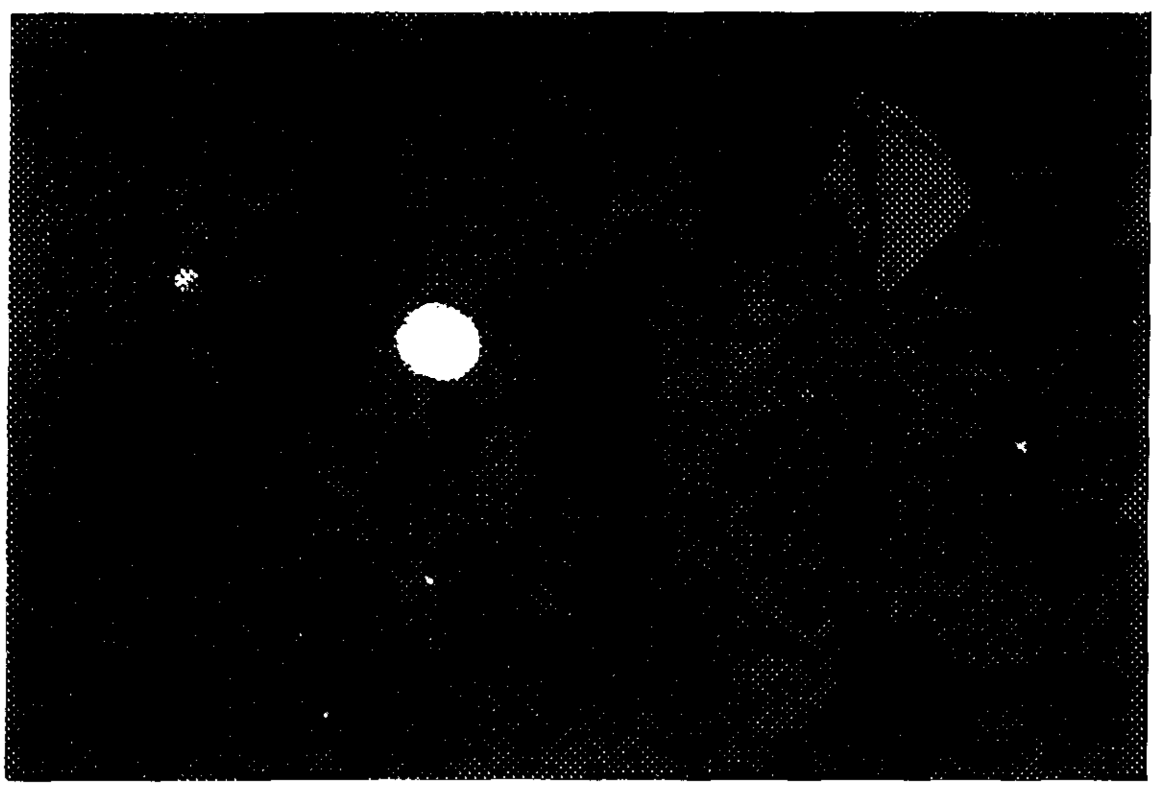
Photomicrograph 347-16A.



