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STOPPING WATER POLLUTION AT ITS SOURCE

MISA

Ministry for the Improvement of Standards and Liabilities

EFFLUENT MONITORING REGULATION

FOR THE

THE DEVELOPMENT DOCUMENT

FOR THE

ONTARIO MINERAL INDUSTRY SECTOR:

GROUP A

Environment Ontario

Jim Bradley
Minister

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THE DEVELOPMENT DOCUMENT FOR THE EFFLUENT MONITORING REGULATION FOR THE ONTARIO MINERAL INDUSTRY SECTOR: GROUP A

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USE OF THE MISA SECTOR SPECIFIC REGULATIONS WITH THE GENERAL REGULATION

Under the MISA program, the monitoring requirements for each sector are specified in two regulations - The General Effluent Monitoring Regulation (Ontario Regulation 695/88) and the relevant sector-specific regulation.

The General Effluent Monitoring Regulation provides the technical principles which are common to all sectors. It covers the "how to" items such as sampling, chemical analysis, toxicity testing, flow measurement and reporting.

The sector-specific regulation specifies the monitoring requirements of each direct discharger, such as the actual parameters to be monitored, the frequency of monitoring and the regulation in-force dates.

The General Effluent Monitoring Regulation, which must be used in conjunction with the sector specific regulation, is published under separate cover. The same document also includes a discussion of the MISA approach to effluent monitoring.

GENERAL INTRODUCTION

The purpose of this document is to provide background information on the development of the MISA Effluent Monitoring Regulation for the Ontario Mineral Industry Sector: Group A.

The pertinent information is set out in a number of sections. These sections provide:

- an overview of Group A plants including a description of the six categories that make up Group A;
- an in-depth explanation of the technical rationale which led to the regulation in its present format;
- the effluent monitoring regulation;
- explanatory notes which provide an interpretation of the requirements of the regulation.

TABLE OF CONTENTS

PAGE

USE OF THE MISA SECTOR SPECIFIC REGULATIONS WITH THE GENERAL REGULATION i

GENERAL INTRODUCTION ii

PART I - OVERVIEW OF THE ONTARIO MINERAL INDUSTRY SECTOR: GROUP A

I INTRODUCTION I-1

II DEFINITION OF THE ONTARIO MINERAL INDUSTRY SECTOR: GROUP A I-1

III BASIC PROCESSES USED BY GROUP A PLANTS I-1

IV PRINCIPAL RAW MATERIALS I-12

V PROCESS CHEMISTRY I-16

VI WASTEWATER I-16

VII IN-PLANT CONTROLS I-19

VIII WASTEWATER TREATMENT I-19

IX THE ONTARIO MINERAL INDUSTRY SECTOR: GROUP A IN ONTARIO I-21

X SECTOR OVERVIEW I-22

PART II - TECHNICAL RATIONALE FOR THE MONITORING REQUIREMENTS

I	INTRODUCTION	II-1
II	DEFINITION OF THE ONTARIO MINERAL INDUSTRY SECTOR: GROUP A - STANDARD INDUSTRIAL CLASSIFICATION (SIC) SYSTEM	II-1
III	THE NEED FOR REGULATION	II-1
IV	THE U.S. EPA EXPERIENCE	II-3
V	THE MINISTRY/ONTARIO MINERAL INDUSTRY SECTOR: GROUP A DIALOGUE	II-3
VI	APPROACHES TO MONITORING	II-4
VII	THE EFFLUENT-SPECIFIC MONITORING APPROACH	II-5
VIII	PARAMETERS FOR MONITORING	II-5
IX	DATABASES USED FOR PARAMETER SELECTION	II-6
X	CLASSIFICATION OF EFFLUENTS	II-7
XI	FLOW MEASUREMENT	II-8
XII	PARAMETER/FREQUENCY ASSIGNMENT - GENERAL COMMENTS	II-9
XIII	PARAMETER/FREQUENCY ASSIGNMENT - SPECIFIC COMMENTS	II-14
XIV	VARIABILITY OF GROUP A EFFLUENT FLOWS AND CHEMISTRY	II-15
XV	SUMMARY: TYPE OF SAMPLES PERMITTED	II-16
XVI	ROUTINE MONITORING AND CHARACTERIZATION	II-17
XVII	OPEN CHARACTERIZATION	II-17
XVIII	TOXICITY TESTING	II-19
XIX	QUALITY ASSURANCE/QUALITY CONTROL	II-21
XX	ECONOMIC IMPLICATIONS OF THE REGULATION	II-21
XXI	REFERENCES	II-27

TABLES

Table 1 Probability of Detecting at Least One Sample Above the Detection Limit II-18

Table 2 Estimates of the Average Incremental Operating and Capital Costs by Monitoring Activity II-23

Table 3 Impact of Monitoring Costs on Capital Expenditures and After-tax Profits for the Period 1983 - 1987 ..... II-25

PART III - REGULATION MADE UNDER THE ENVIRONMENTAL PROTECTION ACT

EFFLUENT MONITORING - ONTARIO MINERAL INDUSTRY SECTOR: GROUP A

Section 1 - Definitions III-1

Section 2 - Purpose III-3

Section 3 - Application III-3

Section 4 - Sampling Points III-4

Section 5 - Sample Types III-4

Section 6 - Thrice Weekly Monitoring III-6

Section 7 - Monthly Monitoring - General III-7

Section 8 - Monthly Monitoring - Storm Water III-8

Section 9 - Quarterly Monitoring III-8

Section 10 - Monitoring for Parameters in Analytical Test Group 24 ..... III-9

Section 11 - Quality Control Monitoring III-10

Section 12 - Toxicity Testing III-11

Section 13 - Flow Measurement III-12

Section 14 - Reporting III-13

Section 15 - Exploration or Development Plants III-16

Section 16 - Commencement III-17

Section 17 - Revocation III-17

Legend for Schedules A to G III-18

Schedule A III-19

Schedule B - Copper, Lead, Zinc, Nickel Category III-25

Schedule C - Gold Category III-34

Schedule D - Iron Category III-43
Schedule E - Salt Category III-52
Schedule F - Silver Category III-61
Schedule G - Uranium Category III-70
Schedule H - Sampling Principles III-79
Schedule I - Analytical Principles & Analytical Method Detection Limits . III-81

PART IV - EXPLANATORY NOTES TO THE EFFLUENT MONITORING REGULATION FOR THE ONTARIO MINERAL INDUSTRY: GROUP A

Introduction		IV-1
Section 1:	Definitions	IV-1
Section 2:	Purpose	IV-2
Section 3:	Application	IV-2
Section 4:	Sampling Points	IV-3
Section 5:	Sample Types	IV-4
Section 6:	Thrice Weekly Monitoring	IV-4
Section 7:	Monthly Monitoring - General	IV-5
Section 8:	Monthly Monitoring - Storm Water	IV-5
Section 9:	Quarterly Monitoring	IV-5
Section 10:	Monitoring for Parameters in Analytical Test Group 24	IV-6
Section 11:	Quality Control Monitoring	IV-6
Section 12:	Toxicity Testing	IV-7
Section 13:	Flow Measurement	IV-7
Section 14:	Reporting	IV-7
Section 15:	Exploration or Development Plants	IV-8
Section 16:	Commencement	IV-9
Section 17:	Revocation	IV-9

PART V - A SUMMARY OF CATEGORY MONITORING REQUIREMENTS

A Summary of Category Monitoring Requirements V-1

Category Summary for Process Effluents V-2

Category Summary for Minewater Effluents V-10

Category Summary for Smelter-Refinery Effluents V-18

Category Summary for Storm Water Effluents V-27

PART VI - A SUMMARY OF THE RESULTS OF THE ONTARIO MINERAL INDUSTRY: GROUP A MISA PRE-REGULATION MONITORING PROGRAM

A Summary of the Results of the Ontario Mineral Industry: Group A MISA Pre-regulation Monitoring Program VI-1

Base Metal Sulphides VI-1

Iron Ore Operations VI-2

Uranium VI-2

Gold VI-2

Sampling Locations: Effluent Types VI-2

SUMMARY
Pre-characterization Data - Conventional Parameters VI-4

Pre-characterization Data - Organics VI-4

TABLES

Table 1 - Sampling Locations: Effluent Stream Types VI-3

PART VII - MISA ADVISORY COMMITTEE REPORT REGARDING THE DRAFT EFFLUENT MONITORING REGULATION FOR THE ONTARIO MINERAL INDUSTRY SECTOR: GROUP A

Letter to the Minister VII-1

1. Introduction VII-3

2. Advice to the Minister VII-3

3. Regulation-Specific Recommendations VII-3

PART VIII - MINISTRY OF THE ENVIRONMENT'S RESPONSE TO THE MISA ADVISORY COMMITTEE REPORT

Letter to the MISA Advisory Committee VIII-1

MAC Recommendation VIII-2

MOE Response VIII-2

PART IX - THE PUBLIC REVIEW PERIOD

General Comments from Industry IX-1

Specific Comments from Industry IX-3

Changes Made to Schedule B (List of Plants) of the Draft Effluent Monitoring Regulation IX-3

PART I

OVERVIEW OF THE ONTARIO MINERAL INDUSTRY SECTOR:

GROUP A

PART I - OVERVIEW OF THE ONTARIO MINERAL INDUSTRY SECTOR: GROUP A

I INTRODUCTION

The first part of this section serves as an introduction to the Ontario Mineral Industry Sector: Group A. It defines Group A and serves to describe the mining processes that apply to Group A, the general process chemistry including wastewater generation and treatment.

The section concludes with a specific outline of each of the six categories that make up Group A with emphasis on the differences of each category.

I I DEFINITION OF THE ONTARIO MINERAL INDUSTRY SECTOR: GROUP A

Two groups (A and B) operate under the Ontario Mineral Industry Sector. A separate regulation is being prepared for each group.

All plants in the Ontario Mineral Industry Sector fall into Group A or into Group B. Metal mines and salt mines are found in Group A. Industrial mineral mines are found in Group B.

Because of the diversity of the Ontario mining industry and the large number of plants involved, Group A has been subdivided into six very distinct categories as follows:

(1) Copper, Lead, Zinc, Nickel
(2) Gold
(3) Iron
(4) Salt (sodium chloride)
(5) Silver
(6) Uranium

The unique nature of each category is derived from a combination of differences that involve mineralogy and geology, methods of mining and methods of processing.

All plants and effluents covered under the Effluent Monitoring Regulation are listed in Schedule A.

I I I BASIC PROCESSES USED BY GROUP A PLANTS

Mining, in Ontario, takes place in every part of the Province. Although it is not a major mining area, southern Ontario does possess important deposits of salt, oil, gas and gypsum. Most of these deposits are being actively worked. The climate of southern Ontario is mild and the winters are short. The total annual precipitation consists of 69 centimetres of rain and 165 centimetres of snow.

In Ontario, most of the important mines are located in the north in Precambrian rock that forms part of the internationally famous Canadian Shield. The climate in the shield region of Ontario is much more severe than that in the southern region. The annual precipitation in the shield region consists of approximately 79 centimetres of rain and 285 centimetres of snow. Although summer temperatures in excess of 30° C are not uncommon, winter temperatures below minus 40° C are frequent.

In mining, the term 'hard rock' is loosely used to distinguish igneous and metamorphic rocks from sedimentary rocks. The Canadian Shield is one of the largest and richest hard-rock mining areas in the world. Thousands of square miles of Shield area lie within the boundaries of Ontario.

Mining operations follow two basic patterns: open pit and conventional underground. Of the two, underground operations predominate. It is not unusual, however, for open pit mining to precede conventional underground mining at any particular deposit providing that the geology and ground conditions are suitable.

There are standard underground mining procedures but the varying shapes of orebodies and changeable geology result in no two mines ever being alike.

Mines range all the way from the early prospect which may have only a single level with limited lateral workings, to the deep and complex workings of mines that have been in production for many years. Many Ontario mines reach depths of over 1 kilometre and many Ontario mines have more than 100 kilometres of workings underground.

Opening and developing a mine is expensive. Consequently, any mine layout requires a great deal of planning. As it is desirable to obtain as much information as possible about the nature and attitude of the orebodies before shaft sinking commences, most mining companies like to carry out detailed drilling prior to launching any underground program.

ORE RESERVES DEFINED

Ore is generally defined as a valuable mineral or an aggregate of valuable minerals, more or less mixed with a gangue (waste) material which from the standpoint of a miner can be won at a profit or from the standpoint of the metallurgist can be treated at a profit. Thus, in the case of a mineral-bearing vein, if the average value of a sufficient tonnage is such that a profit is indicated, then the vein filling is called ore. Otherwise, the vein filling is just waste rock.

An orebody is generally a solid and fairly continuous mass of ore which may include low-grade and waste as well as pay ore but is individualized by form or character from adjoining country rock.

Positive ore is ore which is exposed and properly sampled on four sides, in blocks of a reasonable size, having in view the nature of the deposit as regards uniformity of value per tonne and of the third dimension, or thickness.

Proven ore is therefore ore involving practically no risk of failure of continuity.

Probable ore is ore that is reasonably assured but not absolutely certain.

Possible ore reflects the prospective value of a mine beyond or below the last visible ore based on the most accurate data from the mine being examined and from the characteristics of the mining district.

Unbroken ore in an ore body is called ore-in-place.

The term ore reserves, although commonly quoted in terms of 'proven', 'probable' and 'possible', essentially refers to ore-in-place that has been sufficiently developed by means of drifts, raises and crosscuts to show the necessary grade and tonnage. Broken ore reserves are made up of ore contained in stopes after breaking but will generally include ore contained in other underground workings or in the surface dump.

In a vein type deposit, the wallrock is that rock adjacent to the vein and is usually distinguished as the hanging wall on the upper side and the footwall on the under side. In a general sense the term country rock is comparable to the term wallrock but is generally extended to cover the rock surrounding any orebody (vein or lode type). In a wider sense, it may be applied to the rocks invaded by and surrounding an igneous intrusion.

MINING

A) CONVENTIONAL UNDERGROUND

When a mine is put into operation, a shaft is sunk near the orebody. Horizontal passages are cut from the shaft at various depths to reach the ore. The ore is then removed (generally), hoisted to the surface, crushed, concentrated and refined. Waste rock or classified mill tailings may be returned to the mine as fill for the mined-out areas or may be directed to a disposal basin (tailings area).

THE SHAFT

The shaft provides a means of entry or exit for people and materials, and for the removal of ore or waste from underground to surface. It may be vertical or inclined.

> NOTE: A passageway or opening driven horizontally into the side of a hill generally for the purpose of exploring or otherwise opening a mineral deposit is called an adit.

In Ontario, mines have ranged to a depth of more than 2500 metres. Shafts may be rectangular or circular.

Shafts usually contain from one to eight compartments. Shafts sunk from underground levels are called winzes. Winzes are established to permit mining at depth.

Shaft conveyances include buckets, skips, cages or skipcage combinations. The first two are for hoisting rock or ore and they vary in load capacity (generally from one to eighteen tonnes).

They travel at approximately 3,000 feet per minute. Cages are used for men and materials and can transport as many as 85 people per load at slower speeds. Safety devices exist to prevent shaft conveyances from falling, should cables fail.

LEVELS

Levels - horizontal passages in a mine - are generally driven from the shaft at vertical intervals of 30 - 60 metres. That part of the level driven from the shaft to the orebody is known as the crosscut, and that part which continues along the orebody is known as a drift. Crosscuts and drifts vary in size depending on the size of the haulage equipment in use.

A raise is an opening made in the back (roof) of a level to reach the level above.

STOPES

A stope is an excavation where the ore is drilled, blasted and removed by gravity through chutes to ore cars on the haulage level below. Stopes require openings (manways) to provide access for people and materials. Normally, raises connect a stope to the level above and are used for ventilation, for convenience in getting people and materials into the stope, and for admitting backfill.

STOPING METHODS

The stoping method used normally depends on the stability of the walls and ore as ore removal progresses. The three common stoping methods used in Ontario are:

1. The Shrinkage Stope: is used chiefly in narrow regular orebodies where the walls and ore require little support. After each blast, sufficient ore is pulled from the chutes to make room for the miners to drill and blast the next section. As the stope progresses upwards the manways are raised slightly above the level of the broken ore. When the stope reaches the level above, it will be full of broken ore (classed as broken ore reserves). On removal of the ore, the stope may be filled with waste material.

2. The Cut-and-Fill Stope: is used in wider irregular orebodies where the walls require support to minimize dilution (waste from the walls falling into the broken ore). A horizontal section of ore is drilled, blasted and removed. Chutes and manways then are raised to about two metres from the stope roof. Waste material (or mill tailings) is dumped into the stope through the waste-pass raise until it is level with the chutes and manways. Flooring (wood or concrete) is placed over the fill before the next ore cut is drilled and blasted. Scrapers or diesel

endloaders are used to remove ore to the chutes and to level waste or backfill in the stope.

3. The Square-Set Stope: is used in an orebody where the walls and ore require support during ore removal. After each blast, square-set timbers are erected and made solid by blocking to the walls and back. The chutes and manways are raised and backfill is placed in the stope as in the cut-and-fill method. Flooring, called a mucking floor, is laid on the backfill at chute elevation. A floor above, supported on the square-sets where drilling and blasting is carried out, is called the mining floor. Square-set timbering protects the miners from loose rock which might fall from the walls and back of the stope.

SAFETY AND VENTILATION

The Occupational Health and Safety Act: Ontario Regulation for Mines and Mining Plants regulates the operation of mines and requires that a second escapeway be provided for the safety of miners before stoping begins.

Large volumes of fresh air are required to ventilate a mine. This air is delivered from the surface by fans. Some air is drawn off at each level and directed to the working places. Stale air is returned to the surface. Ventilation doors on each level near the shaft station prevent the air from returning to the surface before it has reached the work areas. Special provisions are made for ventilation when diesel equipment is used underground.

B) OPEN PIT OPERATIONS

Whether an orebody will be mined by open pit or underground methods will be determined by the economics of the operation. In all instances, the total capital and operation costs must be considered. A correct decision is extremely important inasmuch as the equipment for open pit and underground use is not interchangeable. Further, investment in equipment for either mining method and pre-production stripping expense for open-pit mining must be made long before mining commences and before returns are received or the method is proven successful. In general, open pit mining is more economical than underground mining especially when the orebody is large and the depth of overburden is not excessive.

Some predominant advantages inherent in the open pit method are as follows:

a) The open pit method is quite flexible in that it allows for large increases or decreases in production on short notice without rapid deterioration of the workings.

b) The method is safe. Loose material can be seen and removed or avoided. Crews can be readily observed at work by supervisors. The relatively small number of men employed contributes to safety.

c) Selective mining is possible without difficulty. Grade control can be easily accomplished by leaving lean sections temporarily unmined or by mining for waste.

d) The total cost of open pit mining, per tonne recovered, is usually only a fraction of the cost of underground mining. Further, the cost spread between the two methods is growing wider as larger-scale methods are applied to open pits.

STRIPPING

Material overlying an orebody may consist of earth, sand, gravel, silt, rock or even water. Removal of this material generally falls under the heading of stripping. Normally, stripping of rock will be considered a "mining" operation. Generally, stripping will be accomplished with heavy earth-moving equipment such as the caterpillar-type tractor. Suction and cutter dredges are sometimes used. Removal of overburden generally takes place concurrently with construction of the surface plant, after a decision to mine by open pit has been reached.

BREAKING

Drilling

Drilling is the basic part of the breaking operation in open pit mining; considerable effort has therefore been expended to develop equipment for drilling holes at the lowest possible cost. There are several types of drills which can be used. These include churn drills, percussion drills, rotary drills and jet-piercing drills. All are designed with one objective in mind: to produce a hole of required diameter, depth and direction in rock for later insertion of explosives.

Blasting

Basically, explosives are comprised of chemicals which, when combined, contain all the requirements for complete combustion without external oxygen supply. Early explosives consisted chiefly of nitro-glycerine, carbonaceous material and a oxidizing agent. These mixtures were packaged into cartridges for convenience in handling and loading into holes. Many explosives are still manufactured and packaged to the basic formulas.

In recent years it has been discovered that fertilizer-grade ammonium nitrate mixed with about 6 percent fuel oil (the mixture is called ANFO) could be detonated by a high explosive primer. This new application has spread to the point where virtually all mining companies use this mixture for some or all of the primary blasting. Secondary blasting is usually done at the end of a shift by means of cartridge explosives and electric caps. However, as pit equipment becomes larger and as the scale of operation increases, secondary blasting becomes a relatively smaller part of the mining operation.

LOADING

After the ore has been broken, it is transferred to the mill for treatment. Although a variety of loading equipment is used in open pit mines depending on the scale of operations, the power shovel seems to be preferred.

MILLING

Each mining operation attempts to remove locally as much of the waste rock as possible from its ore and ship the enriched product to a strategically located smelter or refinery. This process of removing the waste rock and separating the valuable materials is termed concentrating. The mill is a concentrator and the product is a concentrate.

Ores generally consist of a complex mixture of valuable and non-valuable particles. The valueless particles are referred to as "gangue".

In a complex ore, it is possible to have microscopic particles of one mineral species existing as cores within small blebs of other species (for example, sphalerite within galena). The purpose of crushing and grinding the ore in the mill, therefore, is to cleanly liberate all the desirable constituents of the ore so that each may be recovered as a separate concentrate.

It is unusual in most ores to affect good liberation of values at sizes coarser than 200 mesh. However, if the crushing and grinding part of the process is not controlled very carefully, a fraction of sub-micron sizes are produced and these may interfere with subsequent operations. Thus, in milling, the objective is to reduce the ore in size to a degree of fineness which gives an economic liberation of the valuable mineral or minerals but which avoids as much as possible the production of sliming fractions.

CRUSHING

After the ore is broken underground in the mine, it is generally sent to the surface for storage in a coarse ore bin. When required, the coarse ore bin feeds a primary crusher. This is usually a jaw crusher which consists essentially of a fixed vertical jaw or plate, and a movable jaw at a slight vertical angle; the movable jaw being pushed backward and forwards by a system of toggles. The rock falls into the opening between the jaws at the top of the crusher and is crushed by the rapid, but short, forward motion of the movable jaw. The plates converge towards the bottom and thus the rock may be pinched and shattered several times before it falls free of the bottom opening.

NOTE: In some cases, the primary crusher may be installed underground at the bottom of the ore pass system. This facilitates skip loading since unwieldly pieces of ore are eliminated.

Some large tonnage concentrators use a gyratory crusher for the primary breaker. It consists of a heavy gyratory crushing head mounted on a vertical shaft. The head works inside a crushing bowl that is fixed to the main frame. Rock introduced into the bowl is caught and

nipped by the gyrating head. It then falls through an opening of predetermined size. Gyratory crushers, usually installed on the surface at large mining properties, can handle three or four hundred tonnes per hour.

The need for a secondary crusher frequently arises when the product from the primary crusher is too large for efficient grinding.

Crushing is done dry and usually takes place in a building separate from the mill or concentrator. Capacity is usually such that the entire daily tonnage requirement is crushed in one or two shifts. This permits balancing of power loads and labour requirements and provides opportunity for repairs.

Size control of the crusher house product is generally achieved with the use of a vibrating screen. The oversize from the screen is returned for further crushing. The remainder of the material is directed to fine ore storage bins (which feed the grinding circuit).

Crusher houses are generally equipped with dust control and ventilation systems which are designed to eliminate any build-up of dust particles in the air.

It is necessary to provide mill-feed storage on the surface at a mining operation since a mill (or concentrator) usually operates 24 hours per day, seven days per week; whereas a mine and crusher plant may only work five or six days per week. At least thirty hours' requirements of crushed ore are generally available in the fine ore storage bins.

GRINDING

Ore from the fine ore bins, along with water, is directed to one or more grinding units in the mill. Each unit generally consists of a ball or rod mill that operates with or without a classifier.

A ball mill consists of a horizontal cylindrical revolving shell that is supported on hollow trunnion bearings. The ore enters through one trunnion opening and is discharged through the other. The mill is kept about half filled with steel balls which, as the mill revolves, cascade and roll over each other. It is this action that crushes the ore. As the balls wear smaller they form a charge of graduated size and therefore, only balls of the largest size are added to maintain the ball charge. The size of the new balls in any particular mill varies. The size is dependent on the size of the mill feed and on the toughness of the ore itself.

A rod mill differs from a ball mill in that steel rods instead of steel balls are used as the grinding media. The rods are approximately the length of the interior of the mill itself.

Autogenous grinding units are becoming quite common. These units force the ore to crush and grind itself. Rods and balls are eliminated. Autogenous mills can be either wet or dry.

CLASSIFICATION

The usual function of a classifier in a mill circuit is to perform a physical separation that results in oversize particles being returned to mills for further grinding.

In operation, the pulp discharged from a grinding mill flows down a launder to a classifier. The classifier generally takes the form of a long inclined tank that has been equipped with a rake-type mechanism that is able to move sandy material up the incline. The pulp from a mill enters the bottom end of the inclined tank where the heavier, coarser particles settle and are caught and moved up the incline by the rake mechanism to the top end of the tank. From here, the coarse particles flow by gravity into the feed end of a grinding mill. The fine particles that do not settle at the bottom end of the tank are carried, as finished particles, by a current of controlled velocity over an adjustable weir and are directed to the next stage of the process (usually flotation).

Many kinds of classifiers, especially those which operate on a centrifugal principle, are coming into wide use in newer plants.

Grinding in closed circuit is a term used to describe a mill and a classifier that work together as a unit. The material so produced will have a certain maximum size. The finest size produced is controlled to some extent.

A rod mill may be used to prepare feed for a ball mill. In this case, it may function without a classifier and this is termed open circuit operation.

After the material has been ground to the required size, it may be subjected to one or more of a large number of processes that are available. Such processes include flotation, cyanidation, dissolution in acid and ion exchange.

FLOTATION

Flotation, or more specifically froth flotation, is a physico-chemical method of concentrating finely ground sulphide ores (it may, in some instances, be applied to non-sulphide materials). The process involves chemical treatment of an ore pulp to create conditions favourable for the attachment of certain mineral particles to air bubbles. The air bubbles carry the selected minerals to the surface of the pulp and form a stabilized froth which is skimmed off while the other minerals remain submerged in the pulp.

In general, sulphide mineral particles coarser than 48 mesh (about 295 microns or 0.295 millimetres in diameter) cannot be effectively recovered; consequently, an ore that is to be floated must first be ground fine enough so that the desired mineral particles are all, or substantially all, smaller than this limiting size.

The creation of a rising current of air bubbles is accomplished by a flotation machine which produces bubbles by mechanical agitation of the ore pulp, the direct introduction of air under pressure, or both. These operations may be considered as the mechanical adjuncts of the flotation process.

To obtain the adherence of the desired mineral particles to the air bubbles and hence the formation of a mineral-laden froth on the surface of the ore pulp, a hydrophobic surface film must be formed on the particles to be floated and a hydrophilic or wettable film on all others. This is done by adding various chemicals. The selection of these chemicals for each particular ore constitutes the principal problem of the ore dressing metallurgist.

All flotation concentration processes are selective or differential in that one mineral or group of minerals is floated away from accompanying gangue. Ordinarily, however, the separation of unlike minerals, such as sulphides from nonsulphides, is referred to as "bulk flotation" and the term "differential flotation" is restricted to operations involving separations of similar mineral types. Differential flotation may be exemplified by the concentration and subsequent successive removal of copper, lead, zinc and iron sulphides from a single ore.

THICKENING

It is sometimes necessary to increase the solids content of an ore pulp. The machine that does this is called a thickener. Operating continuously, a thickener is a large diameter, comparatively shallow, round tank. As the feed enters, the entrained rock particles sink to the bottom of the thickener and are raked to a discharge mechanism located in the centre of the tank floor. Some of the extremely fine particles in the feed are aided in settling by the addition of chemicals such as lime. The underflow from a thickener tends to resemble a sludge; the resultant clear solution in the thickener overflows the top of the tank and is collected in a launder.

FILTRATION

Some form of filtration is required in most mine-mill circuits. In many cases, a filter will take the form of a large, horizontally-mounted, revolving drum. The drum is porous and partially submerged in a semi-circular steel tank which receives pulp from specific mill processes. As the drum rotates, a vacuum is applied from within which causes a definite thickness of pulp to adhere to the drum. The resultant "cake" is scraped off continuously. The final concentrate from a sulphide mine-mill operation is generally formed in this way.

CYANIDATION

A variety of milling flowsheets are applied in recovering gold, but all rely on cyanidation to dissolve the gold from the ore. Prior to leaching, the ore is ground to facilitate the dissolution of all economically recoverable gold within a reasonable time. Typical fineness of ground ore is 80 percent less than 0.075 millimetres (200 mesh). Some mills grind the ore in cyanide solution which allows the cyanide to attack freshly exposed gold surfaces. In a few mills, preconcentration of coarse gold by gravity methods is practiced to improve overall recovery and reduce the size of the cyanidation circuit. Jigs are generally used for this purpose.

The quantity of cyanide required for dissolution of the gold depends on the grade of the ore and the amount of cyanicides present in the ore. Cyanicides are compounds, for example, metal and sulphide minerals, which react with cyanide, causing excessive reagent consumption and fouling

of the leaching solution. They, or the products formed by their reactions, may also interfere with the dissolution or subsequent precipitation of gold. Pre-aeration of the pulp is usually practiced to minimize the deleterious effects of cyanicides. Both pre-aeration and cyanidation are carried out in agitated tanks. Leaching generally takes between 24 and 72 hours.

Canadian gold mills practice one of two methods to recover gold from the leach solution. Either the Merrill-Crowe or the Carbon-in-Pulp (CIP) process is used, with the former being the more common. However, the CIP process is gaining favour in that it offers the advantages of lower capital and operating costs than the Merrill-Crowe process.

The Merrill-Crowe Process

The Merrill-Crowe Process has been widely used for 90 years. It consists of precipitating gold from a de-aerated solution by the addition of zinc dust. Following cyanidation, the gold-bearing solution (pregnant solution), is separated from the tailings solids, usually by vacuum filtration followed by clarification. Solid-liquid separation is sometimes done by counter-current decantation in the thickeners rather than by filtration.

The clarified solution is de-aerated under vacuum. Zinc dust is then added to precipitate gold which is then collected in a filter press. The gold precipitate is periodically removed and fire refined in a furnace to produce a bullion containing over 90 percent precious metals (gold and silver).

Following gold precipitation, most of the gold-free (barren) solution is recycled back to the cyanidation process to take advantage of its residual leaching ability for gold. However, part of the barren solution has to be discarded to prevent the build-up of contaminants that interfere with gold dissolution and/or precipitation.

The Carbon-in Pulp Process

In the CIP Process, dissolved gold is removed directly from the leach pulp by contact and adsorption on activated carbon granules. This is done in a series of agitated tanks with the pulp moving counter current to the activated carbon. The carbon is coarser than the pulp and is retained in the adsorber by an appropriately sized screen. The pulp flows continuously from one adsorber to the next, each tank having a retention time of about one hour. The carbon is advanced in a batch manner, generally once a day. Following carbon adsorption the barren pulp is discharged to the tailings pond. There is consequently no recycling of the barren cyanide solution and this results in greater losses of cyanide to the tailing pond than is the case with the Merrill-Crowe process.

The adsorbed gold is stripped from the carbon using a hot caustic cyanide solution under either pressurized or atmospheric conditions. It is then recovered from the stripping solution by electrolytic deposition on steel wool cathodes which are periodically removed and refined by fire or by electro-refining.

DISSOLUTION IN ACID: ION EXCHANGE

Uranium is usually recovered from its ore by contacting the ore with sulphuric acid and, after a series of steps, use of an ion exchange resin.

In addition to all of the above, amalgamation (use of mercury) may be utilized to recover gold, physical processes may be used to recover heavy minerals and so forth. The possibilities are almost endless. For example, evaporation is used to recover salt from brine and pyrometallurgy (smelting and refining) is used to win many metals from ores or concentrates.

IV PRINCIPAL RAW MATERIALS

The Ontario Mineral Industry Sector: Group A is an industrial sector that is largely "inorganic" in nature. The ores being processed are composed of inorganic compounds such as sulphides and oxides. Bulk chemicals are used by many Group A plants. These bulk chemicals are normally restricted to sulphuric acid, nitric acid, hydrochloric acid, ammonia, calcium oxide, sodium carbonate and sodium hydroxide. Cyanide in the form of a sodium, potassium or calcium salt is used in large quantities by the gold industry and, in smaller quantities, by some base metal sulphide plants.

Organic chemicals are used by Group A plants in the froth flotation process. Most flotation chemicals fall into at least one of the three following categories:

1. Frothers
2. Collectors (Promoters)
3. Modifiers

FROTHERS

In a flotation cell, the production of a persistent froth of desired selectivity is extremely important. Involving the introduction of small air bubbles into the flotation pulp in the cell, the requisite frothing action is enhanced by the addition of a specific type of chemical, called a frother, into the ore pulp. In effect, a frother is a chemical that acts to produce a froth of satisfactory stability. The frother toughens the bubble wall (which is stabilized further by the mineral particles adhering to it) and thus prolongs the life of each bubble. A useful frother creates a froth which survives long enough to permit the removal of its mineral load and yet breaks down within a reasonable length of time so that a permanent foam is not created.

Although some inorganic substances may cause frothing, the really effective agents are organic substances. In general, frothing agents have structural formulae that are characterized by the presence of two constituents having opposite properties: one part of the molecule is nonpolar, and the other is polar. Typical examples are amyl alcohol, $C_5H_{11}.OH$, cresol, $CH_3.C_6H_4.OH$, and toluidine, $CH_3.C_6H_4\ NH_2$.

The frothing properties are related to the composition and structure of both parts of the molecule. Among homologous substances (i.e., substances having the same general structure, and therefore the same polar group, but varying hydrocarbon chains), the frothing ability at the concentration which yields maximum frothing increases with increase in the length of the hydrocarbon chain, up to a certain point, but decreases if the length of the chain becomes very great. This is particularly well shown in the series of the aliphatic alcohols, in which frothing increases with increase in the length of the hydrocarbon chain, up to the 7 or 8-carbon-atom alcohol, but decreases thereafter. Substances having the same polar group and about the same solubility, but different structure in the nonpolar part of the molecule, have somewhat similar frothing qualities. Thus, hexyl alcohol, $C_6H_{13}OH$, or heptyl alcohol, $C_7H_{15}OH$, is roughly equivalent to terpineol, a cyclic terpene alcohol, $C_{10}H_{17}OH$.

Frothing can be traced directly to the dual character of frother molecules which have one water-avid and one water-repellent portion. Both these affinities are satisfied if the molecules occur at bubble walls with their polar, hydrated end adhering to the water phase and their nonpolar end away from it. As a result, frother molecules concentrate at the interface between the fluid phases of flotation systems. As a result of the addition of a frother, the gas bubbles formed under the surface of a liquid are partly lined with a monomolecular sheath of frother molecules. This allows each bubble with its lining to approach other bubbles without coalescing. To some extent, the effect produced by the addition of a frother is proportional to the amount of frother. However, past a certain point, the effect of further additions of frother is less than that of preceding additions. Eventually, the addition of further amounts results in a decrease of the frothing action, and finally in the total absence of frothing. The point at which total absence of frothing is obtained corresponds to the saturation by the dissolved substances of the solutions.

The constituents of frothers are volatile substances, and many are pleasantly fragrant. They are in fact found also in the so-called essential oils which are used extensively in perfumery. Accordingly, a substantial part of the frothers added in flotation operations is volatilized so that re-use of flotation tailing waters does not necessarily reduce proportionately the requirement for frothers.

Generally speaking, it is desirable that a frother does not display a significant 'collecting' ability. However, under some circumstances, a frother with a collecting ability may be used to advantage.

Water-insoluble, saturated hydrocarbons such as kerosene will not form a suitable froth. Unsaturated hydrocarbons tend to form a light froth. Organic compounds such as pine oil, alcohols, phenols, and fatty acids generally form appreciable amounts of relatively stable froth.

In practice, the most widely used frothers are pine oil, cresylic acid and certain alcohols such as methyl amyl alcohol. Locally, eucalyptus oil and camphor oil may be used as frothers. A class of reagents known as froth stiffeners can impart stability to a froth in some circumstances. Creosotes are typical of these materials.

COLLECTORS (PROMOTERS)

Of flotation agents, the most important are the 'collectors' (sometimes called 'promoters') which attach themselves to specific normally non-floating minerals thus endowing them with hydrocarbon-like surfaces and making them capable of adhering to the gas bubbles that are generated by a flotation cell.

Natural floatability is exhibited by solids that possess an outer surface that is nonionic in character. For practical purposes, this means a hydrocarbon surface. Collector molecules should therefore consist, at least in part, of hydrocarbon or similar groups.

In practice, each collector molecule contains a polar and a non-polar group. When attached to a mineral particle, these molecules are so oriented that the non-polar or hydrocarbon group is extended outward. Such orientation results in the formation of a hydrophobic hydrocarbon film on the mineral surface.

Collectors in use include the following:

Potassium Amyl Xanthate
Potassium Sec-Amyl Xanthate
Potassium Ethyl Xanthate
Potassium Isopropyl Xanthate
Potassium Hexyl Xanthate
Sodium Sec-Butyl Xanthate
Sodium Isobutyl Xanthate
Sodium Isopropyl Xanthate
Sodium Ethyl Xanthate
Sodium Di-Ethyl-Dithiophosphate
Sodium Di-Secondary Butyl Dithiophosphate
Sodium Di-Isopropyl Dithiophosphate
Sodium Di-Amyl Dithiophosphate
Isopropyl Ethylthionocarbamate

MODIFYING (REGULATING) AGENTS

Chemical products which are used to modify or control the normal behavior of minerals in a flotation operation are broadly classed as modifying (regulating) agents. The list of modifying agents used in flotation is long and varied and generally includes all reagents whose principle function is neither collecting nor frothing.

Modifying agents can be put into general categories as follows:

a) pH Modifiers

These tend to be bulk chemicals such as sodium hydroxide and sulphuric acid.

b) Activating Agents

This class of reagents is added to a flotation system to permit better collector attachment to the mineral to be floated. Examples are:

1) Copper Sulphate
2) Sodium Sulphide
3) Lead Nitrate
4) Lead Acetate
5) Aluminum Chloride

c) Depressing Agents

Depressing agents assist in the separation of one mineral from another when the floatabilities of the two minerals to be separated are quite similar for any given collector or collector combination. Examples are:

1) Sodium and Calcium Sulphites and Hyposulphites and Sodium Hydrosulphite
2) Zinc Sulphate
3) Sodium Silicate
4) Hydrofluoric Acid
5) Sulphur Dioxide
6) Quebracho and Tannic Acids
7) Ferrocyanides
8) Ferricyanides
9) Permanganate
10) Chromate
11) Natural Colloids

d) Dispersants

In sulphide mineral flotation, the separation is ordinarily made in the presence of slimes (very fine particles). However, for nonsulphide flotation where selectivity between species must be accomplished by subtle means, slime control is almost always necessary. In some cases (for example, the separation of clay from quartz), a dispersant can be added to the flotation system to ensure that coflocculation of the desired mineral and gangue does not occur. Dispersants in use include:

1) Hexametaphosphate
2) Lignin Sulfonates
3) Sodium Silicate
4) Tannin

e) Flocculants, Coagulants, Coagulant Aids

A large number of these compounds are used. These compounds are not unique to the mining industry and are used by most industries in the Province. Examples are:

1) Alum
2) Bentonite Clays
3) Activated Silica
4) Cationic Poly-electrolytes
5) Non-ionic Organic Polymers

It is necessary to note that most flotation chemicals are added in "starvation" quantities to mill pulps. In general, only a few grams per tonne of ore are added of any particular reagent. However, some base metal sulphide mills are large and, as a result, on a daily basis, reagent use can be substantial.

V PROCESS CHEMISTRY

Plants in Group A rely heavily on physical processes to release and concentrate mineral particles. Typical operations include crushing, grinding, filtration, clarification and processes that rely on differences in specific gravity of different mineral particles. Flotation is a physico-chemical process that relies on surface effects induced by very small quantities of organic and inorganic chemicals. On the other hand, gold is often recovered by inducing it to dissolve in a cyanide solution and uranium is usually recovered by inducing it to dissolve in a sulphuric acid solution.

With the exceptions of gold and uranium plants, process chemistry within Group A tends to be simple.

VI WASTEWATER

There are two common sources of wastewater at most Group A plants. They are:

1) the mine and its associated facilities and
2) the tailings disposal area and its associated facilities.