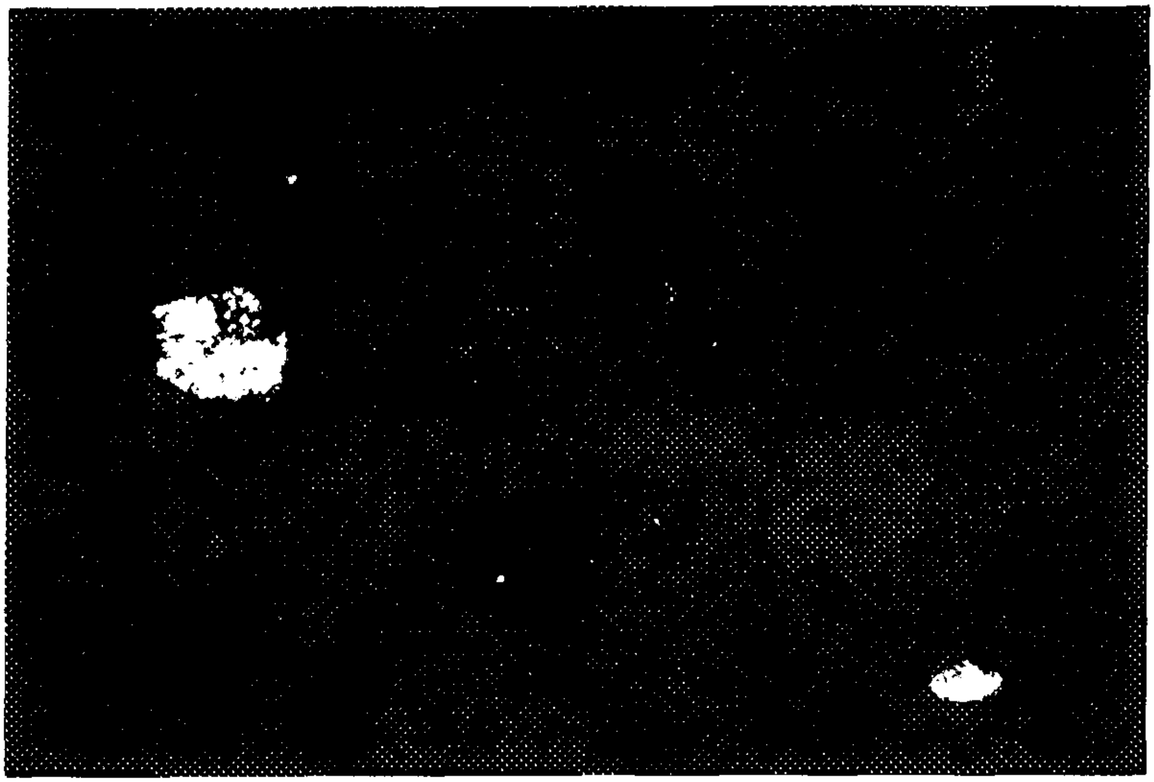
Photomicrograph 347-18A



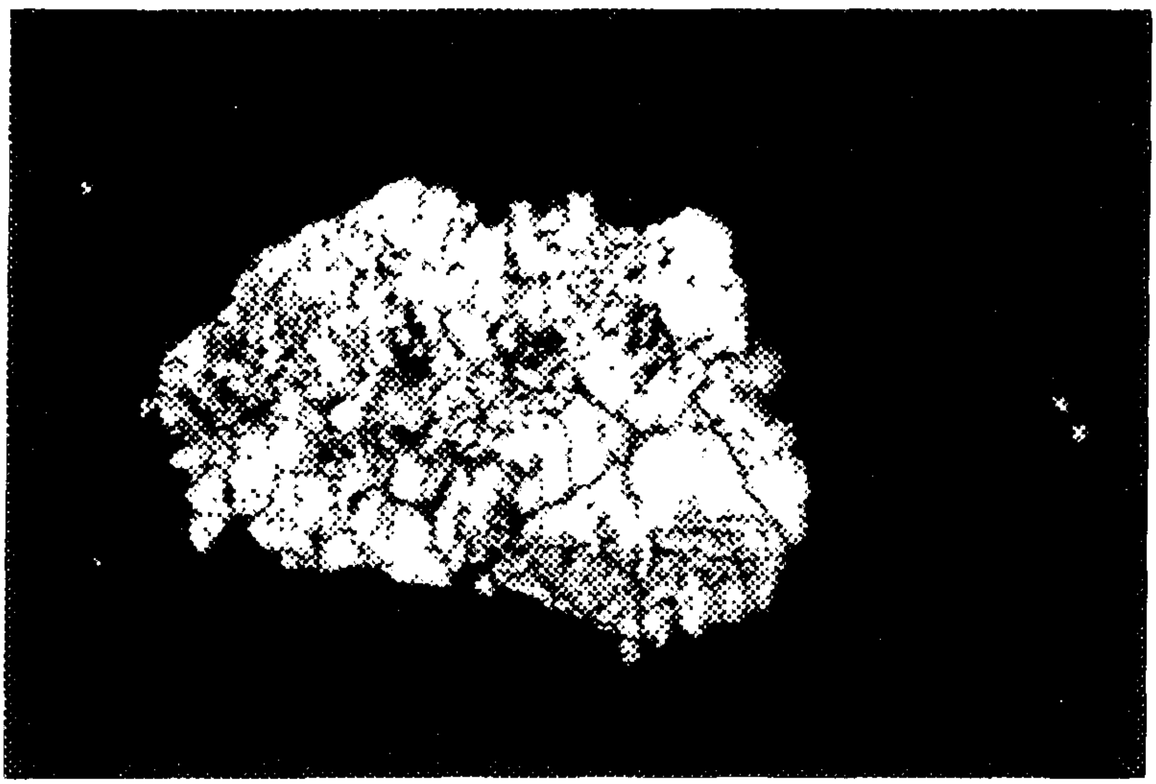
Photomicrograph 347-19A.



Photomicrograph 347-20A.

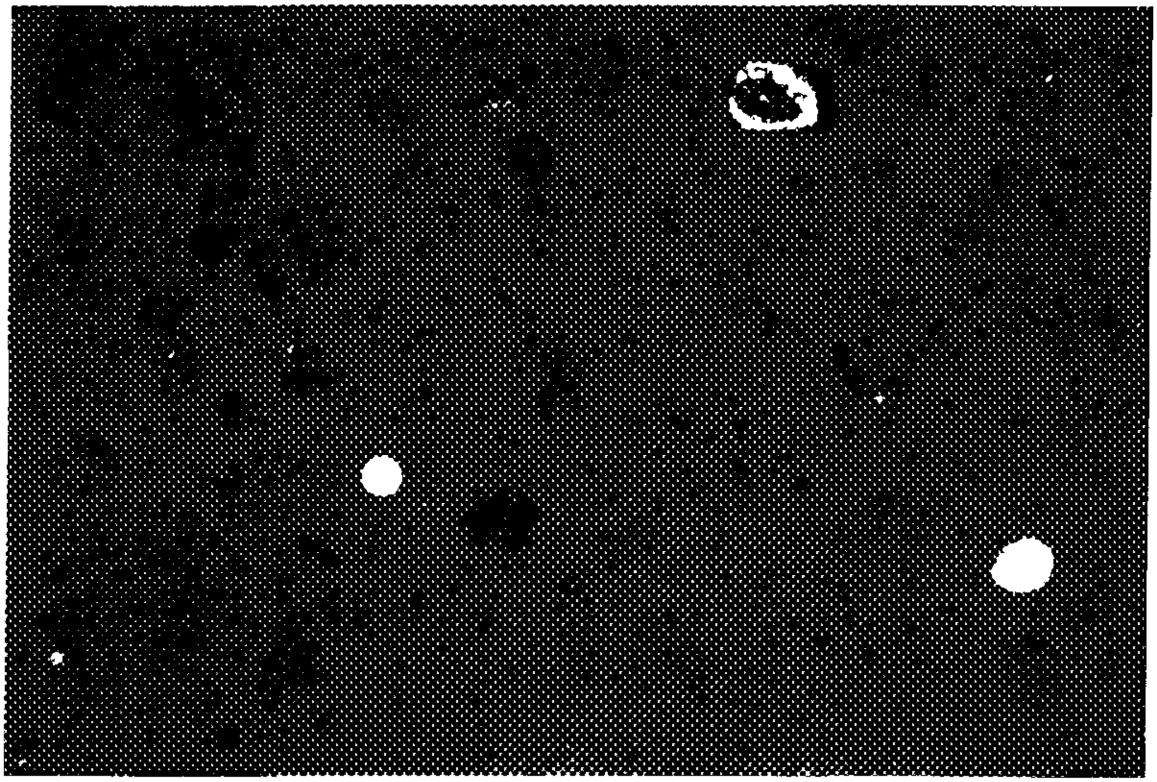


Photomicrograph 347-22A.