THE MINE

Natural surface water percolates into most mine workings at rates which are almost impossible to predetermine. Rain and snow fall directly into open pits. In most cases, this natural water comes into intimate contact with any exposed minerals that occur in the orebody or in the associated waste rock. Obviously, it is somewhat easier to predict the amount of natural water that will gain access to an open pit than it is to predict the amount of natural water that will gain access to underground mine workings. In northern Ontario, for instance, we normally expect that each hectare of land will receive a daily average of over 20,000 litres of water due to natural precipitation. Of course, we do not know what percentage of this will leave any

particular area as runoff or what percentage of this will evaporate or what percentage will be retained by the land itself. But it is obvious that a 20 hectare open pit will receive an average of 20 x 20,000 = 400,000 litres of natural water per day.

In addition to natural water influents, water is pumped underground for mining purposes. In many cases, this aspect of underground water consumption is quite predictable. For instance, water is used underground for drilling, dust suppression, pumping, cooling and sanitation.

The quantity of water used in drilling operations can be predicted with reasonable accuracy on the basis of such things as manufacturers recommendations.

Drilling time can be computed from the diamond drilling experience which normally precedes the exploitation of any orebody. From the exploration drilling and subsequent to the selection of the mining system it should be possible to forecast the drilling hours required for:

a) development footage
b) stope development footage
c) production drilling footage

Water usage for the purposes of dust suppression can be determined on the basis of:

a) the number of rounds taken per day
b) the number of transfer points in the ore transportation system.
c) crushing plant installation and ventilation
d) general allowances for hose clean up and geological examinations, and
e) ventilation humidity requirements.

With regard to pumping, the water requirement relates to gland water and is more or less directly dependent on the number of pumps being used, the size of the various pumps and the operating pressure of the pumps.

The amount of (cooling) water used underground for regulating the bearing temperature on equipment such as crushers, fans and compressors can be accurately predicted on the basis of manufacturers specifications.

In many instances, a predictable volume of water may be used in mines where underground sanitary facilities are provided. This volume of water is more or less directly related to the number of manshifts in any given period.

Where backfill is used in a mine, water (generally mill water) will be used to convey tailings from the mill to the underground workings.

In summary, the natural water that percolates into a mine (open pit or underground) and the water that is deliberately pumped into an open pit or underground for process use comes into contact with the mineralized rock. This water must be removed from the mine or the mine would flood. The water is therefore collected in one or more sumps and is pumped to the surface (or out of the pit). This water, while it is resident in the mine is contaminated by the mining process itself. It may contain quantities of mine-machinery lubricants, trace quantities of various explosives, rock-fines, mine-water treatment chemicals, and indeed, traces of all of the chemical materials that are used in and around a mine. If mill water is used to convey

tailings underground for use as backfill, then the minewater can also become contaminated with all of the reagents that are used in the mill. Since backfill is not used in open pit operations, the overall chemical characteristics of minewater from open pit and from underground operations tend to differ somewhat.

Minewater may be acid due to the decomposition of iron sulphides if they exist in the ore or it may be quite alkaline.

THE TAILINGS DISPOSAL AREA

In Ontario, any mill slurry produced by a mine-mill operation must be directed to an engineered impoundment area called a "tailings area". A common size for these tailings areas in the Province is from 40 to 120 hectares. Formal tailings areas that cover less than 5 hectares do exist in Ontario as do major tailings areas that cover more than 500 hectares. Tailings dams in Ontario are commonly less than 15 metres in height although dams in excess of this height are known in nearly all of the mining camps.

The decant from the tailings area is normally the largest and most important single wastewater flow at a mine-mill operation. This wastewater reflects the chemistry of the mill and quite often the mine and is influenced by practices such as recycling and backfilling. The quality of the wastewater may be influenced by the spontaneous decomposition of mineral species being held in the area itself. The chemistry of a tailings area decant will vary from mine to mine and from mining camp to mining camp. The pH of the untreated effluent, like minewater, may be acid or alkaline. The untreated effluent may contain suspended solids, residual mine-mill reagents, heavy metals, ammonia, arsenic and, in the case of nuclear properties may contain radio-active substances. Wastewater from a tailings area is often returned to a mill for re-use. Seepage from the bases of dams will be returned to the tailings area or, more commonly, will be directed to the tailings area treatment system for treatment.

OTHER SOURCES OF WASTEWATER FOUND IN GROUP A INCLUDE:

RUNOFF

In some cases, inactive tailings areas associated with Group A plants are equipped with permanent waste treatment facilities that intercept or collect runoff and subject it to treatment before discharge to the environment. Without exception, this type of runoff associated with Group A plants is acid runoff caused by the spontaneous decomposition of iron sulphides found in uranium mine tailings areas. This runoff is characterized by a low pH, a high sulphates and total dissolved solids content and the presence of various amounts of metals and radionuclides.

Runoff is collected and directed to a treatment facility at the site that serves either the mine, the mill or the tailings area. The chemical characteristics of runoff of this nature depends on the mine-mill processes and the type of ore being handled. Suspended solids and associated metals are routinely the main problems encountered with this type of waste.

SMELTER-REFINERY EFFLUENTS

Most major smelters and refineries in Group A discharge their wastes to tailings areas associated with their respective mines and mills. These effluents then become part of the tailings area decants and are treated as such. However, two plants in the copper, nickel, lead, zinc category, one plant in the silver category and two plants in the uranium category do discharge effluents directly to a watercourse. The wastewaters generated by the plants in each category are different and are related to the unique chemistry or metallurgy of the processes being used at each plant.

In the Effluent Monitoring Regulation:

- Minewater is called "minewater effluent"
- Tailings area decant is called "process effluent"
- Runoff is called "storm water effluent"
- Wastewater from smelters and refineries is called "smelter-refinery effluent"

VII IN-PLANT CONTROLS

In-plant controls are cost-effective methods of limiting the discharge of pollutants through process modifications, chemical substitution and water reduction and recycling.

Process modifications have included measures to improve the efficiency of mine-mill operations thereby reducing the amount of pollutants discharged in the wastewaters. Chemical storage areas are contained and all spills are directed to retention or waste treatment systems.

Chemical substitution involves the replacement of certain process chemicals known to be toxic and persistent with chemicals with lower toxicity or greater treatability. This has long been a practice of the mining industry.

In-plant recycling of wastewaters is common. Recycling of tailings area effluents is common in the copper, nickel, lead, zinc category and the iron category. Recycling of tailings area decants in all other categories is practiced to a limited extent or is precluded by metallurgical considerations.

VIII WASTEWATER TREATMENT

In most Ontario mining operations, wastewater treatment revolves around pH control and the control of suspended solids. At many operations, this is all that is required. At some operations, the pH is in the proper range and control of suspended solids is all that is required. When ores or wastes are acid-producing, neutralization of effluents is carried out. Neutralization using lime is common although other bases can and have been used.

Since most tailings areas have calculated retention times in the order of months or years and since tailings area overflows are commonly baffled to prevent the escape of floating materials such as oils, some milling reagents and general debris, tailings areas by themselves can have a significant impact on contained wastes. Processes such as photo-decomposition, aeration,

sedimentation and bio-chemical degradation are all active in a well-designed tailings area. Where a tailings area alone cannot accomplish required waste treatment, the decant is directed to downstream polishing ponds where additional treatment is carried out. Many tailings area effluent volumes are reduced substantially by the practice of wastewater recycle.

Special treatment problems can and do arise in Group A. The gold category uses substantial amounts of cyanide to win gold from ore. As a result, cyanide treatment is commonly required within the category. When cyanide complexes are simple, ponding of wastes in contact with the atmosphere may be all that is required. However, in many cases, treatment of cyanide using reagents such as hydrogen peroxide, chlorine or sulphur dioxide is required and is carried out. Acid mine drainage is a common problem within Group A and many neutralization plants have been put in place to achieve neutral metal-free effluents. Some of these acid flows are radioactive and control of the radionuclides is carried out. Barium chloride, for instance, is added to control radium in effluents.

Experience has shown that minewater can be handled in at least one of the following ways:

1) The minewater can be directed to the mill for re-use, or
2) The minewater can be directed to the tailings area, or
3) The minewater can be collected and treated by itself.

All three methods of handling minewater have advantages and disadvantages. All three methods are presently being used in Ontario.

In Ontario, minewater is collected and treated by itself if:

1) the mine is located a considerable distance from the mill, or
2) the chemical characteristics of the minewater are such that the water cannot be used as make-up in the mill circuit, or
3) the mill is operating in closed circuit with its tailings area in order to accomplish a specific objective.

In Ontario, minewater is directed to a tailings area when:

1) a mine is close to its corresponding tailings area, or
2) when the minewater is not acceptable for direct use in the mill circuit, or
3) when separate treatment of the minewater would simply force a total duplication of the tailings area decant treatment facilities.

In Ontario, minewater is directed to the mill whenever and wherever possible.

In Ontario, the control of seepage from tailings areas is, in a sense, straightforward. In each case the seepage must be collected. After collection, the seepage can be handled in one (or more) of three ways:

1) The seepage can be treated by itself, or
2) The seepage can be pumped back into the tailings area, or
3) The seepage can be directed to the treatment facility that effects control of the tailings area decant.

Depending on local circumstances, all three methods of seepage control are used in Ontario.

Many metals found in Group A effluents are present in these effluents in particulate form; that is, the metals are present as finely divided ore or waste particles. Careful suspended solids control at most Group A plants will generally result in satisfactory control of metals in effluents. Where metals actually occur in a dissolved form, careful neutralization and settling will resolve most problems. Some compounds found in the Sector do not respond well to these treatment strategies. Chief among these is ammonia which is a common constituent of most minewater effluents and is frequently detected in decants from tailings areas. Reagent substitution has been carried out in cases where ammonia itself has been used as a chemical in a mine or in a mill. However, ammonia in minewater has, as its primary source, the explosives used to break rock. Aside from good housekeeping practices, treatment strategies for ammonia control are lacking given the ammonia concentrations and flow volumes involved.

IX THE ONTARIO MINERAL INDUSTRY SECTOR: GROUP A IN ONTARIO

Group A consists of 67 plants which discharge wastewaters to natural watercourses in Ontario. All but three of these plants are located in northern Ontario. Most of the plants are located in northeastern Ontario.

Four plants in Group A discharge directly to the Great Lakes. The remainder are either indirect dischargers to the Great Lakes or are discharged to the Arctic watershed.

X SECTOR OVERVIEW

Because of the large number of plants involved and because of similarities between certain plants, Group A has been subdivided into six categories. Generic monitoring schedules have been prepared for each category and, together, these schedules make up Schedules B to G of the Group A Effluent Monitoring Regulation. The six categories are as follows:

1. Copper, Nickel, Lead, Zinc Category

   Number of Plants: 17

Effluent Stream Type	Number of Sampling Points
Process Effluent	7
Minewater Effluent	7
Smelter-Refinery Effluent	2
Storm Water Effluent	1

Ore Type: Massive and disseminated sulphides

Common ore minerals:	Galena	PbS
	Sphalerite	ZnS
	Chalcopyrite	$CuFeS_2$
	Pentlandite	$(Ni, Fe)_9 S_8$
Common gangue minerals:	Pyrite	FeS_2
	Pyrrhotite	$Fe_7 S_8$

Mining Methods: Open pit and underground; sometimes in combination
Use of backfill common

Milling Methods: Flotation common; circuits may be complex

Smelting/Refining: Done on the property or concentrates shipped to off-site smelter or refinery

Waste Treatment: Effluents can be acid; neutralization commonly required
Effluents may contain organic mine-mill reagents
Effluents may contain metals such as copper, nickel and zinc
Large tailings areas common; some in excess of 500 hectares

2. Gold Category

Number of Plants: 36

Effluent Stream Type	Number of Sampling Points
Process Effluent	24
Minewater Effluent	18
Smelter-Refinery Effluent	0
Storm Water Effluent	0

Ore Type:
- Largely vein deposits
- Some massive deposits

Common ore mineral: native gold
Common gangue minerals: quartz, silicates

- Arsenopyrite (FeAsS) is present in some deposits
- In many cases, gold is intimately associated with sulphide minerals

Mining Methods:
- Usually underground; sometimes open pit
- Use of backfill common

Milling Methods:
- Some gravity separation
- Cyanidation used by most plants
- Merrill-Crowe process common
- Carbon-in-Pulp process used at several plants
- Flotation at some plants
- Roasting of concentrates at some plants

Smelting/Refining:
- Production of gold bullion at most plants

Waste Treatment:
- Most effluents strongly alkaline to prevent formation of toxic hydrogen cyanide gas
- Cyanide destruction at several plants using techniques that involve; natural degradation, hydrogen peroxide, chlorine, or sulphur dioxide
- Heavy metals common in untreated effluents
- Many tailings areas less than 20 hectares in size; many tailings areas over 100 hectares in size

3. Iron Category

Number of Plants: 1

Effluent Stream Type	Number of Sampling Points
Process Effluent	1
Minewater Effluent	0
Smelter-Refinery Effluent	0
Storm Water Effluent	0

Ore Type: Two plants banded iron sediments

Common ore mineral:	magnetite	Fe_3O_4
Common gangue mineral:	chert	SiO_2

One plant massive siderite

Common ore mineral:	siderite	$FeCO_3$
Common gangue minerals:	quartz	SiO_2
	pyrite	FeS_2

Mining Methods: Two plants: open pit
One plant: underground
Backfill is not used

Milling Methods: Two plants: magnetic separation and pelletizing flotation reagent used
One plant: heavy media separation and sintering

Smelting/Refining: One plant: sintering

Waste Treatment: Acid drainage at two plants (requires neutralization)
High degree of recycle at two plants

4. Salt (Sodium Chloride) Category

Number of Plants: 2

Effluent Stream Type	Number of Sampling Points
Process Effluent	3
Minewater Effluent	2
Smelter-Refinery Effluent	0
Storm Water Effluent	0

Ore Type: Beds of salt (sodium chloride) associated with some dolomite and minor quantities of other minerals such as gypsum

Common ore mineral:	halite	(NaCl)
Common gangue mineral:	dolomite	(a calcium-magnesium carbonate)

Mining Methods: Underground room-and-pillar

Milling Methods: Sizing and packing
Some salt products made from brine taken from wells with subsequent evaporation techniques applied

Smelting/Refining: High purity salt is produced by evaporation of brines recovered from brine wells

Waste Treatment: Wastewaters contain sodium chloride
Sodium ferrocyanide is added to the main product (rock salt for road de-icing) at both plants
Sodium ferrocyanide is also added to products other than road salt on occasion
There are no tailing areas

5. Silver Category

Number of Plants: 2

Effluent Stream Type	Number of Sampling Points
Process Effluent	0
Minewater Effluent	2
Smelter-Refinery Effluent	0
Storm Water Effluent	0

Ore Type: Commonly vein-type structures

Common ore mineral:	native silver
Associated minerals:	sulphides and arsenosulphides of a large number of metals including cobalt and nickel
Common gangue mineral:	calcite ($CaCO_3$)

Mining Methods: Underground with some open-cuts
Backfill may or may not be used

Milling Methods: Gravity separation
Flotation when needed

Smelting/Refining: Silver produced at one refinery

Waste Treatment: Tailings areas small
Wastes generally alkaline
Arsenic a component of most waste flows; arsenic exists in both suspended and dissolved forms
Effluent volumes are small

6. Uranium Category

Number of Plants: 9

Effluent Stream Type	Number of Sampling Points
Process Effluent	4
Minewater Effluent	0
Smelter-Refinery Effluent	4
Storm Water Effluent	4

Ore Type:
- Beds of quartz pebble conglomerate containing uranium mineralization
- Most important gangue mineral is pyrite (FeS_2)

Mining Methods:
- Underground room-and-pillar
- Backfill not generally used

Milling Methods:
- Pulp is treated with sulphuric acid to release uranium
- Uranium is recovered using ion-exchange

Smelting/Refining:
- Concentrated uranium from the mine-mill complexes is shipped to refineries for production of products such as UO_2

Waste Treatment:
- Acid mine drainage is a common problem in this category due to the pyrite that is found in the ore
- Neutralization plants are common and also serve to control heavy metals
- Most effluents are weakly radio-active and when radium is a problem, additions of substances such as barium chloride are necessary
- Ammonia is a problem at certain plants in this category

PART II

TECHNICAL RATIONALE FOR THE MONITORING REQUIREMENTS

PART II - TECHNICAL RATIONALE FOR THE MONITORING REQUIREMENTS

I INTRODUCTION

The purpose of the technical rationale section is to explain the steps in the development of the Ontario Mineral Industry Sector: Group A.

The section provides background information on the regulation process, the options considered in arriving at the specific Ontario Mineral Industry Sector: Group A monitoring approach and the databases and criteria used for parameter and monitoring frequency selection.

II DEFINITION OF THE ONTARIO MINERAL INDUSTRY SECTOR: GROUP A - STANDARD INDUSTRIAL CLASSIFICATION (SIC) SYSTEM

A simple definition of the Ontario Mineral Industry Sector: Group A is difficult to derive because of the complexity of the ores being mined, the methods of mining being used, differences in mill, smelter and refinery flowsheets and differences in the products being produced.

One approach is to use the Standard Industrial Classification (SIC) codes originally established in Canada for data gathering purposes by Statistics Canada. These codes classify establishments by type of activity and may at best be somewhat arbitrary and perhaps technically ambiguous.

SIC Codes used in Canada that correspond to the categories that make up Group A are as follows:

CATEGORY	SIC CODE
Copper, Lead, Zinc, Nickel	0612, 0613
Gold	0611
Iron	0617
Salt	0625
Silver	0614
Uranium	0616

III THE NEED FOR REGULATION

Currently, the Ontario Mineral Industry Sector: Group A plants monitor and report only certain standard parameters and conventional pollutants under the Ministry of the Environment's Industrial Monitoring Information System (IMIS).

The reportable data may include effluent flow volumes and certain routine parameters that tend to reflect the nature of Group A effluents. These parameters may include but are not limited to: pH, suspended solids, copper, nickel, lead, zinc, arsenic, phosphorus, phenols, oils and

greases, ammonia, other nitrogen compounds (NO_2, NO_3, TKN) and a variety of other metals which depend largely on the type of ore being mined and the nature of the mineral processing operations being used.

In the past, many plants in Group A were not reported on IMIS since these plants discharge their effluents to the Arctic watershed. In the past, the focus of IMIS has been on those plants discharging directly or indirectly to the Great Lakes basin. This situation is being corrected.

Site specific monthly average IMIS data are published by the Ministry in its annual report entitled "Report on the Industrial Direct Discharges in Ontario". The IMIS data are reported to the Ministry on a voluntary basis.

Requirements for some of the standard parameters and conventional pollutants reported under IMIS are imposed by Control Orders or Requirements for Direction, Certificates of Approval or Federal Regulations and Guidelines.

Ministry guidelines are taken from various sources including Provincial Water Quality Objectives (PWQO) and previously published guidelines for industrial sectors.

The Ministry water management guidelines are summarized in the publication entitled "Water Management: Goals, Policies, Objectives and Implementation Procedures of the Ministry of the Environment", referred to as the "Blue Book". Provincial Water Quality Objectives (PWQOs) are currently available for a total of 74 pollutants including 51 EMPPL substances. It is the goal of the Ministry to:

- establish PWQO or Guidelines for all of the EMPPL substances that possess the potential for moderate to high aquatic environmental damage;

- assemble the available aquatic toxicological and other appropriate information for the remaining EMPPL substances, and maintain the capability to set Provincial Water Quality Guidelines for such substances on demand.

There are currently no regulations for specific, toxic and persistent pollutants, generally termed "priority pollutants". In fact, there exists only a very limited data base on the concentrations and loadings of these priority pollutants being discharged into Ontario's waterways. Most Group A plants have virtually no long-term data on the concentration of these pollutants in their effluents.

Clearly there is a need for a comprehensive long-term data base on the discharges of priority pollutants from Group A plants. The MISA Effluent Monitoring Regulation for the Ontario Mineral Industry Sector: Group A will provide this data base.

The effluent limits regulation will be developed for Group A on the basis of the monitoring data base in conjunction with data on Best Available Technology Economically Achievable (BATEA) and Ministry water quality objectives. Because most priority pollutants are amenable to treatment through the use of available technology, the effluent limits regulation will ensure that any required technology is put in place to virtually eliminate the discharge of toxic pollutants.

IV THE U.S. EPA EXPERIENCE

The U S. EPA has published a Development Document for Effluent Limitations Guidelines and Standards for the Ore Mining and Dressing Point Source Category

Under these guidelines, it has been established that the "Best Available Technology Economically Achievable (BATEA) for toxic pollutants is the "Best Practicable Technology" (BPT). BPT facilities consist of a direct discharge point source with end-of-pipe treatment, consisting of lime precipitation, where needed, and settling.