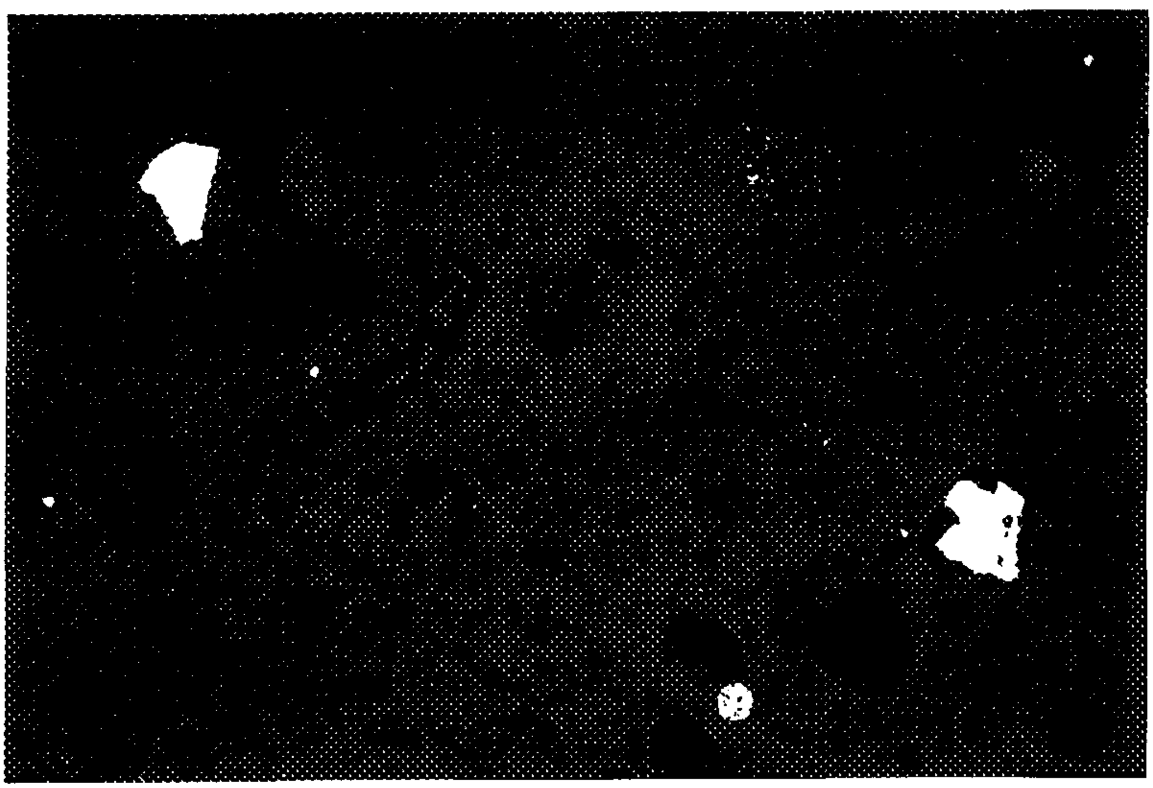


Photomicrograph 347-15.

◎ Table of Contents

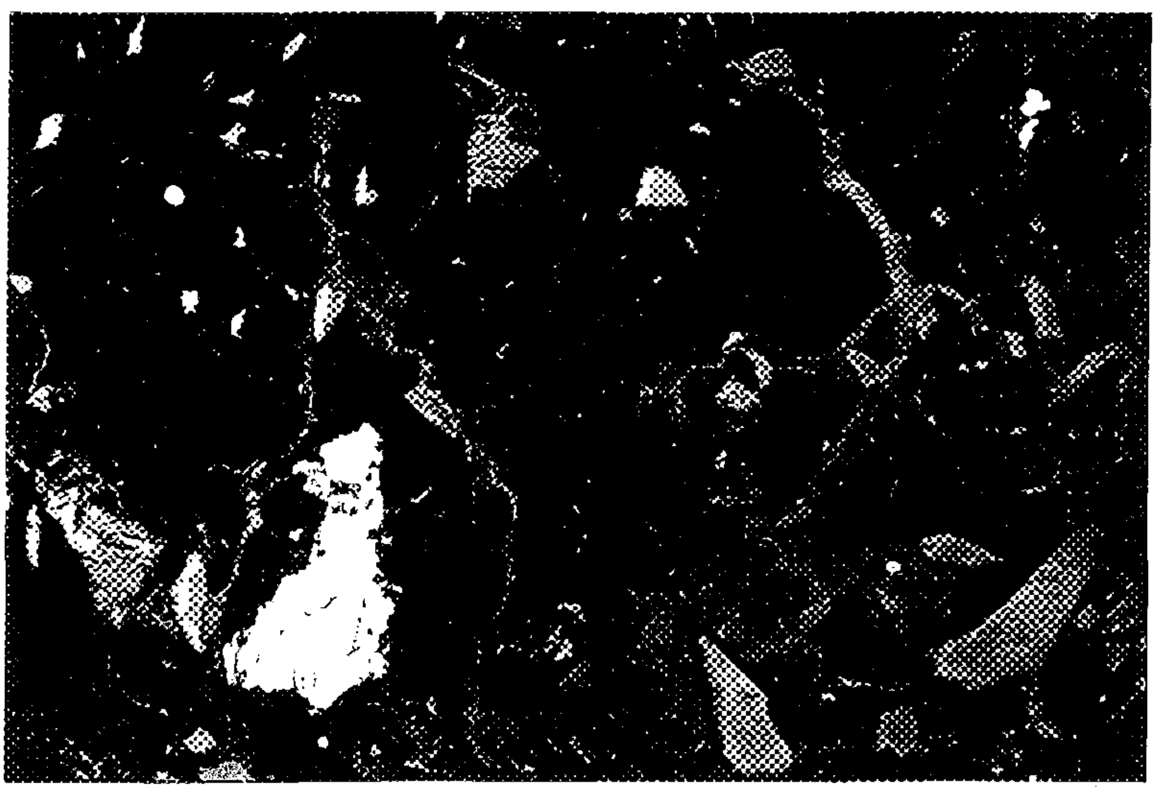


Photomicrograph 347-23A



Photomicrograph 347-24A

Photomicrograph 347-24.