In developing its effluent limitations guidelines and standards for toxic pollutants, EPA originally addressed a list of 129 toxic pollutants, referred to as the "priority" pollutants list, that was developed in the late 1970's. An extensive sampling and analysis program was undertaken in 1977 to determine the presence and concentrations of the 129 priority pollutants in the Ore Mining and Dressing point source category for possible regulation. Of the 129 toxic pollutants studied, 124 were excluded in all subcategories for one of the following reasons:

- they were not detected (by analytical methods available)
- they were present at levels not treatable by known technologies
- they were effectively controlled by technologies upon which other effluent limitations are based.

The toxic pollutants to be limited by BPT in effluents consist of: cadmium, copper, lead, mercury, and zinc. Conventional pollutants to be limited by "Best Conventional Pollutant Control Technology" (BCT) include: Total Suspended Solids (TSS) and Hydrogen ion (pH). BCT replaces BPT for the control of conventional pollutants.

V THE MINISTRY/ONTARIO MINERAL INDUSTRY SECTOR: GROUP A DIALOGUE

The Ministry adopted an open consultative process with industry in developing the Group A Effluent Monitoring Regulation. Additional input was available in the Regulation formulating process through the MISA Advisory Committee (MAC). The MISA Advisory Committee is a panel of qualified professionals and environmentalists established to provide a third opinion to the Minister on regulations developed by the joint efforts of industry and the Ministry before and after they are released for "public" review.

A Joint Technical Committee (JTC) consisting of industry, Environment Canada, The Atomic Energy Control Board and Ministry representatives served as the means for reaching consensus. A member of the MISA Advisory Committee also took part in the JTC discussions.

Agreement was reached with industry on principles which were to serve as general guidelines for the monitoring regulation. A multi-discipline group of Ministry/Environment Canada/Atomic Energy Control Board experts developed the general rationale for the site-specific monitoring requirements. A joint Government/Industry Regulation Writing team then produced the Regulation text for review by the JTC.

On the basis of the rationale and the databases available to the Ministry, the category specific monitoring requirements were drawn up. The specific monitoring requirements were then reviewed and modified as required.

VI APPROACHES TO MONITORING

The simplest monitoring approach both for implementation and regulation would have been to have a uniform requirement for all of the 67 plant sites that make up Group A of the Ontario Mineral Industry Sector. However, some individual plants in Group A employ less than 20 people, some employ several thousand; some plants mine or process less than 300 tonnes of ore per day, some mine or process more than 10,000 tonnes per day. In addition, large differences in the types of ore being processed, the methods of mining, milling, smelting and refining all resulted in the general conclusion that a uniform regulation that would apply to all sites would be too difficult to achieve and that a regulation that applies to each plant on a site specific basis would be equally difficult to arrive at and still maintain a sense of "fairness" to all those being regulated. As a consequence, Group A was divided into six categories and generic effluent monitoring schedules were prepared for each category.

It is necessary to note that the Ontario Mineral Industry Sector under MISA covers all mining operations in Ontario and all facilities that are directly associated with Ontario mining operations. For example, the Sector includes all underground and open pit mining operations, all primary smelters and refineries, asphalt plants, brick plants, lime plants, cement plants, pits and quarries.

Ontario is one of the richest and most complex mining areas in the world. As such, the number of companies and mineral properties (all called "plants" in the Effluent Monitoring Regulation) covered by the Ontario Mineral Industry Sector is large.

Two groups ("A" and "B") operate under the Ontario Mineral Industry Sector. A separate regulation is being prepared for each group.

All plants in the Ontario Mineral Industry Sector fall into Group A or into Group B. Metal mines and salt mines are found in Group A. Industrial mineral mines are found in Group B.

Because of the diversity of the Ontario mining industry and the large number of plants involved, Group A has been subdivided into six very distinct categories as follows:

(1) Copper, Lead, Zinc, Nickel
(2) Gold
(3) Iron
(4) Salt (sodium chloride)
(5) Silver
(6) Uranium

The unique nature of each category is derived from a combination of differences that involve mineralogy and geology, methods of mining and methods of processing.

All plants and effluents covered under the Effluent Monitoring Regulation are listed in Schedule A.

All generic effluent monitoring schedules together make up Schedules B to G of the Effluent Monitoring Regulation.

VII THE EFFLUENT-SPECIFIC MONITORING APPROACH

For each category in Group A, effluent monitoring schedules were developed. Conventional as well as priority pollutants were assigned for monitoring on the basis of their presence and their concentrations in the respective site effluents as determined from historical and current monitoring data available to the Ministry. In addition, supplemental data on raw materials, by-products and products were also used for parameter assignments. Thus, in keeping with the diversity of the plants in the sector, the routine monitoring requirements for specific parameters could be different for each effluent but would reflect the high probability of finding those parameters in that effluent.

Included in the effluent monitoring schedules were requirements for toxicity testing using both the fish (Rainbow Trout) and Daphnia magna acute lethality toxicity tests on all discharges from Group A plants.

VIII PARAMETERS FOR MONITORING

The priority pollutants assigned for monitoring of effluents in Group A were taken directly from the Ontario Effluent Monitoring Priority Pollutants List (1987) (EMPPL).

The derivation of the EMPPL is fully documented in a Ministry report dated July 1988. The EMPPL includes chemicals detected in Ontario municipal and industrial effluents and Ontario's waterways which pose a hazard to the receiving environment because of their toxicity and persistence. The potential presence of a chemical based on use and manufacturing data could also have placed it on EMPPL. The EMPPL currently lists 179 chemicals. New chemicals identified in Ontario effluents and waterways will be assessed under EMPPL criteria and, if warranted, placed on the EMPPL on an ongoing basis.

The only compounds, chemicals or substances deleted from the EMPPL for the purposes of Group A monitoring were as follows:

(a) specific conductance (Group 7)
- is used as an indicator of dissolved solids
- Group A is monitoring dissolved solids

(b) total alkyl leads (Group 13)
- they are not a Group A product and are not likely to be in effluents

(c) sulphide (Group 15)	-	in certain Group A categories, metal sulphides may make up over 50% of the waste being discharged to a tailings area
	-	in most categories, sulphides are a component of ores or wastes
	-	Group A is monitoring for both sulphur and sulphates and metals found as sulphides in the various ores, as such, monitoring for sulphide itself is not necessary
(d) herbicides (Group 21) and	-	none of theses substances are manufactured or organochlorine pesticides (Group 22) used in Group A plant processes
(e) fatty and resin acids (Group 26)	-	they are not a Group A product

In addition to chemicals found on the current EMPPL, Group A will be doing open characterizations on organic and inorganic elements or compounds that lie outside of the EMPPL and will carry out monitoring for substances that are somewhat specific to Group A. These include chlorides, cyanates, thiocyanates, iron, uranium and weak acid dissociable cyanides.

IX DATABASES USED FOR PARAMETER SELECTION

The major source of information on the presence and concentration of conventional and priority pollutants in Group A effluents was the pre-regulation effluent characterization data. Data from existing Ministry and industry records were also used. Pre-regulation effluent characterization was carried out in the 1987 at all major Group A plants that used organic reagents for process purposes. Two sample runs were made and each featured open characterization of organic and inorganic components.

Best professional judgement (BPJ) based on knowledge of process chemistry, products, by-products and raw materials for each category was also important in parameter selection.

X CLASSIFICATION OF EFFLUENTS

Unlike many other sectors, cooling water effluents, in general, are only a minor component of Group A plant effluents and, as such, are not featured in the Effluent Monitoring Regulation. In general, cooling water will make up less than 1% of the flow of Group A plant effluents.

All Group A effluents fall into one of the following categories:

(a) Minewater Effluent

Underground and open pit mines may generate an effluent that is called "minewater effluent". In simple terms, minewater effluent is water that flows or is pumped from the mine workings. Water gains access to mine workings by percolating through surrounding rock, by its association with materials that may be required by the mining process itself and by its deliberate introduction into the mine for use in the mining process. To prevent the mine workings from flooding, this water must be removed from the mine. In some cases, this water is re-used in other processes and is not discharged directly to the environment. When this cannot be done, this water is treated, if necessary, and then discharged to the environment.

(b) Process Effluent

Many mining operations generate large amounts of finely divided waste rock called "tailings". These tailings are routinely transported in the form of a slurry of solids and water to a storage area called a "tailings area". The solids settle in the tailings area while the associated liquid in the area is allowed to leave the area and forms an effluent that is known as a tailings area decant. In the Effluent Monitoring Regulation, a tailings area decant is called a "process effluent". A tailings area decant is treated, if necessary, before being discharged to the environment. In addition, a portion of the decant may be returned to the plant for re-use. The volume of a tailings area decant is normally directly related to the amount of water being used in processing at the plant and the amount of water being recycled. However, this volume can be augmented by natural precipitation gaining access to the tailings area and by any natural watercourses gaining access to the tailings area.

(c) Smelter-Refinery Effluent

Most smelters and refineries in Group A discharge their wastes to a tailings area or to a treatment facility associated with a tailings area. Here, the smelter-refinery effluents become subject to recycle and all the other treatment strategies that a tailings area decant may undergo and exit the area as a "process effluent". As such, the smelter-refinery effluent category is reserved for those smelter-refinery effluents that are not discharged to a tailings area or associated treatment facilities but are discharged directly to the environment with or without treatment.

(d) Storm Water Effluent

Storm water effluents in Group A largely originate on inactive tailings areas that may cover hundreds of hectares. The effluent volumes are precipitation driven but can be augmented by natural sources of water such as springs and streams that may exist in the areas. Because of the large areas that are normally involved, storm water effluents in Group A tend to be continuous effluents but this is not always so. In terms of Group A, storm water effluent is runoff from inactive tailings areas that is collected and, if necessary, treated before discharge to the environment.

It should be noted that the Effluent Monitoring Regulation covers the effluents from all existing plants in Group A and the effluents from Ministry of the Environment approved treatment facilities operating at inactive or abandoned plants in Ontario. The Effluent Monitoring Regulation, however, does not cover the very large number of inactive or abandoned plants in the province that lack treatment facilities or effluent collection strategies. These plants are not covered by the Effluent Monitoring Regulation for the following reasons:

(1) These properties are not active. They are either inactive or abandoned. Process effluents, minewater effluents or smelter-refinery effluents are not being discharged. Storm water effluents, if they exist, are not being collected or treated. Storm water effluents at these plants are nonpoint sources.

(2) Many of these properties are in remote locations, access is difficult and electrical power is usually not available.

(3) The jurisdiction for the reclamation of these properties lies outside of the Ontario Ministry of the Environment.

XI FLOW MEASUREMENT

Each direct discharger in Group A is required to measure or estimate the flow of each effluent stream type at the time of sampling and at a location or set of locations representative of the flow at the sampling point. Methods, devices or calculations for the measurement or estimation of flow must be capable of accuracy to within plus or minus 20 per cent of the actual flow.

Traditionally, mine effluent limits have been based on concentration which is independent of flow. Waste loadings of conventional parameters from the industry have routinely been very low. Environmental problems largely arise because receiving waters in the mining areas are generally soft and, as such, are quite sensitive to even minor inputs of a variety of substances. Past emphasis, therefore, has been on concentration rather than flow. This is likely to continue but the need for accurate measurement of final flow volumes is recognized.

A number of problems with flow measurement do exist for Group A plants. For example, many final effluent sample points for Group A plants are remote from plant facilities. While some are located within sight of plant buildings, many are located downstream of tailings areas and may

be several kilometres from the centre of plant activities. Quite often, electrical power is not available at the site and this makes continuous flow measurement difficult. Because of the severe weather conditions that may exist at these sites for at least four or five months of the year, access to the sites may be difficult or dangerous at certain times. Because of the conditions of extreme cold, continuous flow measurement would require permanent heated buildings and continuous maintenance of devices such as flumes so that ice build-up would not influence the accuracy of the readings. Even without continuous measurement of flows, ice build-up and plugging of devices by debris will be a problem. The activities of beavers will in many cases cause significant problems.

Since the effluents involved in Group A are generally subjected to long retention times and since the retention facilities involved routinely cover more than one hundred hectares and include level control, daily and even significant weekly fluctuations in flow and concentration are not expected. For these reasons, continuous flow measurement is not required in the Effluent Monitoring Regulation. Because of the difficulties that Group A plants will encounter due to remote locations, lack of power, severe weather and problems in keeping measuring devices free of debris, flow measurement accuracy requirements have been set at plus or minus 20 per cent.

However, it must be stated that many Group A plants will be installing flow measurement devices and the accuracy of these devices in most cases will be well within the ±20% accuracy required. These devices will have to be maintained according to the advice of the manufacturers of the devices and all reasonable care or maintenance of the various devices will be required. They will be operated at or near their stated accuracies.

XII PARAMETER/FREQUENCY ASSIGNMENT - GENERAL COMMENTS

Three basic frequencies of routine monitoring are required in the Ontario Mineral Industry Sector: Group A Regulation. They are: 3 times per week, monthly and quarterly.

The Group A Effluent Monitoring Regulation varies from all other sectors in that it involves generic sampling schedules for the categories that make up Group A. While some of these categories are small, the most important ("copper, nickel, lead, zinc" and "gold") contain 17 and 38 plants respectively. Since the intent of the regulation is to characterize effluents so that BATEA can be arrived at for either Group A as a whole or for each category of Group A individually, it was felt that daily sampling was not required. For example, over the life of the Regulation, daily sampling for suspended solids in the Gold category would give rise to 365 (days) x 35 (sampling points) = 12,775 results. Since suspended solids is a conventional parameter that has been sampled at Group A type plants for decades, there is no need for this frequency of data. At three times per week, 5,460 results will be generated that will be applicable to the Gold category alone. In addition, the lack of chemical and flow variability on a daily or even weekly basis that tends to characterize Group A effluents supports the utilization of three times per week sampling as opposed to daily sampling.

In Ontario, two of the most important environmental control parameters used in mining are suspended solids and pH. Metals such as copper, nickel, lead and zinc are also important as is arsenic. Other frequently used parameters include oils and greases, phenols, ammonia, cyanide and phosphorus. These parameters may figure prominently in the Effluent Monitoring Regulation.

In general, parameters that will or may be carried over to become part of a future "limits" regulation based on best available technology economically achievable (BATEA) are sampled on a thrice weekly basis. This gives rise to 12 data points per month and permits the calculation of statistically valid monthly loadings. Parameters that are sampled on a monthly basis may be carried over to become part of the future "limits" regulation referred to above. Sampling on a monthly basis gives rise to 12 data points per year and permits the calculation of statistically valid yearly loadings. All other parameters are to be sampled on a quarterly basis to ensure that the chemical nature of each effluent has been documented. The quarterly samples will also ensure that any seasonal changes in the effluents that may occur will be documented. Since a number of sampling points exist in each category of Group A, the detailed quarterly sampling that is required will give rise to enough analytical data to permit an adequate definition of the chemical nature of the effluents that are generated by each category. Any unusual, unexpected or abnormal results generated by the quarterly sampling will be subject to further investigation.

The Group A regulation also includes requirements for monitoring substances that are somewhat specific to the industry. These substances include cyanates, weak acid dissociable cyanides, chlorides and uranium.

In general, parameters assigned for sampling on a three times per week or monthly basis, are those parameters that have historically been subject to control either at provincial or federal levels. These parameters include pH, suspended solids, copper, nickel, lead, zinc, arsenic, phosphorus, phenols, oils and greases, ammonia and related nitrogen compounds. Using existing data bases and best professional judgement at the JTC level, the frequency of monitoring for certain or unusual parameters was adjusted on a category basis and, on occasion, on a site specific basis. Parameters being sampled on a quarterly basis are basically the EMPPL parameters augmented by organic and inorganic characterizations and toxicity requirements.

The necessity for three times per week or monthly monitoring of certain routine parameters is as follows:

pH

- a measure of the hydrogen ion concentration;
- a fundamental parameter which indicates the acidity level in an effluent;
- pH and pH changes may alter the toxicity of many materials to aquatic life;
- pH impacts the availability of nutrients for plants,
- low and high pH values cause corrosion and may make soluble metals dissolve from sludges and bottom sediments;
- PWQO require pH to fall within the range of 6.5 - 9.5 (receiving waters).

Total Suspended Solids (TSS)

- gross measure of suspended material including volatile suspended solids (organic) and inorganic materials;
- organic fractions may include grease, oils, fibres, microorganisms and dispersed insoluble organic compounds;
- inorganic materials include sand, silt, clay and insoluble metal compounds;
- measure of the effectiveness of treatment system separation equipment;
- may be a substrate for toxic contaminants which can leach out in water;
- may increase turbidity of water reducing recreational value;
- may impair photosynthetic activity of aquatic plants;
- can form sludge banks on settling leading to localized anaerobic conditions;
- may kill fish by clogging gills.

Ammonia plus Ammonium (Total ammonia)

- a measure of both ionized and un-ionized ammonia in effluents;
- ammonia is toxic to fish at levels above 0.02 mg/L (un-ionized);
- the concentration of ammonia in its un-ionized state varies with pH and temperature;
- MOE recommends 0.5 mg/L NH_3 (total) as the upper limit for raw water supplies and 0.02 mg/L of un-ionized NH_3 for the protection of aquatic life

Total Kjeldahl Nitrogen (TKN)

- a measure of both organic nitrogen and total ammonia;
- may present an oxygen demand on the receiving water through nitrification;
- potential nutrient leading to growth of undesirable aquatic plants.

Oxidized Nitrogen (Total Nitrates + Nitrites)

- measures total oxidized nitrogen (nitrate + nitrite);
- Ministry drinking water objectives limit NO_3 + NO_2 to 10 mg/L;
- levels of NO_3 above 10 mg/L in drinking water can impact hemoglobin in children leading to infantile methemoglobinemia.

Total Phosphorus (Total P)

- nutrient which may lead to growth of undesirable aquatic plants;
- phosphorus discharges to the Great Lakes are identified as a concern in the Canada-U.S. Great Lakes Water Quality Agreement.

Phenolics (4AAP)

- the 4-amino antipyrine (4AAP) method measures total phenolics;
- tend to be ubiquitous contaminants and are thus good indicators of pollution severity;
- can be general indicators of treatment;
- can taint fish flesh at levels as low as 1 µg/L.

Oil & Grease (Solvent Extractables)

- measure of the gross hydrocarbon that could produce a visible film, sheen or discolouration on the surface of a watercourse;
- substances measured may include hydrocarbons, fatty acids, soaps, fats, oils and waxes;
- measure of groups of substances whose common characteristics is their solubility in Freon TM or hexane;
- can cause tainting of edible aquatic organisms;
- can cause odour and taste problems in drinking water;
- may form deposits on shorelines and bottom sediments;
- oil slicks prevent the full aesthetic enjoyment of water;
- can be a carrier for other toxic contaminants;
- fish and water fowl are adversely affected by oils;
- crude oil at 0.3 mg/L can be toxic to freshwater fish.

Heavy Metals Plus Arsenic

- uptake can occur in plants and animals;
- toxicity effects can be seen at low concentrations in soft waters;
- can exhibit toxicity to humans;
- sublethal effects have been documented.

XIII PARAMETER/FREQUENCY ASSIGNMENT - SPECIFIC COMMENTS

The following parameters are to be run on all quarterly samples taken from all effluent sampling points:

(1) (see Ontario Regulation 695/88 - Schedule 1)
All parameters in Analytical Test Groups 16, 17, 18, 19, 20, 23 and 24.

(2) (see Ontario Regulation 695/88 - Schedule 1)
Analytical Test Groups 28a and 28b
An open characterization for organics that lie outside of the Analytical Test Groups in (1) above with limits of quantification set at 10 parts per billion (ppb) relative to the internal standard specified in Schedule 3, Part C of the General Effluent Monitoring Regulation. Any compound at or above this value must be identified and quantified.

(3) (see Ontario Regulation 695/88 - Schedule 1)
All parameters in Analytical Test Groups 1 to 12 inclusive, 14, 25 and 27.

(4) (see Ontario Regulation 695/88 - Schedule 1)
All parameters in Analytical Test Group 29. The limit of quantification for all parameters in Analytical Test Group 29 is set at 50 ppb.

(5) Toxicity Tests:
1 Fish Toxicity Test
1 Daphnia magna Acute Lethality Test

(6) PCBs
(see Ontario Regulation 695/88 - Schedule 1 - Analytical Test Group 27)
This applies only to those plants that use PCBs in electrical equipment or store PCBs.

(7) Dioxins
One analysis for dioxins (see Ontario Regulation 695/88 - Schedule 1 - Analytical Test Group 24) must be carried out during the life of the monitoring regulation. If this was done at a particular sampling point during the effluent pre-characterization study, it need not be repeated.

The frequency assignment of conventional parameters is given for all six categories in Schedules B to G of the Sectoral Effluent Monitoring Regulation.

XIV VARIABILITY OF GROUP A EFFLUENT FLOWS AND CHEMISTRY

Tailings areas vary in size from a few hectares to hundreds of hectares. As a result, wastes are retained within these areas for varying lengths of time. Since the surface area and average depth of a tailings area can be determined at any time and since the volume of wastes being discharged to an area is known along with other factors such as the volume of precipitation that the area is receiving, a calculated retention time can be determined for an area. In general, most tailings areas in Ontario have calculated retention times in excess of 30 days. Calculated retention times of several months are common and a few tailings areas have calculated retention times measured in years.

The Ontario Mineral Industry: Group A Effluent Monitoring Regulation is based on "calculated retention times" instead of "actual" retention times. "Actual" retention times for most tailings areas are difficult to determine. With such long retention times existing, dyes or chemicals that might be added to a tailings area influent to determine an "actual" retention time tend to degrade within the area itself and may not give consistent or reliable results. Because of the large number of chemical and physical processes that go on in a tailings area, significant amounts of radioactive tracers would have to be added to a non-radioactive tailings area influent in an attempt to achieve the same goal. The addition of radioactive materials to a non-radioactive tailings area on a recurring basis in an attempt to determine an "actual" retention time is not warranted.

Retention times are a function of both the size and method of operation of a tailings area. It is possible for a large tailings area to have a short calculated retention time and vice versa.

Since a tailings area normally provides a long retention period for any wastes being fed to it, mixing of wastes is enhanced and decant chemistry tends to remain stable over long periods of time. Wastes held for extended periods within a tailings area are subject to a number of physical, biological and chemical processes that act to reduce the impact of the waste on the environment and, in some cases, retention within a tailings area over a period of time has been sufficient to meet current regulatory requirements. Monthly and more particularly seasonal variations in tailings area effluent chemistry have been noted. These are largely due to the seasonal variations in the amounts of sunlight received, the differences in temperatures and the rates and type of precipitation received at any particular site since plant operations tend to be stable. Variations in effluent quality on a daily basis are generally insignificant. As a result, daily samples are not being required in the Effluent Monitoring Regulation. In addition, because of the low variability of the chemistry in tailings area decants, representative grab samples are optional when taking samples on a thrice weekly or monthly basis provided that the tailings area in question provides at least 30 days calculated retention time for wastes.

Minewater does vary in quality and quantity from one mine to another but, at any individual mine, minewater quantity and quality tends to remain stable over long periods of time. In some cases, minewater is pumped continuously from the mine workings but, in most cases, mine pumps cycle on and off on a more or less regular basis. Mine workings can extend for more than one hundred kilometres underground and minewater from these vast areas flows slowly into common underground sumps from which it is pumped to the surface. Natural precipitation on surface will only slowly make its way into mine workings in most cases. Weeks, months or years may be required for this to happen. Also, mining methods being used at any particular mine will change only slowly. As a result of all of the foregoing, minewater tends to be only slowly variable in quantity and quality. Because of this limited variability, the Sector Effluent

Monitoring Regulation permits grab samples to be taken when thrice weekly or monthly samples are being collected provided that the minewater has been retained for at least 5 days.

Grab samples are also optional on smelter-refinery effluents for samples that are required on a thrice weekly or monthly basis provided that the waste has been subjected to 5 days retention. Again, the general lack of variability of effluent chemistry on a daily basis is the reason for this action. It should be kept in mind that most Group A smelters and refineries discharge their wastes to tailings areas and do not discharge their wastes directly to the environment.

Grab samples are permitted on all samples taken of storm water effluent. For the most part, storm water effluents covered by the Sector Effluent Monitoring Regulation are generated as the result of runoff from inactive mining sites. Hundreds of hectares of land are normally involved. Since effluents tend to be continuous, sampling will routinely be carried out on a monthly basis. However, during periods of hot or dry weather in the summer and periods of extremely cold weather in the winter, effluent volumes may be diminished or absent. Since adequate effluent volumes cannot be guaranteed for composite sampling at all times and since the chemistry of the runoff tends to be stable for long periods of time, grab samples are permitted. Minor storm events do not have much impact on an inactive tailings area since the tailings surface tends to absorb the precipitation resulting from most routine events. This precipitation is released slowly and forms, in part, the continuous effluent from the area.

Since most Group A plants have been set up in a manner that directs effluents to common treatment sites, "storm water effluents" originating at parking lots or facilities such as concentrate loading areas are rare. When they do exist, they are subject to all of the provisions of the General Effluent Monitoring Regulation that apply to "storm water effluents".

XV SUMMARY: TYPE OF SAMPLES PERMITTED

Grab samples are permitted as follows providing that the effluent, prior to sampling, has been retained for at least the prescribed calculated period of time

Effluent Stream Type	Required Calculated Retention Time
Process Effluent	30 days
Minewater Effluent	5 days
Smelter-Refinery Effluent	5 days
Storm Water Effluent	0 days

The above grab samples are permitted only for samples that are being taken on a thrice weekly or monthly basis. Composite samples are required in all other cases and for all samples being taken on a quarterly basis. One exception to this rule is storm water effluent. Grab samples are permitted for all types of storm water samples.

XVI ROUTINE MONITORING AND CHARACTERIZATION

Routine monitoring for the Ontario Mineral Industry Sector: Group A consists of a number of conventional parameters that are standard to the industry (on Provincial and Federal levels). These parameters are run on a thrice weekly or monthly basis. Characterization (also referred to as "closed characterization") is run on a quarterly basis and consists of the complete EMPPL with the few exceptions outlined in Part II, Section VIII.

From the statistical data shown in Table 1, it is clear that for a given parameter that is present 50% of the time or greater in an effluent, the probability of finding the contaminant is very high and virtually the same whether eleven samples (99.9% probability) or four samples (93.7% probability) are taken.

For a given parameter that is present infrequently such as 2% of the time, characterizing eleven samples provides only a 19.9% chance of detecting the parameter. Nine samples would provide only a slightly reduced probability of 16.6%. The biggest unknown in attempting to determine the appropriate characterization frequency is the a priori probability of a parameter's presence in an effluent.

By dividing Group A into six categories that shared similarities, by recognizing the lack of Group A's flow and parameter variability, by recognizing the fact that the generic approach in monitoring that has been taken on a category level will lead to a large amount of data that is common to a category and can be shared by a category, the costs of characterization were reduced without a significant sacrifice in technical data.

Because of the costs associated with the analysis of PCBs and dioxins, PCBs are to be run quarterly only at those plants that use or store PCBs. Because there is no reason to suspect that dioxins would be present in any Group A plant effluent, dioxins will only be run once at Group A plants. If dioxin has already been run at a Group A plant during the pre-characterization program, it need not be repeated.

XVII OPEN CHARACTERIZATION

It is the intention of the Ministry to identify as many compounds as possible that can be extracted (or purged) from samples taken on a quarterly basis. Termed "open characterization", a limit of quantification for this work has been set as close to 10 ppb as possible on a sample to sample basis.

Open characterization will provide tentative identification of both organic compounds and elements that are currently not on EMPPL. Use is made of gas chromatography/mass spectrometry (GC/MS) and inductively coupled plasma procedures or atomic emission spectroscopy to obtain the data.

Open characterization will be used to provide compounds for hazard assessment for potential addition to the EMPPL. In this way, open characterization when combined with characterization data will provide a more relevant parameter list for future monitoring and control. The 1987 EMPPL does not cover all of the compounds that could be discharged from the Group A plants because of the current lack of valid monitoring data to indicate the presence of compounds.

TABLE 1 - PROBABILITY OF DETECTING AT LEAST ONE SAMPLE ABOVE THE DETECTION LIMIT

SINGLE SAMPLE PROBABILITY OF		NUMBER OF SAMPLES								RATIO OF DETECT/ (DETECT + NON-DETECT)
DETECT (P)	NON-DETECT (Q)	12	11	10	9	8	6	4	2	(D/D+ND)
0.5	0.5	0.999	0.999	0.999	0.998	0.996	0.984	0.937	0.750	1/2
0.4	0.6	0.998	0.996	0.994	0.990	0.983	0.953	0.870	0.640	2/5
0.3	0.7	0.986	0.980	0.972	0.960	0.942	0.882	0.759	0.510	3/10
0.2	0.8	0.931	0.914	0.893	0.866	0.832	0.738	0.590	0.360	1/5
0.1	0.9	0.717	0.686	0.651	0.613	0.569	0.468	0.344	0.190	1/10
0.05	0.95	0.460	0.431	0.401	0.370	0.337	0.265	0.185	0.098	1/20
0.02	0.98	0.215	0.199	0.183	0.166	0.149	0.114	0.078	0.040	1/50
0.01	0.99	0.113	0.105	0.095	0.086	0.077	0.058	0.039	0.019	1/100

This table shows the probability of a sample with a parameter above MDL for the number of samples tested.

The relatively modest incremental cost of running open characterization in conjunction with characterization analysis and large pay back in data produced is a strong justification for coupling open scans with Group A characterization requirements.

The detection limit achievable for open characterization of organic compounds will depend upon the sample size, concentration factor, efficiency of extraction from the original matrix, GC/MS conditions, overall complexity of the sample, degree of chromatographic resolution from other co-extractives and the mass spectral characteristics of specific compounds. In some cases, compounds extracted from a 1.0 L sample may be identifiable at concentrations as low as 1 - 5 parts per billion (ppb). In other cases, identification may require concentrations of components to be 50 ppb or greater. In the majority of the cases, 10 - 20 ppb concentrations should be detectable.

The protocols and procedures for analysis of the samples for open characterization will be published in a document produced by the Ministry's Laboratory Services Branch This document will be available prior to this regulation coming into force. Chemical Abstract Service (CAS) numbers should be provided for all compounds identified under open characterization.

In addition, Analytical Test Group 29 outlines the parameters that constitute an open characterization for elements. Required limits of quantification here are 50 ppb.

The Ontario Mineral Industry Sector. Group A will perform open characterizations for organics and elements on all effluents on a quarterly basis. ("Quarterly" means on the same sample taken for quarterly characterization.)

XVIII TOXICITY TESTING

Toxicity testing requirements for Group A consist of both the fish toxicity test (Rainbow Trout Acute Lethality Test) and the Daphnia magna Acute Lethality Test as outlined in the published protocols entitled:

- "Protocol to Determine the Acute Lethality of Liquid Effluents to Fish";
- "Daphnia magna Acute Lethality Toxicity Test Protocol".

Both tests are to be run quarterly on all Group A effluents.

Since it is essential to protect all forms of aquatic life, it is critical that the impact of various effluents be assessed on as many different types of aquatic organisms as is practical.

The Ministry has reviewed both Daphnia magna and rainbow trout test results on the same samples and concluded that Daphnia magna and trout differ in their sensitivity to some effluents and thus the addition of the Daphnia magna test will provide valuable additional information.

pH Adjustment

pH adjustment will not be allowed on samples collected for the Group A Regulation for the following reasons:

- the Ministry needs to establish the actual toxicity level of the final discharges in the from of LC50 values to assist in future toxicity limit setting. The LC50 limits to be set will be based on those limits achievable using BATEA. The toxicity data will assist in defining the limit;

- pH adjustment simulates no condition that actually occurs in the environment;

- adjustment of pH may have an impact on modifying the toxicity of other compounds in the sample.

Final discharges with pH outside the Ministry guidelines of 6.5 to 9.5 will be tested using both the rainbow trout and the Daphnia magna toxicity tests without pH adjustment. While the undiluted effluent may be predictably lethal primarily due to pH alone, the series of dilutions required under the tests will isolate the pH effect and allow the calculation of an LC50 value.

Companies may, on a voluntary basis, where the pH is outside the range of the Ministry guidelines, perform toxicity tests on pH adjusted effluents in parallel with those on unadjusted effluents. Submission of data on pH adjusted samples will be voluntary and will be used by the Ministry for comparison with the pH unadjusted sample results.

Use of Full Dilution Series vs. Full Strength (Pass/Fail) Tests

Pass/fail tests produce non-quantitative results. For some plants, it may not be possible for available technology to achieve an LC50 of 100%. Thus, doing full dilution series to determine an LC50 on an effluent will allow the option of selection a technically sound final toxicity criteria instead of using only pass/fail.

For effluent samples that are non-lethal at full strength, additional information is rarely obtained from the dilutions in a full series LC50. However, the non-lethality of the sample is never known with 100% certainty in advance of starting the test.

If a pass/fail test fails, there are only two ways of obtaining an LC50 value. First, the full series LC50 test could be performed on the same sample after the pass/fail test is complete. This would be unsatisfactory because, given that 96 hours is the minimum time necessary to provide a measure of acute lethality for trout, by the time the series dilutions were started the sample would be at least 4 - 6 days old. This is unacceptably long for a perishable sample.

Collecting a totally new sample for the LC50 series after the original sample has failed a pass/fail test is also unacceptable because it will be collected at an entirely different time.

XIX QUALITY ASSURANCE/QUALITY CONTROL

Quality assurance and quality control (QA/QC) encompasses all of the procedures undertaken to ensure that data produced are generated within known probability limits of accuracy and precision.

Quality assurance is the overall verification program which provides producers and users of data the assurance that predefined standards of quality at predetermined levels of confidence are met. Quality assurance is comprised of two elements: quality control and quality assessment.

Quality control is the overall system of guidelines, procedures and practices which are designed to regulate and control the quality of products or services with regards to previously established performance criteria and standards.

Quality assessment is the overall system of activities which ensure that quality control is being performed effectively. This is carried out immediately following quality control and involves evaluation and auditing of quality control data to ensure the success of the quality control program.

QA/QC is one of the most important aspects of the MISA monitoring regulations. The QA/QC program includes many small but essential activities ranging from proving the cleanliness of sample bottles, using proper sampling equipment, containers and preservatives to instrument calibration; validation of authenticity of standards, inclusion of blanks, spikes and controls in analytical runs to documenting performance; participation in external round-robins to defining the proper method for reporting a final data number. Omission of one of these activities can lead to unreliable data resulting in improper conclusions and perhaps inappropriate actions.

The financial stakes riding on the monitoring regulation data are too high to compromise the generated date with inadequate QA/QC.

XX ECONOMIC IMPLICATIONS OF THE REGULATION

Mining is a major contributor to employment and income in Ontario's north. Nearly all of the metal mines which are subject to the MISA monitoring regulation are located on the Canadian shield. The two salt mines are located in Southwestern Ontario where sedimentary rocks contain large salt deposits from prehistoric seas.

The value of all mineral production in the province was $5.6 billion in 1987. Employment in the six mining categories totalled approximately 28,000 with the majority of jobs being located in northern Ontario (A.R.A., 1988).

Each mining category serves different markets with different economic characteristics which makes comparisons among categories difficult. The salt industry in particular is substantially different from metal markets so that the implications of monitoring costs for the two salt mines were examined separately from the metal mines.

The Ontario mining industry is dynamic. Mines change ownerships, new mines are opened while others become inactive or are mothballed. Consequently, the list of mines which is subject to

the regulation has been altered since the public review period to reflect these changes. Details of these changes are presented in Part IX.

The number of mines subject to the MISA Monitoring Regulation has dropped from 92 to 67, with 13 mines designated as exploration and development properties. The cost estimates presented here reflect these changes and are not directly comparable with those presented in previous drafts of this report.

Exploration or development plants are required to report only monitoring of data that are currently required by the Ministry. Therefore, significant financial outlay will not be required by these mines, and cost estimates were not derived for these properties. Because the silver category now consists of exploration or development plants, for the purposes of cost estimation, the silver category was excluded.

Capital and operating costs were estimated for five monitoring activities for each of the five commodity-specific categories and then for each mine location. Monitoring activities for which costs are estimated include sampling, flow measurement, characterization and routine analyses, toxicity testing and reporting.

Costs of characterization, routine and toxicity testing were estimated by assuming that all tests would be carried out at a commercial lab in Toronto. This procedure permits the costs of analyses for each mine to be compared and aggregated. No capital expenses were associated with analysis costs.

Capital investments would be required to install flow measurement equipment at each mine site and to purchase computers and software to store and manipulate monitoring data. Additional labour would be required to maintain flow measurement equipment, to collect samples and to record data over the 12 month period of the regulation. Maintenance of flow measurement installations were seen to be especially problematic because of weather conditions.

Estimates of flow measurement, sampling and reporting resource requirements and cost estimates were provided by the Ontario Mining Association. Details and supporting documentation of these costs and their implications are found in "Monitoring Costs and their Implications for Direct Dischargers in the Ontario Mineral Group A Sector Final Report" (Policy and Planning Branch, MOE 1989).

Ontario Mining Association representatives pointed out that some mines may contract sampling activities to consultants. Therefore, costs were estimated for one scenario in which all metal mines contracted sampling to consultants and for another scenario in which all metal mining operations conducted sampling with their own staff.

Flow measurement is another activity about which there are substantial uncertainties. Installation costs of flow measurement devices were found to range from $20,000 to $70,000 per installation depending on sites. Therefore, total capital costs for flow measurement installations could vary by 3.5 times.

As shown in Table 2, average incremental operating and capital costs of monitoring are estimated to total $13.1 million under the scenario in which mine employees do their own sampling. If consultants are hired to collect samples, costs could total as much as $18.0 million. Operating costs attributable to consultant sampling would be over three times that if

mine employees conducted their own sampling. The average total cost per mine ranges from $240,000 to $333,000.

TABLE 2

ESTIMATES OF THE AVERAGE INCREMENTAL
OPERATING AND CAPITAL COSTS BY MONITORING ACTIVITY
($ Millions)

ACTIVITY	MINE SAMPLING		CONSULTANT SAMPLING	
	Capital	Operating	Capital	Operating
Sampling (including transportation)	1.7	2.8	1.3	8.1
Flow measurement	2.2	.05	2.2	.05
Chemical Analyses	-	3.8	-	3.8
Toxicity Testing	-	.2	-	.2
Reporting (including initial report)	.5	1.9	.5	1.9
SUBTOTAL	4.4	8.7	3.9	14.1
GRAND TOTAL*	13.1		18.0	

* Totals may not add up due to rounding

Capital costs vary marginally between the two scenarios, from $3.9 million under consultant sampling to $4.4 million under mine sampling.

- Flow measurement devices account for approximately 53% of the total costs, sampling requirements account for 35% and reporting accounts for the remaining 12%.

Operating costs over the 12 month period are estimated to range from $8.7 million under the mine sampling scenario to $14.1 million if consultants undertake sampling.

Routine monitoring costs were estimated for an alternative scenario in which all mines tested for the same parameters and at the same frequency. This would result in a cost of $5.0 million as opposed to $2.8 million under the proposed requirements. This difference of $2.3 million is a measure of the cost-effectiveness of adopting the category and stream-specific approach.

Monitoring costs incurred by the firms under the MISA regulations will increase operating expenses and, unless there is some offsetting increase in productivity associated with wastestream monitoring, profits to the firms and returns on particular plant will be reduced.

Economic effects of the monitoring costs on the industry, and on those firms for which financial data are available, were examined.

The approach taken in this analysis is to estimate how the appropriate incremental monitoring costs would affect historic after-tax profits, capital expenditures, the return on total assets, and the return on capital employed by each firm. The analysis will show how the monitoring costs would have changed each firm's performance measures if they had been incurred during the worst year, the best year, and an average year over the period of 1981 - 1987 for which relevant data are available.

Financial data was available for 17 firms which account for 45 of the 67 mines.

Table 3 summarizes the impacts of monitoring costs on capital expenditures and after-tax profits. For all but 2 companies, monitoring capital costs represent less than 2% of average annual capital expenditures over the period. Monitoring costs would have ranged from .1% to 54% of annual capital expenditures when expenditures were at their lowest.