Photomicrograph 347-25.

◎ Table of Contents

Harris
EXPLORATION
SERVICES

MINERALOGY AND GEOCHEMISTRY

534 ELLIS STREET, NORTH VANCOUVER, B C, CANADA V7H 2G6 TELEPHONE (604) 929 5867

Report for: Janet Freeth,
Rescan Environmental Services Ltd.,
6th Floor,
1111 West Hastings St.,
VANCOUVER, B.C.
V6J 4V4

Report 95-29

March 13th, 1995

PETROGRAPHIC EXAMINATION OF ROCK SAMPLES FROM THE N.W.T. DIAMONDS PROJECT

Introduction:

Two samples of crushed rock, numbered BHP FUC 3-3 66m. and BHP M8 27-31m., were submitted for examination. Small portions of each sample were prepared as polished thin sections (Slides 95-100X and 95-101X).

The objective of this work is to determine mineralogical and textural features relevant to acid rock drainage potential.

Summary:

Sample BHP FUC 3-3 66m. consists of fresh intrusive-type diabase, composed of meshwork intergrowths of plagioclase with pyroxene and accessory amphibole - locally showing classic ophitic relationships. This rock contains a little quartz and disseminated Fe-Ti oxides.

It contains an estimated 1% pyrite, as small anhedral grains and as delicate lattice and meshwork intergrowths with ilmenite and rutile. Carbonate is absent.

Sample BHP M8 27-31m. is a fragmental rock consisting of an optically indeterminate, minutely fine-grained, brown material of altered mafic aspect. This appears compositionally homogenous, except for its content (about 10%) of xenoliths - consisting of quartz, feldspars and biotite, or granitoid intergrowths of these minerals.

The rock contains an estimated 0.1 - 0.2% pyrite, mainly as minute spherulites and small framboidal clusters. Carbonate is apparently absent.

J.F. Harris Ph.D.

SAMPLE: BHP FUC 3-3 66m. (Slide 95-100X)

Estimated mode

Plagioclase	50
Pyroxene	35
Amphibole	10
Quartz	2
Rutile) Ilmenite)	2
Pyrite	1
Pyrrhotite	trace
Chalcopyrite	trace

This sample consists of rock fragments ranging in size from 0.02 - 3.0mm.

The lithology is clearly displayed in the coarser fragments, which are composed of intergrowths of fresh, lath-like, prismatic plagioclase grains (0.2 - 1.0mm in size), with pyroxene and amphibole. The pyroxene grains occasionally reach 2mm in size, and sometimes show partial or complete incorporation of smaller plagioclase prisms (ophitic texture).

Accessories are minor quartz and Fe/Ti oxides (ilmenite and rutile), and the rock is classifiable as a tholeiitic diabase. The constituent minerals are all notably fresh, except for occasional modification of the mafics to brown ferruginous secondary material and fibrous secondary amphibole. This feature is often developed adjacent to disseminated sulfides.

Carbonate is absent.

Sulfides consist predominantly of pyrite. This exhibits a grain-size range of 0.02 - 0.2mm, and is almost entirely anhedral. It occurs as discrete granules interstitial to the silicates, and in intimate association with Fe-Ti oxides as fine-grained meshworks and rimming intergrowths. Some of the latter have the look of secondary pyrite after pyrrhotite, but only extremely rare examples of actual pyrrhotite could be found. Traces of chalcopyrite are also present (typically independent of the pyrite).

SAMPLE BHP M8 27-31m. (Slide 95-101X)

Estimated mode

	Brown matrix	90
	Pyrite	0.2
Xenoliths		
	Plagioclase	4
	K-feldspar	1
	Quartz	4
	Biotite	0.5
	Pyroxene	trace
	Pyrite	0.2

This sample is made up of rock fragments 0.05 - 5.0mm in size.

These consist predominantly of a turbid, brown, cryptocrystalline to minutely fibrous material of indeterminate composition (possibly a form of secondary amphibole or serpentine). This resembles a tuff or mudstone.

It shows a distinct fragmental texture, being composed of more or less close-packed, sub-rounded, pellety clasts, 0.02 - 1.0mm in size, in a matrix of the same material.

The other silicate constituents noted in the estimated mode occur as scattered xenoliths, 0.05 - 2.0mm in size. The smaller ones are individual mineral grains, and the larger ones mostly intergrowths of granitoid aspect, composed of quartz, fresh feldspars and biotite.

Tiny liberated flakes of brown biotite also occur sparsely scattered through the brown matrix. These may be xenocrystic or a true matrix component.

Very minor proportions of pyrite are present. This occurs in distinctive form - as minute spherulites and clusters of framboids 2 - 70 microns in size. Extremely rare anhedral grains of normal granular pyrite, to 0.3mm in size, (possibly xenolithic) were also seen.

The absence of Fe oxides is a notable feature. The rock is apparently devoid of carbonate.

PHOTOMICROGRAPHS

SAMPLE BHP FUC 3-3 66m.

Neg. 357-20: Cross-polarized transmitted light. Scale 1cm = 170 microns. Typical field of the diabase lithotype constituting this sample. Grey prismatic grains with lamellar twinning are fresh plagioclase. Coloured grains (orange-violet) are pyroxene. Greenish-brown mottled areas are secondary amphibole. Black (opaque) areas are Fe-Ti oxides and/or sulfides.