TABLE 3

IMPACT OF MONITORING COSTS ON CAPITAL EXPENDITURES AND AFTER-TAX PROFITS FOR THE PERIOD 1983 - 1987
(Percentages)

Firm	Capital Expenditures**			After-tax Profits**		
	Low	High	Average	Low	High	Average
Algoma Steel Corp.	0.1	0.4	0.1	-0.2	0.5	-0.4
American Barrick Resources Corp.	0.6	0.1	0.2	-1.2	1.1	-40.5
Canadian Salt Company**	3.1	1.9	2.5	2.1	1.8	1.9
Canamax Resources Inc.	53.8	0.9	1.7	-76.4	-5.0	-9.6
Denison Mines Ltd.	0.6	0.1	0.2	1.8	0.5	2.5
Dickenson	N/A	N/A	N/A	15.8	4.2	7.1
Domtar Inc. (Sifto)***	0.18	0.07	0.11	0.51	0.2	0.3
Falconbridge Ltd.	2.5	0.6	1.0	-26.7	1.1	1.8
Giant Yellowknife Mines Ltd.	24.3	0.6	2.3	41.0	6.3	13.9
Inco Ltd.	0.6	0.4	0.5	*	1.9	-8.8
Lac Minerals Ltd.	0.3	0.1	0.2	-2.6	1.4	3.2
Minnova Inc.	1.0	0.2	0.4	*	5 8	15 0
Muscocho Explorations Ltd.	9.3	6.7	N/A	*	*	*
Noranda Inc.	0.1	0.0	0.0	-0.1	0.1	1.4
Placer Dome Inc.	0 4	0.2	0.3	4.2	0.8	1.8
Rio Algom Ltd.	0.8	0.1	0.3	2.2	1.2	1.5
St. Andrews Goldfields Ltd.	1.8	0.0	0.6	*	57.0	*

* Figures are greater than 100%
** The highest monitoring costs were used in the calculation
*** Data was only available from 1983-1985

The impact of monitoring operating costs on after-tax profits varies substantially among individual companies. For 9 companies, monitoring represented less than 4% of average annual after-tax profits for the period. For companies which incurred either very small losses or profits during the period, monitoring costs had the largest impact and represented over 100% of after-tax earnings. This is the case for 2 gold mining operations and 2 base metal producers. Several companies, particularly gold mining operations experienced losses in 1987 and in previous years. Monitoring operating costs would have increased these losses. Several of these companies are in the process of bringing mines into operation in the upcoming years and therefore it is reasonable to expect that their financial situation will improve.

For the remaining 4 companies, monitoring operating costs would have accounted for between 9.6% and 40.5% of average annual after-tax profits.

Monitoring operating costs decreased on average both the rate of return on capital employed ratio and the return on assets by less than 1% for 13 of the 17 firms evaluated. For the other 4 firms, monitoring operating costs caused the return on capital employed ratio to decline by less than 3%. This indicates that the monitoring costs would have little impact on the firm's long term investment decisions.

Potential benefits to the firms of the monitoring regulation include gains in productivity by improving processes, reduction in raw material losses in wastewater, and goodwill gained by demonstrating to the public that they are responding to environmental problems.

The monitoring regulations may have a positive temporary impact on employment, in Northern Ontario, creating up to 52 new jobs. There will be an increased demand for laboratory services as a result of the monitoring regulation which could stimulate expansion of existing laboratory facilities in Thunder Bay, Ontario. Flow measurement and sampling equipment companies could also face increased demand. The monitoring database will be available to design cost-effective control programs aimed at eliminating toxic contamination where it occurs.

XXI REFERENCES

(1) U.S. Environmental Protection Agency, "Development Document for the Effluent Limitations and Guidelines for the Ore Mining and Dressing Point Source Category Volumes I and II", Washington D.C., July 1978.

(2) Ontario Ministry of the Environment, "1986 Report on the Industrial Direct Discharges in Ontario", October 1987.

(3) Ontario Ministry of the Environment, "Water Management: Goals, Policies, Objectives and Implementation Procedures of the Ministry of the Environment", November 1978 (Revised May 1984).

(4) Ontario Ministry of the Environment, "Protocol to Determine the Acute Lethality of Liquid Effluents to Fish", July 1983.

(5) Ontario Ministry of the Environment, "Daphnia magna Acute Lethality Toxicity Test", April 1988.

(6) Ontario Ministry of the Environment, "The Effluent Monitoring Priority Pollutants List (1987)", July 1988.

(7) Ontario Ministry of the Environment, "The Problem of Acid Mine Drainage in the Province of Ontario", 1977.

(8) Ontario Ministry of the Environment, "The Chemical Characteristics of Mineral Tailings in the Province of Ontario", 1979.

(9) Ontario Ministry of the Environment, "Mine Waste Control", 1977.

(10) Ontario Ministry of the Environment, "The Physical, Chemical and Radiological Characteristics of the Surface Layers of Ontario Uranium Tailings Deposits", 1982.

(11) Ontario Ministry of the Environment, "The Use, Characteristics and Toxicity of Mine-Mill Reagents in the Province of Ontario", 1977.

(12) Ontario Ministry of the Environment, "Levels of Metals and Non-Metals in Vegetation Growing on Deposits of Mineral Tailings in the Province of Ontario", 1984.

(13) Ontario Ministry of the Environment, "Rationale for the Establishment of Ontario's Provincial Water Quality Objectives", 1979.

(14) ARA, Ontario Ministry of the Environment, "Industry Profile: The Metal Mining and Refining Sector in Ontario", 1988.

PART IIi

REGULATION MADE UNDER THE ENVIRONMENTAL PROTECTION ACT

EFFLUENT MONITORING - ONTARIO MINERAL INDUSTRY SECTOR:

GROUP A

ONTARIO REGULATION 491/89

REGULATION MADE UNDER THE
ENVIRONMENTAL PROTECTION ACT

EFFLUENT MONITORING - ONTARIO MINERAL INDUSTRY SECTOR: GROUP A

Definitions

1.-(1) In this Regulation,

"final treatment" means the last treatment of an effluent before that effluent is discharged to a surface watercourse;

"General Effluent Monitoring Regulation" means Ontario Regulation 695/88;

"grab sample" means a volume of effluent of at least 100 millilitres that is collected over a period not exceeding one hour and immediately transferred to the appropriate laboratory sample container as set out in Column 2 of Schedule 2 to the General Effluent Monitoring Regulation and in Column 2 of Schedule H to this Regulation;

"Group A" means the plants listed in Schedule A;

"minewater effluent" means effluent from a mine, pit or quarry;

"minewater effluent sampling point" means a location in a minewater effluent stream situated,

(a) before the place of discharge to a surface watercourse,

(b) after any final treatment, and

(c) upstream of any significant contaminant masking or significant dilution from any other effluent stream;

"minewater effluent stream" means minewater effluent that flows through an open or closed channel;

"process effluent" means effluent from an active tailings area or from a treatment facility associated with an active tailings area;

"smelter-refinery effluent" means effluent from a smelter, a refinery or both;

"smelter-refinery effluent sampling point" means a location in a smelter-refinery effluent stream situated,

(a) before the place of discharge to a surface watercourse,

(b) after any final treatment, and

(c) upstream of any significant contaminant masking or significant dilution from any other effluent stream;

"smelter-refinery effluent stream" means smelter-refinery effluent that flows through an open or closed channel;

"storm water" means run-off from a storm event or thaw that discharges to a surface watercourse from an inactive tailings area or from a treatment facility associated with an inactive tailings area;

"tailings area" means an area that is confined by manmade or natural structures or both and that is used for the disposal of finely divided solid waste materials produced as a result of the milling of ore;

"travelling blank sample" means a quality control sample prepared in accordance with subsections 11(2) and (3);

"travelling spiked blank sample" means a quality control sample prepared in accordance with subsection 11(4);

(2) The definitions in section 1 of the General Effluent Monitoring Regulation that are not redefined in this Regulation apply to this Regulation.

(3) Where a term is defined in this Regulation and in the General Effluent Monitoring Regulation, the definition in this Regulation applies to the General Effluent Monitoring Regulation insofar as that Regulation governs direct dischargers to whom this Regulation applies.

Purpose

2. The purpose of this Regulation is to establish a data base on effluent quality in the metal and salt mining sector that will be used, along with other pertinent information, to develop effluent limits for that sector.

Application

3.-(1) This Regulation applies only with respect to the plants listed in Schedule A and only with respect to the effluent streams named in Schedule A.

(2) For the purposes of this Regulation, the plants to which this Regulation applies are divided into categories as set out in Schedule A.

(3) The category-specific monitoring schedule for each plant is as set out in Schedule A.

(4) For the purposes of subsection (5) and section 15, the plants shown as exploration or development plants in Schedule A are exploration or development plants.

(5) Sections 3 to 7 of the General Effluent Monitoring Regulation and subsection 3(7), sections 4 to 13, and subsections 14(1) to (21) and 14(23) of this Regulation do not apply with respect to exploration or development plants.

(6) This Regulation is a Sectoral Effluent Monitoring Regulation within the meaning of the General Effluent Monitoring Regulation.

(7) Each direct discharger shall carry out the monitoring obligations, including the sampling, analysis, toxicity testing, flow measurement, recording and reporting obligations of this Regulation, in accordance with the General Effluent Monitoring Regulation and in accordance with Schedules H and I to this Regulation.

(8) An obligation on a direct discharger to do a thing under this Regulation is discharged if another person has done it on the direct discharger's behalf.

(9) A direct discharger who for any period of time does not discharge an effluent is exempt, for that period, from the requirements of this Regulation that pertain to that effluent.

(10) A direct discharger need not collect any sample required to be collected by this Regulation if to do so would result in extraordinary danger to health or safety.

Sampling Points

4.-(1) Each direct discharger shall, by the day on which a report is required to be submitted by that discharger under subsection 14(1), establish a sampling point on each effluent stream named in Schedule A for that discharger's plant, as follows:

1. A minewater effluent sampling point on each minewater effluent stream.

2. A process effluent sampling point on each process effluent stream.

3. A smelter-refinery effluent sampling point on each smelter-refinery effluent stream.

4. A storm water sampling point on each storm water effluent stream.

(2) Each direct discharger shall use the sampling points established under subsection (1) for all sampling required by this Regulation, except that a direct discharger may use alternate sampling points where that is acceptable to the Director.

(3) Except as otherwise specifically provided, sets of samples required to be collected under this Regulation need not be collected on the same day.

Sample Types

5.-(1) In this section, "calculated retention time", in relation to an effluent stream, means the period of time in days that results from dividing the average daily flow, expressed in cubic metres, of that stream from any tailings area or treatment facility into the total available volume, expressed in cubic metres, of the tailings area or treatment facility.

(2) For the purpose of calculating a calculated retention time, each direct discharger shall obtain the average daily flow of a stream by averaging the daily flow of the stream over any thirty operating days.

(3) For the purpose of calculating a calculated retention time, each direct discharger shall measure or estimate the daily flow of a stream at a location or set of locations representative of the flow of the stream, using methods, devices and calculations that are capable of accuracy to within plus or minus 20 per cent of the actual flow.

(4) For the purposes of subsections (7) and (8), a calculated retention time must be calculated on or before the day on which the direct discharger is required to submit an initial report under subsection 14(1).

(5) Subject to subsections (7) to (9), each direct discharger shall collect each sample required to be collected from a process effluent sampling point, minewater effluent sampling point or smelter-refinery effluent sampling point as a composite sample.

(6) Subject to subsection (9), each direct discharger shall collect each sample required to be collected as a composite sample,

(a) by one of the means described in clauses 3(4)(a), (c) and (e) of the General Effluent Monitoring Regulation; or

(b) by taking three equal volume grab samples at intervals of at least 2 hours over an eight hour period and combining them manually.

(7) For the purposes of sections 6 and 7, where the calculated retention time in relation to a process effluent stream is thirty days or more, a direct discharger may collect each sample from that stream as a single grab sample.

(8) For the purposes of sections 6 and 7, where the calculated retention time in relation to a minewater effluent stream or a smelter-refinery effluent stream is five days or more, a direct discharger may collect each sample from that stream as a single grab sample.

(9) Despite subsection 3(8) of the General Effluent Monitoring Regulation, where a sample is collected from a process effluent sampling point, a minewater effluent sampling point or a smelter-refinery effluent sampling point for analysis for one or more parameters in any of analytical test groups 15 to 18 and 28a as set out in Schedule 1 to the General Effluent Monitoring Regulation, the sample shall consist of three equal volume grab samples taken at intervals of at least two hours over an eight hour period.

(10) Each direct discharger shall combine grab samples collected as a sample in accordance with subsection (9) for analysis for parameters in analytical test group 15, as set out in Schedule 1 to the General Effluent Monitoring Regulation, in the laboratory immediately before analysis.

(11) Each direct discharger shall combine grab samples collected as a sample in accordance with subsection (9) for analysis for parameters in analytical test groups 16 to 18 and 28a, as set out in Schedule 1 to the General Effluent Monitoring Regulation, in a purge vessel in the laboratory immediately before analysis.

Thrice Weekly Monitoring

6.-(1) On three operating days in each week, each direct discharger shall collect a set of samples sufficient to perform the analyses required by subsection (2) from each process effluent sampling point, minewater effluent sampling point and smelter-refinery effluent sampling point of that discharger.

(2) Each direct discharger shall analyze each set of samples collected under subsection (1) for the parameters indicated in the column marked "3W", for the stream from which the set was collected, of the category-specific monitoring schedule for that discharger's plant.

(3) A direct discharger whose plant is in the copper, lead, zinc, nickel category and who does not use cyanide as a process chemical need not analyze the sets of samples collected under subsection (1) from a process effluent sampling point for the parameters in analytical test group 2 as set out in Schedule 1 to the General Effluent Monitoring Regulation.

(4) A direct discharger whose plant is in the copper, lead, zinc, nickel category and who does not use backfill that contains cyanide need not analyze the sets of samples collected under subsection (1) from a minewater effluent sampling point for the parameters in analytical test group 2 as set out in Schedule 1 to the General Effluent Monitoring Regulation.

(5) A direct discharger whose plant is in the gold category and who does not use backfill that contains cyanide need not analyze the sets of samples collected under subsection (1) from a minewater effluent sampling point for the parameters in analytical test group 2 as set out in Schedule 1 to the General Effluent Monitoring Regulation or for the parameters in

analytical test group M8 as set out in Schedule I to this Regulation.

(6) A direct discharger whose plant is in the gold category and who mills an average of less than 1000 tonnes of ore per operating day need not analyze the sets of samples collected under subsection (1) from a process effluent sampling point or a minewater effluent sampling point for the parameters copper, nickel, lead and zinc in analytical test group 9 as set out in Schedule 1 to the General Effluent Monitoring Regulation or for the parameter arsenic in analytical test group 10 as set out in Schedule 1 to the General Effluent Monitoring Regulation.

(7) For the purpose of subsection (6), a direct discharger mills an average of less than 1000 tonnes of ore per day if the average amount of ore milled per day in that discharger's plant, over any thirty operating days before the day on which a report is required to be submitted by that discharger under subsection 14(1), is less than 1000 tonnes.

(8) For the purposes of subsection (1), samples collected from a sampling point after the first sample is collected from that sampling point under subsection (1) shall be collected no sooner than twenty-four hours after the previous sampling under subsection (1) from that sampling point.

Monthly Monitoring - General

7.-(1) On one operating day in each month, each direct discharger shall collect a set of samples sufficient to perform the analyses required by subsections (2) and (3) from each process effluent sampling point, minewater effluent sampling point and smelter-refinery effluent sampling point of that discharger.

(2) Each direct discharger shall analyze each set of samples collected under subsection (1) for the parameters indicated in the column marked "M", for the stream from which the set was collected, of the category-specific monitoring schedule for that discharger's plant.

(3) Each direct discharger to whom subsection 6(6) applies shall, in addition to performing the analyses required by subsection (2), analyze each set of samples collected under subsection (1) from a process effluent sampling point or a minewater effluent sampling point of that discharger for the parameters copper, nickel, lead and zinc in analytical test group 9 as set out in Schedule 1 to the General Effluent Monitoring Regulation and for the parameter arsenic in analytical test group

10 as set out in Schedule 1 to the General Effluent Monitoring Regulation.

(4) A direct discharger whose plant is in the uranium category need not analyze the sets of samples collected under subsection (1) from a smelter-refinery effluent sampling point for the parameters in analytical test group 6 as set out in Schedule 1 to the General Effluent Monitoring Regulation.

(5) The exemption set out in subsection (4) does not apply in relation to the plant referred to in Schedule A as the refinery at Port Hope, Ontario.

(6) For the purposes of subsection (1), samples collected from a sampling point after the first sample is collected from that sampling point under subsection (1) shall be collected no sooner than fifteen days after the previous sampling under subsection (1) from that sampling point.

Monthly Monitoring - Storm Water

8.-(1) On one day in each month, each direct discharger shall collect a set of samples from each storm water sampling point of that discharger, sufficient to perform the analyses required by subsection (2).

(2) Each direct discharger shall analyze each set of samples collected under subsection (1) for the parameters indicated in the column marked "M", for the stream from which the set was collected, of the category-specific monitoring schedule for that discharger's plant.

(3) For the purposes of subsection (1), samples collected from a sampling point after the first sample is collected from that sampling point under subsection (1) shall be collected no sooner than fifteen days after the previous sampling under subsection (1) from that sampling point.

Quarterly Monitoring

9.-(1) Subject to subsection (2), on one operating day in each quarter, each direct discharger shall collect a set of samples sufficient to perform the analyses required by subsection (3) from each sampling point of that discharger.

(2) Each direct discharger whose plant is in the salt category may collect a set of samples from each minewater effluent sampling point of that discharger on only two operating

days during the period beginning on the 1st day of February, 1990 and ending on the 31st day of January, 1991, instead of at the frequency set out in subsection (1).

(3) Each direct discharger shall analyze each set of samples collected under subsections (1) and (2) for the parameters indicated in the column marked "Q", for the stream from which the set was collected, of the category-specific monitoring schedule for that discharger's plant.

(4) A direct discharger who does not use or store polychlorinated biphenyls need not analyze the sets of samples collected under subsections (1) and (2) for the parameters in analytical test group 27 as set out in Schedule 1 to the General Effluent Monitoring Regulation.

(5) A direct discharger whose plant is in the uranium category need not analyze the sets of samples collected under subsection (1) from a smelter-refinery effluent sampling point for the parameters in analytical test group 6 as set out in Schedule 1 to the General Effluent Monitoring Regulation.

(6) The exemption set out in subsection (5) does not apply in relation to the plant referred to in Schedule A as the refinery at Port Hope, Ontario.

(7) Despite clause 4(2)(b) of the General Effluent Monitoring Regulation, no direct discharger shall analyze samples collected under subsection (1) or (2) using the alternate instrumental measurement method principles set out in Column 5 of Schedule 3 to the General Effluent Monitoring Regulation.

(8) For the purposes of subsections (1) and (2), samples collected from a sampling point after the first sample is collected from that sampling point under subsection (1) or (2) shall be collected no sooner than forty-five days after the previous sampling under subsection (1) or (2) from that sampling point.

(9) A direct discharger is only required to fulfill the requirements of subsection (1) in four consecutive quarters.

Monitoring for Parameters in Analytical Test Group 24

10.-(1) On one operating day during the period beginning on the 1st day of February, 1990 and ending on the 31st day of January, 1991, each direct discharger shall collect a set of samples from each sampling point of that discharger and shall analyze each such set for the parameters in analytical test group

24 as set out in Schedule 1 to the General Effluent Monitoring Regulation.

(2) A direct discharger is exempt from the requirements of this section if, during the period beginning on the 1st day of July, 1987 and ending on the 31st day of December, 1987, the discharger collected a set of samples from each effluent stream of that discharger, analyzed each such set for the parameters in analytical test group 24 as set out in Schedule 1 to the General Effluent Monitoring Regulation, and reported the results of those analyses to the Municipal Industrial Strategy for Abatement Office of the Ministry of the Environment.

Quality Control Monitoring

11.-(1) Each direct discharger shall prepare a travelling blank sample and a travelling spiked blank sample for each sample collected under subsections 9(1) and (2).

(2) Where a direct discharger is required to prepare a travelling blank sample for another sample, the discharger shall,

(a) prepare a quality control sample of uncontaminated water;

(b) ensure that the quality control sample accompanies the container intended for the other sample from the laboratory that provides the container to the area in which the other sample is to be collected;

(c) open and reseal the quality control sample in that area; and

(d) return the quality control sample together with the other sample to the laboratory for analysis.

(3) Each direct discharger shall, after opening and before resealing a travelling blank sample under clause 2(c), preserve it according to the same methods, if any, used to preserve the other sample.

(4) Where a direct discharger is required to prepare a travelling spiked blank sample for another sample, the discharger shall,

(a) prepare a quality control sample of uncontaminated water to which a standard solution has been added;

(b) preserve the quality control sample according to the same methods, if any, used to preserve the other sample;

(c) within twenty-four hours of complying with clauses (a) and (b), ensure that the quality control sample accompanies the container intended for the other sample from the laboratory that provides the container to the area in which the other sample is to be collected; and

(d) return the quality control sample, unopened, together with the other sample to the laboratory for analysis.