Neg. 357-21: Reflected light. Same field as 357-20. Shows pyrite (cream colour) as small pockets intergranular to silicates (e.g. right; centre; upper left) and as intimate intergrowths with Fe-Ti oxides (lower left). Field also includes a thin cross-cutting veinlet of pyrite (upper centre). Note: this field has an atypically high abundance of pyrite compared with the overall sample.

Neg. 357-22: Reflected light. Scale 1cm = 85 microns. Detail of pyrite as lattice-work of thin films in cleavages of Fe-Ti oxide. Field also includes some small euhedral grains of pyrite (left).

SAMPLE BHP M8 27-31m.

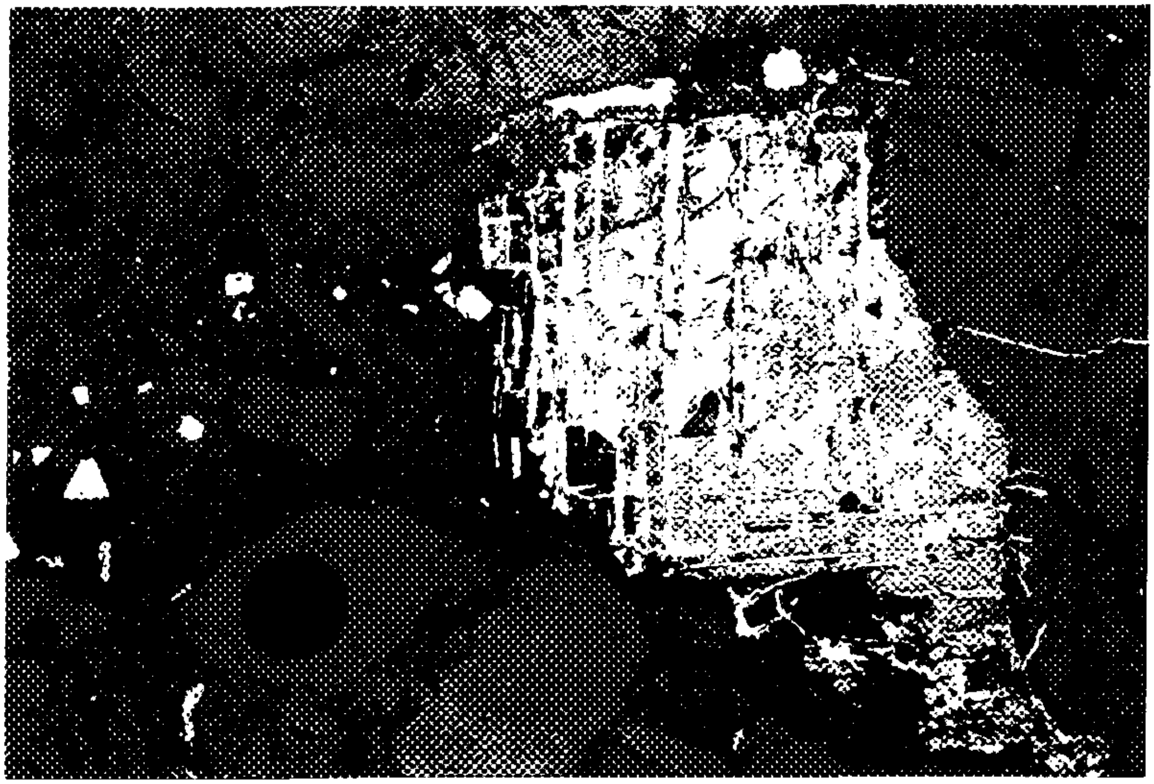
Neg. 357-23: Cross-polarized transmitted light. Scale 1cm = 170 microns. Quartz/feldspar xenoliths (white/blue-grey) in crypto-crystalline altered matrix. Pellety/fragmental texture in the matrix is recognizable as patches of greater and lesser isotropy (black vs brown flecked).

Neg. 357-24: Reflected light. Scale 1cm = 85 microns. Shows pyrite (white) as sparsely disseminated, individual, tiny spheroids and as a cluster of the same (upper left). Heterogenous fragmental character of the altered rock matrix is clearly shown, as are the angular quartzo-feldspathic xenoliths (lighter brownish-grey).

Neg. 357-25: Reflected light. Scale 1cm = 85 microns. Example of angular aggregate (xenolith?) of fine-grained compact pyrite (cream colour; lower left). Field also includes a few vari-sized pyrite spheroids (upper left; top right).

Photomicrograph 357-20

Photomicrograph 357-21.



Photomicrograph 357-22.

Photomicrograph 357-23

Appendix III-C3

BHP Diamonds/Diamet Exeter Lake Project
Analytical Results of Modified Special Waste Extraction Tests (50 g solids in final water volume of 1 L after 1 hour in a rotary extractor)
@ = ABA results available
(latest update March 10, 1995)