(5) Each direct discharger shall analyze each travelling blank sample prepared under subsection (1) for the parameters indicated in the column marked "Q", for the stream from which the sample for which the travelling blank sample was prepared was collected, of the category-specific monitoring schedule for that discharger's plant.

(6) Despite subsection (5), a direct discharger need not analyze a travelling blank sample for parameters in analytical test groups 1, 3, 8, 28a, 28b and 29.

(7) Each direct discharger shall analyze each travelling spiked blank sample prepared under subsection (1) for the parameters in analytical test groups 16 to 20, 23 and 27 indicated in the column marked "Q", for the stream from which the sample for which the travelling spiked blank sample was prepared was collected, of the category-specific monitoring schedule for that discharger's plant.

(8) Each direct discharger shall ensure that the standard solution referred to in clause 4(a) contains at least the parameters to be analyzed for, and shall record the concentration of each such parameter in the travelling spiked blank sample.

(9) Subsection 3(31) of the General Effluent Monitoring Regulation does not apply to direct dischargers governed by this Regulation.

Toxicity Testing

12.-(1) Subject to subsection (2), on one operating day in each quarter, each direct discharger shall collect a sample from each sampling point of that discharger and shall perform a fish

toxicity test and a Daphnia magna acute lethality toxicity test on each such sample.

(2) Each direct discharger whose plant is in the salt category may collect a sample from each minewater effluent sampling point of that discharger on only two operating days during the period beginning on the 1st day of February, 1990 and ending on the 31st day of January, 1991, instead of at the frequency set out in subsection (1), and shall perform a fish toxicity test and a Daphnia magna acute lethality toxicity test on each such sample.

(3) For the purposes of subsections (1) and (2), a sample collected from a sampling point after the first sample is collected from that sampling point under subsection (1) or (2) shall be collected no sooner than forty-five days after the previous sampling under subsection (1) or (2) from that sampling point.

(4) Each direct discharger shall make every reasonable effort to collect each sample under subsections (1) and (2) on a day on which a set of samples is collected under subsection 9(1) or (2) from the same sampling point.

(5) A direct discharger is only required to fulfill the requirements of subsection (1) in four consecutive quarters.

Flow Measurement

13.-(1) Each direct discharger shall at the time of each sampling under sections 6 to 11 from an effluent stream of that discharger, measure or estimate the flow of that stream at a location or set of locations representative of the flow at the sampling point established under section 4 for that stream, and shall record the measured or estimated data.

(2) Where a direct discharger collects a sample from an effluent stream in accordance with clause 5(6)(a) on an operating day, the requirement under subsection (1) to measure or estimate the flow of that stream at the time of that sampling is fulfilled if the discharger measures or estimates that flow three times, at intervals of at least two hours, over the course of the operating day.

(3) Subsections 6(1) to (6) of the General Effluent Monitoring Regulation do not apply to direct dischargers governed by this Regulation.

(4) Each direct discharger shall use methods, devices and calculations for the measurement or estimation of the flow of an effluent stream that are capable of accuracy to within plus or minus 20 per cent of the actual flow.

Reporting

14.-(1) Each direct discharger shall submit an initial report to the Director in respect of that direct discharger's plant, by the 1st day of November, 1989 or by the 1st day of the third month following the month in which the discharger's plant was added to Schedule A.

(2) Each direct discharger shall ensure that the plans submitted under paragraph 1 of subsection 7(1) of the General Effluent Monitoring Regulation identify by type each effluent stream on which the discharger establishes a sampling point under section 4.

(3) Each direct discharger shall include in the initial report each calculated retention time to be relied on in accordance with section 5, together with documentation sufficient to satisfy the Director that each method, device and calculation used to measure or estimate the flow of an effluent stream for the purpose of calculating a calculated retention time, meets the accuracy requirement of subsection 5(3).

(4) Each direct discharger shall notify the Director in writing of any significant changes occurring on or before the 31st day of January, 1991 in respect of the information submitted under subsections (1) to (3), within thirty days after the end of the month during which the change occurs.

(5) Each direct discharger shall notify the Director in writing of any change of name or ownership of its plant occurring during the period beginning on the 15th day of June, 1989 and ending on the 31st day of January, 1991, within thirty days after this Regulation comes into force or within thirty days after any such change.

(6) Each direct discharger shall report to the Director, on a floppy diskette in a format acceptable to the Director and by hard copy generated from that diskette and signed by the discharger, the results of all analyses performed by or on behalf of the discharger under sections 6 to 11 of this Regulation, including the data recorded under subsection 11(8) and all positive numerical values at or above the analytical method detection limits calculated by the laboratory performing the

analysis, together with the date on which each sample was collected and the method used to collect each sample.

(7) For the purpose of subsection (6), each direct discharger shall report the results of analyses of samples collected under section 6 within sixty days after the last day of the week in which the sample was collected and shall report the results of analyses of samples collected under sections 7 to 11 within ninety days after the last day of the week in which the sample was collected.

(8) Each direct discharger shall, in accordance with subsection 7(6) of the General Effluent Monitoring Regulation, report to the Director the toxicity test information obtained under section 12, together with the date on which each sample was collected under section 12.

(9) For the purpose of subsection (8), each direct discharger shall report the toxicity test information obtained in respect of each sample collected under section 12 within ninety days after the last day of the week in which the sample was collected, on a floppy diskette in a format acceptable to the Director and by hard copy generated from that diskette and signed by the discharger.

(10) Each direct discharger shall, with respect to each method, device and calculation to be used to measure or estimate the flow of an effluent stream under subsection 13(1), submit to the Director, no later than thirty days before the first use of the method, device or calculation, documentation sufficient to satisfy the Director that the method, device or calculation meets the accuracy requirement of subsection 13(4).

(11) Each direct discharger shall report to the Director the flow measurement information recorded under subsection 13(1), together with the date on which each flow was measured or estimated, on a floppy diskette in a format acceptable to the Director and by hard copy generated from that diskette and signed by the discharger.

(12) The information required to be reported under subsection (11) shall be reported within 60 days after the last day of the week in which the sample in respect of which the flow was measured or estimated was collected, if the sample was collected under section 6, and within 90 days after the last day of the week in which the sample in respect of which the flow was measured or estimated was collected, if the sample was collected under sections 7 to 11.

(13) Each direct discharger shall report flow measurement information recorded under subsection 13(1) as the total volume of effluent discharged per operating day, in cubic metres per day.

(14) Each direct discharger shall report in writing to the Director the date and amount of precipitation of each storm event that occurs during the period beginning on the 1st day of February, 1990 and ending on the 31st day of January, 1991, within sixty days after the storm event.

(15) Each direct discharger shall submit to the Director, at least thirty days before the first day of each month, a written schedule of intended sampling dates by sampling point location for all sampling to be done under sections 7, 9 and 10 in that month.

(16) Each direct discharger shall make every reasonable effort to follow the schedule submitted under subsection (15) but if the schedule cannot be followed as submitted, the discharger shall notify the Director promptly of any change in dates.

(17) Each direct discharger shall keep records of all sampling required by this Regulation, including, for each sample, the date and time of collection, the sampling procedures used, the amount of sample dilution by preservative if dilution exceeds one per cent, and any incident likely to affect an analytical result.

(18) Each direct discharger shall record the results of all maintenance and calibration performed on sampling equipment used in meeting the requirements of this Regulation.

(19) Each direct discharger shall keep records of all analytical methods used in meeting the requirements of this Regulation.

(20) Each direct discharger shall submit a written report to the Director detailing the date, duration and cause of each sampling, toxicity testing, analytical and flow measurement malfunction or problem that interferes with fulfilling the requirements of this Regulation, together with a description of any remedial action taken, within thirty days after the end of the month in which the malfunction or problem occurs.

(21) Each direct discharger shall keep all records and reports required by this Regulation to be kept or made for a period of two years following the date of the last report submitted to the Director under this section.

(22) Each direct discharger shall report to the Director the results of all flow measurements and estimations and of all chemical analyses required to be done on or after the 1st day of February, 1991 by an approval given under section 24 of the Ontario Water Resources Act, within ninety days after making the measurement, estimation or analysis.

(23) The report referred to in subsection (22) shall be submitted on a floppy diskette in a format acceptable to the Director and by hard copy generated from that diskette and signed by the discharger.

(24) The General Effluent Monitoring Regulation does not apply in respect of obligations under subsection (22).

Exploration or Development Plants

15.-(1) Each direct discharger whose plant is an exploration or development plant shall submit to the Director, by the 1st day of November, 1989 or by the first day of the third month following the month in which the discharger's plant was added to Schedule A, a written report including the following information:

1. A plot plan of the plant, along with supporting text, showing the location of all processing areas, effluent streams from all developed onsite and offsite areas, intakes, storm drainage areas, points of effluent discharge to surface watercourses, sampling points, sampling devices and flow measuring devices.

2. A description of any methods, devices and calculations to be used in the plant to measure or estimate the flow of any effluent during the period beginning the 1st day of February, 1990 and ending the 31st day of January, 1991, together with an assessment of the accuracy of those methods, devices and calculations.

(2) Each direct discharger whose plant is an exploration or development plant shall submit to the Director, within thirty days following the end of each month in the period beginning the 1st day of February, 1990 and ending the 31st day of January, 1991, a written report including the following information:

1. A statement of how many tonnes of ore and how many tonnes of waste rock were handled in the plant in the month.

2. A statement of the types of chemicals, including chemical explosives, used in the plant in the month, together with a statement of how many kilograms of each type were used.

3. A statement of how many cubic metres of effluent were discharged from the plant to surface watercourses in the month.

4. A description of all mining methods and milling methods used in the plant in the month.

(3) Each direct discharger whose plant is an exploration or development plant shall report in writing to the Director the results of all flow measurements and estimations and of all chemical analyses required to be done, during the period beginning the 1st day of February, 1990 and ending the 31st day of January, 1991, by a permit to take water given under section 20 of the Ontario Water Resources Act or by an approval given under section 24 of the Ontario Water Resources Act, within thirty days after making the measurement, estimation or analysis.

Commencement

16.-(1) This Regulation, except sections 6 to 13 comes into force on the day on which it is filed.

(2) Sections 6 to 13 come into force on the 1st day of February, 1990.

Revocation

17. Sections 4 to 13 are revoked on the 1st day of February, 1991.

LEGEND FOR SCHEDULES A TO G

3W	-	Thrice weekly
M	-	Monthly
Q	-	Quarterly
EXP/DEV	-	Exploration or Development Plant

SCHEDULE A

ITEM	PLANT	LOCATION	OWNER AS OF JUNE 15, 1989	EFFLUENT STREAM NAME	EFFLUENT STREAM TYPE	CATEGORY-SPECIFIC MONITORING SCHEDULE
COPPER, LEAD, ZINC, NICKEL CATEGORY						
1	Copper Cliff Treatment Plant	Sudbury, Ontario	Inco Limited	Final Discharge	Process Effluent	B
2	Crean Hill	Sudbury, Ontario	Inco Limited	Minewater	Minewater Effluent	B
3	Falconbridge	Sudbury, Ontario	Falconbridge Limited	Final Discharge at Nickel Iron Refinery Road	Process Effluent	B
4	Garson	Sudbury, Ontario	Inco Limited	Minewater, culvert at street	Minewater Effluent	B
5	Geco Division	Manitouwadge, Ontario	Noranda Minerals Inc.	Final Discharge	Process Effluent	B
6	Kidd Creek Mine	Kidd Township	Falconbridge Limited	Minewater	Minewater Effluent	B
7	Levack	Sudbury, Ontario	Inco Limited	Minewater	Minewater Effluent	B
8	Lockerby	Sudbury, Ontario	Falconbridge Limited	Minewater	Minewater Effluent	B
9	Metallurgical Site	Hoyle Township	Falconbridge Limited	Final Discharge	Process Effluent	B
10	Nickel Refinery	Sudbury, Ontario	Inco Limited	Discharge from Second Pond	Smelter-Refinery Effluent	B
11	Nolin Creek Treatment Plant	Sudbury, Ontario	Inco Limited	Final Discharge	Storm Water Effluent	B
12	Onaping	Sudbury, Ontario	Falconbridge Limited	Discharge from Onaping Mine Pond	Minewater Effluent	B
13	Refinery	Port Colborne, Ontario	Inco Limited	Final Discharge	Smelter-Refinery Effluent	B
14	Shebandowan Property	Thunder Bay, Ontario	Inco Limited	Final Discharge	Process Effluent	B
15	Strathcona (Moose Lake)	Sudbury, Ontario	Falconbridge Limited	Final Discharge Moose Creek at Fecunis	Process Effluent	B

ONTARIO MINERAL INDUSTRY SECTOR: GROUP A

SCHEDULE A

ITEM	PLANT	LOCATION	OWNER AS OF JUNE 15, 1989	EFFLUENT STREAM NAME	EFFLUENT STREAM TYPE	CATEGORY-SPECIFIC MONITORING SCHEDULE
COPPER, LEAD, ZINC, NICKEL CATEGORY (continued)						
16	Whistle	Sudbury, Ontario	Inco Limited	Minewater	Minewater Effluent	B
17	Winston Lake Mine	District of Thunder Bay	Minnova Inc.	Final Discharge	Process Effluent	B
GOLD CATEGORY						
18	Aquarius Mine EXP/DEV	Timmins, Ontario	Lac D'Aminante Du Quebec Ltee.	Final Discharge	Process Effluent	C
19	Arthur W. White Mine	Golden Township	Dickenson Mines Limited	Final Discharge Balmer Creek at Bridge	Process Effluent	C
20	Ateba Mines Limited EXP/DEV	Beardmore, Ontario	Ateba Mines Inc.	Polishing Pond Decant	Process Effluent	C
21	Aunor-Delnite	Timmins, Ontario	Giant Yellowknife Mines Limited	Minewater	Minewater Effluent	C
22	Bell Creek	Timmins, Ontario	Canamax Resources Inc.	Final Discharge	Process Effluent	C
23	Broulan Reef EXP/DEV	Timmins, Ontario	Belmoral Mines Ltd.	Minewater	Minewater Effluent	C
24	Campbell Red Lake Mine	Golden Township	Placer Dome Inc.	Final Discharge Balmer Creek at Bridge	Process Effluent	C
25	Chesbar Resources Incorporated EXP/DEV	Chester Township	Chesbar Resources Inc.	Minewater	Minewater Effluent	C
26	Citadel Gold Mines Incorporated	McMurray Township	Citadel Gold Mines Inc.	Final Discharge	Process Effluent	C

SCHEDULE A

ITEM	PLANT	LOCATION	OWNER AS OF JUNE 15, 1989	EFFLUENT STREAM NAME	EFFLUENT STREAM TYPE	CATEGORY-SPECIFIC MONITORING SCHEDULE
GOLD CATEGORY (continued)						
27	David Bell Mine	Hemlo, Ontario	Teck-Corona Operating Corporation	Final Discharge	Process Effluent	C
28	Detour Lake Mine	Detour Lake, Ontario	Placer Dome Inc.	Final Discharge Minewater	Process Effluent Minewater Effluent	C
29	Dome Mine	Timmins, Ontario	Placer Dome Inc.	Final Discharge	Process Effluent	C
30	Dona Lake Mine	Pickle Lake, Ontario	Placer Dome Inc.	Final Discharge	Process Effluent	C
31	Eastmaque Gold Mines Limited	Kirkland Lake, Ontario	Eastmaque Gold Mines Ltd.	Final Discharge	Process Effluent	C
32	ERG Resources	Timmins, Ontario	Giant Yellowknife Mines Limited	Final Discharge	Process Effluent	C
33	Golden Giant Mine	Hemlo, Ontario	Hemlo Gold Mines Inc.	Final Discharge	Process Effluent	C
34	Jerome Mine EXP/DEV	Osway Township	Muscocho Explorations Ltd.	Minewater	Minewater Effluent	C
35	Kremzar Mine	Finan Township	Canamax Resources Inc.	Final Discharge	Process Effluent	C
36	Macassa Division	Kirkland Lake, Ontario	LAC Minerals Ltd.	Final Discharge	Process Effluent	C
37	Magnacon Mine	Mishibishu Lake Wawa, Ontario	Muscocho Explorations Ltd.	Final Discharge	Process Effluent	C
38	Magnet Mine EXP/DEV	Errington Township	Ateba Mines Inc.	Minewater	Minewater Effluent	C
39	Majino Mine	Finan Township Goudreau, Ontario	Muscocho Explorations Ltd.	Final Discharge Minewater	Process Effluent Minewater Effluent	C

SCHEDULE A

ITEM	PLANT	LOCATION	OWNER AS OF JUNE 15, 1989	EFFLUENT STREAM NAME	EFFLUENT STREAM TYPE	CATEGORY-SPECIFIC MONITORING SCHEDULE
GOLD CATEGORY (continued)						
40	Marhill	Timmins, Ontario	Canamax Resources Inc.	Minewater	Minewater Effluent	C
41	McDermott	Harker Township	American Barrick Resources Corporation	Final Discharge	Process Effluent	C
42	Mishibishu Lake EXP/DEV	Wawa, Ontario	Granges Exploration Ltd.	Minewater	Minewater Effluent	C
43	Muskegsagagen Lake	District of Kenora	Bond Gold Canada Inc.	Final Discharge	Process Effluent	C
44	Opapamiskan Lake EXP/DEV	Pickle Lake, Ontario (North-East)	Placer Dome inc.	Minewater	Minewater Effluent	C
45	Owl Creek Mine EXP/DEV	Timmins, Ontario	Falconbridge Limited Kidd Creek Division	Minewater	Minewater Effluent	C
46	Page Williams Mine	Hemlo, Ontario	LAC Minerals Ltd.	Minewater Final Discharge	Minewater Effluent Process Effluent	C
47	Pamour #1	Timmins, Ontario	Giant Yellowknife Mines Limited	Final Discharge Minewater	Process Effluent Minewater Effluent	C
48	Pamour-Schumacher	Timmins, Ontario	Giant Yellowknife Mines Limited	Final Discharge Minewater	Process Effluent Minewater Effluent	C
49	Paymaster EXP/DEV	South Porcupine	Paymaster Gold Mines Limited	Minewater	Minewater Effluent	C
50	Renable Gold Mines Limited	Renable, Ontario	Renable Gold Mines Limited	Final Discharge Minewater	Process Effluent Minewater Effluent	C
51	Ross Mine EXP/DEV	Timmins, Ontario	Giant Yellowknife Mines Limited	Minewater	Minewater Effluent	C

ITEM	PLANT	LOCATION	OWNER AS OF JUNE 15, 1989	EFFLUENT STREAM NAME	EFFLUENT STREAM TYPE	CATEGORY-SPECIFIC MONITORING SCHEDULE
GOLD CATEGORY (continued)						
52	Scadding Mine	Scadding Township	Orofino Resources Limited	Final Discharge	Process Effluent	C
53	St. Andrew Gold Fields	Stock Township	St Andrew Goldfields Ltd.	Minewater	Minewater Effluent	C
IRON CATEGORY						
54	Algoma Ore Division	Wawa, Ontario	The Algoma Steel Corporation, Limited	Final Decant	Process Effluent	D
SALT CATEGORY						
55	The Canadian Salt Company Limited	Windsor, Ontario	The Canadian Salt Company Limited	E-1 Main Sewer	Process Effluent	E
				E-6 Condensate Overflow	Process Effluent	E
				Minewater (Ojibway Mine)	Minewater Effluent	E
56	SIFTO Salt Division	Goderich, Ontario	Domtar Inc.	Manhole 3A at property boundary	Process Effluent	E
				Minewater Goderich Mine	Minewater Effluent	E