Sample Name	Rock Type	Pipe/Area	Ag µg/l	Al µg/l	As µg/l	Ba µg/l	B µg/l	Be µg/l	Ca µg/l	Cd µg/l	Co µg/l	Cr µg/l	Cu µg/l	Fe µg/l	Hg µg/l	K µg/l	Mg µg/l	Mn µg/l	Mo µg/l	Na µg/l	Ni µg/l	Pb µg/l	Sb µg/l	Se µg/l	Sr µg/l	Te µg/l	U µg/l	V µg/l	Zn µg/l
FX4 - 1 188 metres@	Granite	Fox Pipe	<0.01	252.0	5.87	4.3	4.47	<0.1	6190	<0.10	0.106	0.35	1.22	60.2	<0.05	7650	314	2.39	1.680	995	0.59	0.44	0.07	1.05	30.1	<0.10	0.039	1.2	30.05
F1 - 1 216 metres@	Kimberlite	Fox Pipe	0.096	253.0	33.2	15.0	17.3	<0.1	962	<0.10	0.518	4.73	5.51	447	0.36	12400	1570	5.81	7.140	29600	16.6	0.35	0.19	1.09	5.4	<0.10	0.12	4.3	3.49
F1 - 1 72 metres@	Kimberlite	Fox Pipe	0.627	4700	74.6	422.0	22.6	<0.1	9130	0.32	8.720	60.20	11.00	12200	0.55	111000	41700	260.00	28.700	52400	237	2.70	1.59	2.54	164	<0.10	7.38	222.0	42.85
KDC - 03 60 metres@	Granite	Koala Pipe	<0.01	84.2	<0.50	3.6	3.29	<0.1	2850	<0.10	0.015	0.35	<0.20	24.6	<0.05	5190	252	0.39	0.399	697	<0.20	<0.10	0.14	2.74	13	<0.10	<0.02	0.9	<0.1
K - 2 156 metres @	Kimberlite	Koala Pipe	0.013	3.6	7.2	120.0	8.67	<0.1	4730	<0.10	0.030	0.89	1.85	35.2	<0.05	12700	9450	0.85	2.140	3490	3.34	<0.10	0.22	<0.50	188	<0.10	<0.02	2.8	1.16
K - 2 222 metres@	Kimberlite	Koala Pipe	0.017	4.9	8.07	79.0	39.1	<0.1	12400	0.32	0.128	1.13	1.44	33.7	0.19	27700	19400	9.53	43.200	3090	12.1	<0.10	1.56	0.69	396	<0.10	0.152	10.9	0.46
K - 2 72 metres @	Kimberlite	Koala Pipe	<0.01	9.6	14.9	73.0	15.4	<0.1	8420	0.14	0.091	1.17	0.76	28.8	0.25	3270	18400	3.64	15.900	1320	4.22	<0.10	1.72	<0.50	218	<0.10	0.042	8.2	3.99
LDC - 05 80 metres@	Granite	Leslie Pipe	0.049	341.0	10.9	3.1	3.11	<0.1	3190	<0.10	0.043	0.67	1.43	101	0.17	5840	376	1.10	0.762	3270	0.53	0.21	0.09	<0.50	48	<0.10	0.036	2.3	<0.1
F2 - 4 166 metres@	Kimberlite	Leslie Pipe	0.046	<1.0	1.47	15.0	4.91	<0.1	2950	<0.10	0.041	0.57	2.68	<10	<0.05	8160	3710	0.20	1.360	685	0.55	<0.10	0.06	<0.50	51	<0.10	<0.02	<0.50	<0.1
M - 8 156 metres@	Kimberlite	Misery North Pipe	0.062	27.8	15.3	107.0	40.6	<0.1	4490	0.37	0.168	2.24	0.81	92.8	<0.05	172000	3250	1.59	55.000	13000	6.54	<0.10	1.96	0.82	155	<0.10	0.053	7.3	4.75
M - 8 48 metres@	Kimberlite	Misery North Pipe	0.035	4.6	3.22	98.7	27.5	<0.1	8070	0.20	0.134	1.08	1.20	37.4	<0.05	24200	27300	4.58	33.900	884	9.02	<0.10	1.61	2.48	278	<0.10	0.110	4.8	<0.1
PDC - 06 200 metres@	Granite	Panda Pipe	<0.01	13.7	5.57	25.9	3.89	<0.1	5350	<0.10	0.042	0.36	<0.20	35.3	0.17	7750	671	5.21	2.680	646	0.60	<0.10	0.12	<0.50	30.2	<0.10	<0.02	3.0	<0.1
P - 7 240 metres@	Kimberlite	Panda Pipe	0.042	19.1	23	148.0	11.3	<0.1	2440	0.17	0.244	1.30	1.81	75.9	0.10	36500	5300	3.62	20.000	1210	6.11	0.17	1.39	<0.50	81	<0.10	<0.02	1.6	4.04
P - 7 62 metres@	Kimberlite	Panda Pipe	<0.01	6.4	11.2	129.0	6.51	<0.1	6240	0.16	0.057	0.95	1.85	56.6	0.21	5610	9470	1.03	25.000	863	5.48	<0.10	1.27	4.74	112	<0.10	0.047	9.4	6.65

Sample Name	Rock Type	Pipe/Area	Ag mg/kg	Al mg/kg	As mg/kg	Ba mg/kg	B mg/kg	Be mg/k	Ca mg/kg	Cd mg/kg	Co mg/kg	Cr mg/kg	Cu mg/kg	Fe mg/kg	Hg mg/kg	K mg/kg	Mg mg/kg	Mn mg/kg	Mo mg/kg	Na mg/kg	Ni mg/kg	Pb mg/kg	Sb mg/kg	Se mg/kg	Sr mg/kg	Te mg/kg	U mg/kg	V mg/kg	Zn mg/kg
FX4 - 1 188 metres@	Granite	Fox Pipe	0.00000	5.04	0.12	0.09	0.09	0	123.8	0	0.00	0.01	0.02	1.204	0.0000	153	6.28	0.0478	0.0336	19.9	0.01	0.0087	0.0015	0.0210	0.6	0	0.0008	0.0246	0.601
F1 - 1 216 metres@	Kimberlite	Fox Pipe	0.00191	5.06	0.66	0.3	0.35	0	19.24	0	0.01	0.09	0.11	8.94	0.0073	248	31.4	0.1162	0.1428	592	0.33	0.0069	0.0037	0.0218	0.11	0	0.0023	0.0864	0.0698
F1 1 72 metres@	Kimberlite	Fox Pipe	0.01254	94	1.49	8.44	0.45	0	182.6	0.01	0.17	1.2	0.22	244	0.0109	2220	834	5.2	0.574	1048	4.74	0.0540	0.0318	0.0508	3.28	0	0.1476	4.4400	0.857
KDC - 03 60 metres@	Granite	Koala Pipe	0.00000	1.68	0	0.07	0.07	0	57	0	0.00	0.01	0	0.492	0.0000	103.8	5.04	0.0078	0.008	13.94	0	0.0000	0.0027	0.0548	0.26	0	0.0000	0.0189	0
K - 2 156 metres @	Kimberlite	Koala Pipe	0.00026	0.07	0.14	2.4	0.17	0	94.6	0	0.00	0.02	0.04	0.704	0.0000	254	189	0.0169	0.0428	69.8	0.07	0.0000	0.0044	0.0000	3.76	0	0.0000	0.0550	0.0232
K - 2 222 metres@	Kimberlite	Koala Pipe	0.00035	0.1	0.16	1.58	0.78	0	248	0.01	0.00	0.02	0.03	0.674	0.0037	554	388	0.1906	0.864	61.8	0.24	0.0000	0.0312	0.0138	7.92	0	0.0030	0.2180	0.0092
K 2 72 metres @	Kimberlite	Koala Pipe	0.00000	0.19	0.3	1.46	0.31	0	168.4	0.00	0.00	0.02	0.02	0.576	0.0051	65.4	368	0.0728	0.318	26.4	0.08	0.0000	0.0344	0.0000	4.36	0	0.0008	0.1644	0.0798
LDC - 05 80 metres@	Granite	Leslie Pipe	0.00098	6.82	0.22	0.06	0.06	0	63.8	0	0.00	0.01	0.03	2.02	0.0033	116.8	7.52	0.022	0.0152	65.4	0.01	0.0043	0.0019	0.0000	0.96	0	0.0007	0.0460	0
F2 - 4 166 metres@	Kimberlite	Leslie Pipe	0.00091	0	0.03	0.3	0.1	0	59	0	0.00	0.01	0.05	0	0.0000	163.2	74.2	0.0039	0.0272	13.7	0.01	0.0000	0.0012	0.0000	1.02	0	0.0000	0.0000	0
M - 8 156 metres@	Kimberlite	Misery North Pipe	0.00123	0.56	0.31	2.14	0.81	0	89.8	0.01	0.00	0.04	0.02	1.856	0.0000	3440	65	0.0318	1.1	260	0.13	0.0000	0.0392	0.0164	3.1	0	0.0011	0.1460	0.095
M - 8 48 metres@	Kimberlite	Misery North Pipe	0.00070	0.09	0.06	1.97	0.55	0	161.4	0.00	0.00	0.02	0.02	0.748	0.0000	484	546	0.0916	0.678	17.68	0.18	0.0000	0.0322	0.0496	5.56	0	0.0022	0.0968	0
PDC - 06 200 metres@	Granite	Panda Pipe	0.00000	0.27	0.11	0.52	0.08	0	107	0	0.00	0.01	0	0.706	0.0034	155	13.42	0.1042	0.0536	12.92	0.01	0.0000	0.0024	0.0000	0.6	0	0.0000	0.0604	0
P 7 240 metres@	Kimberlite	Panda Pipe	0.00084	0.38	0.46	2.96	0.23	0	48.8	0.00	0.00	0.03	0.04	1.518	0.0020	730	106	0.0724	0.4	24.2	0.12	0.0034	0.0278	0.0000	1.62	0	0.0000	0.0318	0.0808
P 7 62 metres@	Kimberlite	Panda Pipe	0.00000	0.13	0.22	2.58	0.13	0	124.8	0.00	0.00	0.02	0.04	1.132	0.0041	112.2	189.4	0.0206	0.5	17.26	0.11	0.0000	0.0254	0.0948	2.24	0	0.0009	0.1870	0.133

Appendix III-C4

NWT Diamonds Project

EBA Engineering Consultants Ltd.

July 4, 1995 EBA File 0101-94-11580 2

VIA FAX: (604) 681-5736 (6 Pages)
BHP Diamonds Inc
1050 West Pender Street, Suite 1600
Vancouver, BC
V6E 3S7

Attention Mr Wayne Corso

Subject. Waste Rock Dump Analysis

We have completed a thermal analysis of the waste rock dumps to aid your evaluation of probable surface water discharge from the dumps and its impact on surrounding lakes and streams. The thermal analysis was conducted in two stages first, the construction of a waste dump was modelled, then, the seepage of water through the dump was modelled The time required for the water to freeze was calculated and compared with the time requiied for the water to seep through and exit the dump

The construction of the waste rock dump was modelled as follows

- the dump was constructed to a height of 20 m within 3 years,
- the height of the dump was raised in 2 m thick layer increments,
- initial rock temperatures that varied from -5°C for material placed at the bottom of the waste dump to -0 5°C for material placed at the top of the waste dump (since the quarried rock temperature will increase as lower levels of the pit are mined), and
- the waste rock was assigned an initial moisture content of 1% (as a percentage of solids weight) Other material properties are listed in Table 1.

The temperatures within the dump and its foundation were found to equilibrate to approximately -5°C throughout (except near the surface where seasonal temperature variations occur) from the model which accounts for the construction sequence. The construction sequence of the dumps may vary somewhat (e.g a longer construction period or thicker lifts), however, such variations are not expected to alter the results significantly

Once the post-construction temperature profile in the dump was established, seepage of water into the dump was modelled Annual precipitation at the site is estimated at 0 31 m, of this amount, runoff (from natural terrain) is estimated at 0 18 m, the remainder (0 13 m) will infiltrate (or be lost to evapotranspiration and sublimation) Runoff from the waste dumps will be lower than from natural terrain, because the tops of the waste dump are typically flat. However, because the tops of the waste dumps are elevated, snow will be swept from them during the winter, resulting in reduced infiltration Based on these consideıations, we have assumed that 50% of the precipitation (or 155 mm) would infiltrate into the dump

The infiltration of water into the dump was modelled as follows·

- water was infiltrated into the dump in layers of 10 mm,

- the water was assumed to percolate quickly from the top of the dump to the original ground surface without freezing,

- upon reaching the bottom of the dump, the water was assumed to saturate the rock (at a dry density of 2000 kg/m^3), producing an incremental saturated height of 40 mm and raising the temperature of the saturated rock to just above freezing, and

- the time required for this thin unfrozen layer to freeze was then computed,

Water infiltration from thawing snow was modelled by infiltrating 10 mm of water for 6 days in a row, water infiltration from summer rains was modelled by infiltrating 10 mm of water in 10 day intervals, 9 times in a row Table 2 presents the schedule at which water infiltrates into the dump, and the time required to freeze each layer On an annual basis, in less than 15% of the infiltration events, all water freezes in 6 hours; in more than 70% of the infiltration events, all water freezes in 10 hours

If it takes too long for the water to freeze, it may begin to escape from the waste dump In order to determine the amount of water that will freeze, the time it would take for water to percolate to the perimeter of the dump and escape was estimated. It is understood that the waste rock will contain a significant fraction of sand and gravel (more than 10%), thus the seepage velocity can be calculated with Darcy's law The seepage velocity, assuming a hydraulic gradient of 2% and a coefficient of permeability of 0.05 m/s, would be 3 6 m/hour

The drainage path through the waste dumps is typically several hundreds of metres, therefore, water will be detained in the dump for several days As a consequence, almost all water, except water that infiltrates near the perimeter of the dump, will freeze. An ice-saturated core would form in the dump The height of this ice-saturated core would increase at a rate of almost 0.6 m per year.

Initially, the hydraulic gradients through the dumps are relatively low, because water seeps along the existing topography As the ice saturated core forms, the hydraulic gradient will probably increase because the rate of rise of the ice-saturated core will be greater away from the perimeter wheıe the temperature is lower. It is envisaged that the ice-saturated core will be relatively flat in the centre of the dumps, with steeper slopes near the perimeter To calculate probable seepage volumes, an estimate had to be made of the extent of the perimeter zone from which runoff will escape.

For a 20 m high dump, with an ice-saturated core that reaches the surface, flat at the top, and uniformly slopes at the edges, the perimeter zone is approximately 150 m wide This figure was obtained by comparing the time for the water to freeze with the time for the water to seep through the dump For a 10% slope, the drainage path would be 200 m, the time for the water to flow that length would be 11 hours (assuming a permeability of 0 05 m/s), which is greater than the time required to freeze more than 70 % of the water that infiltrates into the dump For a 15% slope, the drainage path would be 133 m, the time for the water to flow that length would be 5 hours, less than the time required to freeze 15% of the water that infiltrates the dump Thus, the perimeter zone would be approximately 150 m wide The seepage from the perimeter zone would be 150 mm per square metre per year.

At the Misery North Dump, a small creek runs through the dump Its catchment upstream from the dump is approximately 200,000 sq. m The water transported in this creek will probably not freeze upon passage through the dump and will result in seepage from the zone of the waste dump adjacent to it, similar to the perimeter zones. The total annual volume of water passing through this creek is estimated at 96,000 cu m per year, of which up to 60,000 cu m may be seepage from the dump. This is probably a conservative estimate, because an ice-saturated core may form above the creek

Creeks are present at the future location of the Panda and Koala dumps. However, their catchment areas will be covered entirely by the waste dumps Since the hydraulic gradient along their reach is relatively low, it is expected that no water would flow from them, after the dumps are constructed

The following measures should be considered to reduce drainage from the waste rock dumps

- Finer waste rock material could be placed preferentially around the outside of the waste dumps to impede drainage and retain water within the perimeter zone This would result in more rapid growth of the ice-saturated core in this zone and reduce the width of the perimeter fringe from which water will escape

- The surface of the dump could be sloped to reduce the amount of water that infiltrates the dump Alternatively, infiltration could be reduced by artificially creating a frozen, ice-saturated zone near the top (but below the active layer) of the dump

I trust these comments are useful for evaluating the possible impact of the dumps on the surrounding water courses If you have questions or comments, please call our office

Yours truly,
EBA Engineeting Consultants Ltd

Wim Van Gassen, P Eng
Project Engineer

WVG/DCC/tr

Encl

cc· Derek Cathro

TABLE 1
MATERIAL PROPERTIES IN THERMAL ANALYSIS FOR BHP WASTE DUMPS

MATERIAL	WASTE ROCK	SATURATED WASTE ROCK	FOUNDATION TILL
Water Content (%)	1 0	12 0	8 0
Frozen Dry Density (kg/m^3)	2,000	2,000	2,100
Unfrozen Dry Density (kg/m^3)	2,000	2,000	2,100
Clay Fraction (%)	0 0	0 0	0 0
Frozen Thermal conductivity (W/mC^o)	0 94	2 89	2 03
Unfrozen Thermal conductivity (W/mC^o)	0 60	2 10	1 70
Bulk Density (kg/m^3)	2,020	2,240	2,270
Frozen Specific Heat (KJ/kg C^o)	0 75	0 88	0 83
Unfrozen Specific Heat (KJ/kg C^o)	0 77	1 10	0 99
Latent Heat (MJ/m^3)	-7 0	-80 0	-56 0

TABLE 2
TIME REQUIRED TO FREEZE WATER THAT INFILTRATES DUMP

DATE	AMOUNT OF INFILTRATION (mm)	SATURATED WASTE ROCK THICKNESS (m)	TIME REQUIRED TO FREEZE (hours)
1-June	10	0 04	1 5
2-June	10	0 08	5
3-June	10	0 12	10
4-June	10	0 16	22
5-June	10	0 20	30
6-June	10	0 24	80
15-June	10	0 28	14
25-July	10	0 32	10
5-July	10	0 36	10
15-July	10	0 4	10
25-July	10	0 44	10
5-August	10	0 48	10
15-August	10	0 52	10
25-August	10	0 56	10
5-September	10	0 60	10