ONTARIO MINERAL INDUSTRY SECTOR: GROUP A

SCHEDULE A

ITEM	PLANT	LOCATION	OWNER AS OF JUNE 15, 1989	EFFLUENT STREAM NAME	EFFLUENT STREAM TYPE	CATEGORY-SPECIFIC MONITORING SCHEDULE
SILVER CATEGORY						
57	Leroy Project EXP/DEV	Gowganda, Ontario	Agnico-Eagle Mines Limited	Minewater	Minewater Effluent	F
58	Penna Mine EXP/DEV	Coleman Township, Ontario	Agnico-Eagle Mines Limited	Minewater	Minewater Effluent	F
URANIUM CATEGORY						
59	Denison Property	Elliot Lake, Ontario	Denison Mines Limited	Final Discharge	Process Effluent	G
				Final Discharge	Storm Water Effluent	G
60	Lacnor/Nordic	Elliot Lake, Ontario	Rio Algom Limited	Final Discharge	Storm Water Effluent	G
61	Panel	Elliot Lake, Ontario	Rio Algom Limited	Final Discharge	Process Effluent	G
62	Pronto	Spragge, Ontario	Rio Algom Limited	Final Discharge	Storm Water Effluent	G
63	Quirke	Elliot Lake, Ontario	Rio Algom Limited	Final Discharge	Process Effluent	G
64	Refinery	Blind River, Ontario	Cameco - A Canadian Mining & Energy Corporation	Final Discharge Prior to Addition of Sewage Lagoon Effluent	Smelter-Refinery Effluent	G
65	Refinery	Port Hope, Ontario	Cameco - A Canadian Mining & Energy Corporation	West UF6 Discharge East UF6 Discharge UO2 Discharge	Smelter-Refinery Effluent Smelter-Refinery Effluent Smelter-Refinery Effluent	G
66	Stanleigh	Elliot Lake, Ontario	Rio Algom Limited	Final Discharge	Process Effluent	G
67	Stanrock Property	Elliot Lake, Ontario	Denison Mines Limited	Final Discharge	Storm Water Effluent	G

SCHEDULE B - COPPER, LEAD, ZINC, NICKEL CATEGORY

		EFFLUENT STREAM TYPE:	Process Effluent			Minewater Effluent			Smelter-Refinery Effluent			Storm Water Effluent	
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED											
1	Chemical Oxygen Demand	Chemical oxygen demand (COD)		XXX	XXX		XXX	XXX		XXX	XXX	XXX	XXX
2	Total cyanide (but see subsections 6(3) and (4))	Total cyanide	XXX		XXX	XXX		XXX			XXX		XXX
3	Hydrogen ion (pH)	Hydrogen ion (pH)	XXX		XXX	XXX		XXX	XXX		XXX	XXX	XXX
4a	Nitrogen	Ammonia plus Ammonium	XXX		XXX	XXX		XXX	XXX		XXX	XXX	XXX
		Total Kjeldahl nitrogen		XXX	XXX		XXX	XXX		XXX	XXX	XXX	XXX
4b		Nitrate + Nitrite		XXX	XXX		XXX	XXX		XXX	XXX	XXX	XXX
5a	Organic carbon	Dissolved organic carbon (DOC)			XXX			XXX			XXX		XXX
5b		Total organic carbon (TOC)			XXX			XXX			XXX		XXX
6	Total phosphorus	Total phosphorus		XXX	XXX		XXX	XXX		XXX	XXX	XXX	XXX
7	Specific conductance	Specific conductance											
8	Suspended solids	Total suspended solids (TSS)	XXX		XXX	XXX		XXX	XXX		XXX	XXX	XXX
		Volatile suspended solids (VSS)											
9	Total metals	Aluminum			XXX			XXX			XXX		XXX
		Beryllium			XXX			XXX			XXX		XXX
		Cadmium		XXX	XXX		XXX	XXX		XXX	XXX	XXX	XXX
		Chromium			XXX			XXX			XXX		XXX
		Cobalt		XXX	XXX		XXX	XXX		XXX	XXX	XXX	XXX
		Copper	XXX		XXX	XXX		XXX	XXX		XXX	XXX	XXX
		Lead	XXX		XXX	XXX		XXX	XXX		XXX	XXX	XXX
		Molybdenum			XXX			XXX			XXX		XXX

		EFFLUENT STREAM TYPE:	Process Effluent			Minewater Effluent			Smelter-Refinery Effluent			Storm Water Effluent	
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED											
9	Total metals (continued)	Nickel	XXX		XXX	XXX		XXX	XXX		XXX	XXX	XXX
		Silver			XXX			XXX			XXX		XXX
		Thallium			XXX			XXX			XXX		XXX
		Vanadium			XXX			XXX			XXX		XXX
		Zinc	XXX		XXX	XXX		XXX	XXX		XXX	XXX	XXX
10	Hydrides	Antimony			XXX			XXX			XXX		XXX
		Arsenic	XXX		XXX	XXX		XXX	XXX		XXX	XXX	XXX
		Selenium			XXX			XXX			XXX		XXX
11	Chromium (Hexavalent)	Chromium (Hexavalent)			XXX			XXX			XXX		XXX
12	Mercury	Mercury		XXX	XXX		XXX	XXX		XXX	XXX	XXX	XXX
13	Total alkyl lead	Tetra-alkyl lead											
		Tri-alkyl lead											
14	Phenolics (4AAP)	Phenolics (4AAP)		XXX	XXX		XXX	XXX		XXX	XXX	XXX	XXX
15	Sulphide	Sulphide											
16	Volatiles, Halogenated	1,1,2,2-Tetrachloroethane			XXX			XXX			XXX		XXX
		1,1,2-Trichloroethane			XXX			XXX			XXX		XXX
		1,1-Dichloroethane			XXX			XXX			XXX		XXX
		1,1-Dichloroethylene			XXX			XXX			XXX		XXX
		1,2-Dichlorobenzene			XXX			XXX			XXX		XXX
		1,2-Dichloroethane (Ethylene dichloride)			XXX			XXX			XXX		XXX
		1,2-Dichloropropane			XXX			XXX			XXX		XXX
		1,3-Dichlorobenzene			XXX			XXX			XXX		XXX
		1,4-Dichlorobenzene			XXX			XXX			XXX		XXX
		Bromoform			XXX			XXX			XXX		XXX

SCHEDULE B - COPPER, LEAD, ZINC, NICKEL CATEGORY

		EFFLUENT STREAM TYPE:	Process Effluent			Minewater Effluent			Smelter-Refinery Effluent			Storm Water Effluent	
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED											
16	Volatiles, Halogenated (continued)	Bromomethane			XXX			XXX			XXX		XXX
		Carbon tetrachloride			XXX			XXX			XXX		XXX
		Chlorobenzene			XXX			XXX			XXX		XXX
		Chloroform			XXX			XXX			XXX		XXX
		Chloromethane			XXX			XXX			XXX		XXX
		Cis-1,3-Dichloropropylene			XXX			XXX			XXX		XXX
		Dibromochloromethane			XXX			XXX			XXX		XXX
		Ethylene dibromide			XXX			XXX			XXX		XXX
		Methylene chloride			XXX			XXX			XXX		XXX
		Tetrachloroethylene (Perchloroethylene)			XXX			XXX			XXX		XXX
		Trans-1,2-Dichloroethylene			XXX			XXX			XXX		XXX
		Trans-1,3-Dichloropropylene			XXX			XXX			XXX		XXX
		Trichloroethylene			XXX			XXX			XXX		XXX
		Trichlorofluoromethane			XXX			XXX			XXX		XXX
		Vinyl chloride (Chloroethylene)			XXX			XXX			XXX		XXX
17	Volatiles, Non-Halogenated	Benzene			XXX			XXX			XXX		XXX
		Styrene			XXX			XXX			XXX		XXX
		Toluene			XXX			XXX			XXX		XXX
		o-Xylene			XXX			XXX			XXX		XXX
		m-Xylene and p-Xylene			XXX			XXX			XXX		XXX
18	Volatiles, Water Soluble	Acrolein			XXX			XXX			XXX		XXX
		Acrylonitrile			XXX			XXX			XXX		XXX
19	Extractables, Base Neutral	Acenaphthene			XXX			XXX			XXX		XXX
		5-nitro Acenaphthene			XXX			XXX			XXX		XXX
		Acenaphthylene			XXX			XXX			XXX		XXX
		Anthracene			XXX			XXX			XXX		XXX
		Benz(a)anthracene			XXX			XXX			XXX		XXX
		Benzo(a)pyrene			XXX			XXX			XXX		XXX

		EFFLUENT STREAM TYPE:	Process Effluent			Minewater Effluent			Smelter-Refinery Effluent			Storm Water Effluent	
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED											
19	Extractables, Base Neutral (continued)	Benzo(b)fluoranthene			XXX			XXX			XXX		XXX
		Benzo(g,h,i)perylene			XXX			XXX			XXX		XXX
		Benzo(k)fluoranthene			XXX			XXX			XXX		XXX
		Camphene			XXX			XXX			XXX		XXX
		1-Chloronaphthalene			XXX			XXX			XXX		XXX
		2-Chloronaphthalene			XXX			XXX			XXX		XXX
		Chrysene			XXX			XXX			XXX		XXX
		Dibenz(a,h)anthracene			XXX			XXX			XXX		XXX
		Fluoranthene			XXX			XXX			XXX		XXX
		Fluorene			XXX			XXX			XXX		XXX
		Indeno(1,2,3-cd)pyrene			XXX			XXX			XXX		XXX
		Indole			XXX			XXX			XXX		XXX
		1-Methylnaphthalene			XXX			XXX			XXX		XXX
		2-Methylnaphthalene			XXX			XXX			XXX		XXX
		Naphthalene			XXX			XXX			XXX		XXX
		Perylene			XXX			XXX			XXX		XXX
		Phenanthrene			XXX			XXX			XXX		XXX
		Pyrene			XXX			XXX			XXX		XXX
		Benzyl butyl phthalate			XXX			XXX			XXX		XXX
		Bis(2-Ethylhexyl) phthalate			XXX			XXX			XXX		XXX
		Di-n-butyl phthalate			XXX			XXX			XXX		XXX
		4-Bromophenyl phenyl ether			XXX			XXX			XXX		XXX
		4-Chlorophenyl phenyl ether			XXX			XXX			XXX		XXX
		Bis(2-Chloroisopropyl)ether			XXX			XXX			XXX		XXX
		Bis(2-Chloroethyl)ether			XXX			XXX			XXX		XXX
		2,4-Dinitrotoluene			XXX			XXX			XXX		XXX
		2,6-Dinitrotoluene			XXX			XXX			XXX		XXX
		Bis(2-Chloroethoxy)methane			XXX			XXX			XXX		XXX
		Diphenylamine			XXX			XXX			XXX		XXX
		N-Nitrosodiphenylamine			XXX			XXX			XXX		XXX
		N-Nitrosodi-n-propylamine			XXX			XXX			XXX		XXX

SCHEDULE B - COPPER, LEAD, ZINC, NICKEL CATEGORY

		EFFLUENT STREAM TYPE:	Process Effluent			Minewater Effluent			Smelter-Refinery Effluent			Storm Water Effluent	
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED											
20	Extractables, Acid (Phenolics)	2,3,4,5-Tetrachlorophenol			XXX			XXX			XXX		XXX
		2,3,4,6-Tetrachlorophenol			XXX			XXX			XXX		XXX
		2,3,5,6-Tetrachlorophenol			XXX			XXX			XXX		XXX
		2,3,4-Trichlorophenol			XXX			XXX			XXX		XXX
		2,3,5-Trichlorophenol			XXX			XXX			XXX		XXX
		2,4,5-Trichlorophenol			XXX			XXX			XXX		XXX
		2,4,6-Trichlorophenol			XXX			XXX			XXX		XXX
		2,4-Dimethyl phenol			XXX			XXX			XXX		XXX
		2,4-Dinitrophenol			XXX			XXX			XXX		XXX
		2,4-Dichlorophenol			XXX			XXX			XXX		XXX
		2,6-Dichlorophenol			XXX			XXX			XXX		XXX
		4,6-Dinitro-o-cresol			XXX			XXX			XXX		XXX
		2-Chlorophenol			XXX			XXX			XXX		XXX
		4-Chloro-3-methylphenol			XXX			XXX			XXX		XXX
		4-Nitrophenol			XXX			XXX			XXX		XXX
		m-Cresol			XXX			XXX			XXX		XXX
		o-Cresol			XXX			XXX			XXX		XXX
		p-Cresol			XXX			XXX			XXX		XXX
		Pentachlorophenol			XXX			XXX			XXX		XXX
		Phenol			XXX			XXX			XXX		XXX
21	Extractables, Phenoxy Acid Herbicides												
22	Extractables, Organochlorine Pesticides												
23	Extractables, Neutral -Chlorinated	1,2,3,4-Tetrachlorobenzene			XXX			XXX			XXX		XXX
		1,2,3,5-Tetrachlorobenzene			XXX			XXX			XXX		XXX
		1,2,4,5-Tetrachlorobenzene			XXX			XXX			XXX		XXX
		1,2,3-Trichlorobenzene			XXX			XXX			XXX		XXX

SCHEDULE B - COPPER, LEAD, ZINC, NICKEL CATEGORY

		EFFLUENT STREAM TYPE:	Process Effluent			Minewater Effluent			Smelter-Refinery Effluent			Storm Water Effluent	
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED											
23	Extractables, Neutral -Chlorinated (continued)	1,2,4-Trichlorobenzene			XXX			XXX			XXX		XXX
		2,4,5-Trichlorotoluene			XXX			XXX			XXX		XXX
		Hexachlorobenzene			XXX			XXX			XXX		XXX
		Hexachlorobutadiene			XXX			XXX			XXX		XXX
		Hexachlorocyclopentadiene			XXX			XXX			XXX		XXX
		Hexachloroethane			XXX			XXX			XXX		XXX
		Octachlorostyrene			XXX			XXX			XXX		XXX
		Pentachlorobenzene			XXX			XXX			XXX		XXX
24	Chlorinated Dibenzo-p-dioxins and Dibenzofurans (but see section 10)	2,3,7,8-Tetrachlorodibenzo-p-dioxin											
		Octachlorodibenzo-p-dioxin											
		Octachlorodibenzofuran											
		Total heptachlorinated dibenzo-p-dioxins											
		Total heptachlorinated dibenzofurans											
		Total hexachlorinated dibenzo-p-dioxins											
		Total hexachlorinated dibenzofurans											
		Total pentachlorinated dibenzo-p-dioxins											
		Total pentachlorinated dibenzofurans											
		Total tetrachlorinated dibenzo-p-dioxins											
		Total tetrachlorinated dibenzofurans											
25	Solvent Extractables	Oil and grease	XXX		XXX	XXX		XXX	XXX		XXX	XXX	XXX
26	Fatty and Resin Acids												
27	Polychlorinated Biphenyls (PCBs) (but see subsection 9(4))	PCBs (Total)			XXX			XXX			XXX		XXX

SCHEDULE B - COPPER, LEAD, ZINC, NICKEL CATEGORY

	EFFLUENT STREAM TYPE:	Process Effluent			Minewater Effluent			Smelter-Refinery Effluent			Storm Water Effluent	
	FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	M	Q
ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED											
28a Open Characterization - Volatiles				XXX			XXX			XXX		XXX
28b Open Characterization - Extractables				XXX			XXX			XXX		XXX
29 Open Characterization - Elemental	Aluminum			XXX			XXX			XXX		XXX
	Antimony			XXX			XXX			XXX		XXX
	Arsenic			XXX			XXX			XXX		XXX
	Barium			XXX			XXX			XXX		XXX
	Beryllium			XXX			XXX			XXX		XXX
	Bismuth			XXX			XXX			XXX		XXX
	Boron			XXX			XXX			XXX		XXX
	Cadmium			XXX			XXX			XXX		XXX
	Calcium			XXX			XXX			XXX		XXX
	Cerium			XXX			XXX			XXX		XXX
	Cesium			XXX			XXX			XXX		XXX
	Chromium			XXX			XXX			XXX		XXX
	Cobalt			XXX			XXX			XXX		XXX
	Copper			XXX			XXX			XXX		XXX
	Dysprosium			XXX			XXX			XXX		XXX
	Erbium			XXX			XXX			XXX		XXX
	Europium			XXX			XXX			XXX		XXX
	Gadolinium			XXX			XXX			XXX		XXX
	Gallium			XXX			XXX			XXX		XXX
	Germanium			XXX			XXX			XXX		XXX
	Gold			XXX			XXX			XXX		XXX
	Hafnium			XXX			XXX			XXX		XXX
	Holmium			XXX			XXX			XXX		XXX
	Indium			XXX			XXX			XXX		XXX
	Iridium			XXX			XXX			XXX		XXX

		EFFLUENT STREAM TYPE:	Process Effluent			Minewater Effluent			Smelter-Refinery Effluent			Storm Water Effluent	
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED											
29	Open Characterization - Elemental (continued)	Iron			XXX			XXX			XXX		XXX
		Lanthanum			XXX			XXX			XXX		XXX
		Lead			XXX			XXX			XXX		XXX
		Lithium			XXX			XXX			XXX		XXX
		Lutetium			XXX			XXX			XXX		XXX
		Magnesium			XXX			XXX			XXX		XXX
		Manganese			XXX			XXX			XXX		XXX
		Mercury			XXX			XXX			XXX		XXX
		Molybdenum			XXX			XXX			XXX		XXX
		Neodymium			XXX			XXX			XXX		XXX
		Nickel			XXX			XXX			XXX		XXX
		Niobium			XXX			XXX			XXX		XXX
		Osmium			XXX			XXX			XXX		XXX
		Palladium			XXX			XXX			XXX		XXX
		Phosphorus			XXX			XXX			XXX		XXX
		Platinum			XXX			XXX			XXX		XXX
		Potassium			XXX			XXX			XXX		XXX
		Praesodymium			XXX			XXX			XXX		XXX
		Rhenium			XXX			XXX			XXX		XXX
		Rhodium			XXX			XXX			XXX		XXX
		Rubidium			XXX			XXX			XXX		XXX
		Ruthenium			XXX			XXX			XXX		XXX
		Samarium			XXX			XXX			XXX		XXX
		Scandium			XXX			XXX			XXX		XXX
		Selenium			XXX			XXX			XXX		XXX
		Silicon			XXX			XXX			XXX		XXX
		Silver			XXX			XXX			XXX		XXX
		Sodium			XXX			XXX			XXX		XXX
		Strontium			XXX			XXX			XXX		XXX
		Sulfur			XXX			XXX			XXX		XXX
		Tantalum			XXX			XXX			XXX		XXX

		EFFLUENT STREAM TYPE:	Process Effluent			Minewater Effluent			Smelter-Refinery Effluent			Storm Water Effluent	
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED											
29	Open Characterization - Elemental (continued)	Tellurium			XXX			XXX			XXX		XXX
		Terbium			XXX			XXX			XXX		XXX
		Thallium			XXX			XXX			XXX		XXX
		Thorium			XXX			XXX			XXX		XXX
		Thulium			XXX			XXX			XXX		XXX
		Tin			XXX			XXX			XXX		XXX
		Titanium			XXX			XXX			XXX		XXX
		Tungsten			XXX			XXX			XXX		XXX
		Uranium			XXX			XXX			XXX		XXX
		Vanadium			XXX			XXX			XXX		XXX
		Ytterbium			XXX			XXX			XXX		XXX
		Yttrium			XXX			XXX			XXX		XXX
		Zinc			XXX			XXX			XXX		XXX
		Zirconium			XXX			XXX			XXX		XXX
M1	Chlorides	Chlorides			XXX			XXX			XXX		XXX
M2	Cyanates	Cyanates			XXX			XXX			XXX		XXX
M3	Dissolved solids	Dissolved solids		XXX	XXX		XXX	XXX		XXX	XXX	XXX	XXX
M4	Sulphates	Sulphates		XXX	XXX		XXX	XXX		XXX	XXX	XXX	XXX
M5	Iron	Iron		XXX			XXX			XXX		XXX	
M6	Thiocyanates	Thiocyanates			XXX			XXX			XXX		XXX
M7	Uranium	Uranium											
M8	Weak acid dissociable cyanides	Weak acid dissociable cyanides (Free cyanide)			XXX			XXX			XXX		XXX

ONTARIO MINERAL INDUSTRY SECTOR - GROUP A REGULATION

SCHEDULE C - GOLD CATEGORY

Not Applicable

		EFFLUENT STREAM TYPE:	Process Effluent			Minewater Effluent			Smelter-Refinery Effluent			Storm Water Effluent	
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED											
1	Chemical Oxygen Demand	Chemical oxygen demand (COD)		XXX	XXX		XXX	XXX				XXX	XXX
2	Total cyanide (but see subsection 6(5))	Total cyanide	XXX		XXX	XXX		XXX				XXX	XXX
3	Hydrogen ion (pH)	Hydrogen ion (pH)	XXX		XXX	XXX		XXX				XXX	XXX
4a	Nitrogen	Ammonia plus Ammonium	XXX		XXX	XXX		XXX				XXX	XXX
		Total Kjeldahl nitrogen		XXX	XXX		XXX	XXX				XXX	XXX
4b		Nitrate + Nitrite		XXX	XXX		XXX	XXX				XXX	XXX
5a	Organic carbon	Dissolved organic carbon (DOC)			XXX			XXX					XXX
5b		Total organic carbon (TOC)			XXX			XXX					XXX
6	Total phosphorus	Total phosphorus		XXX	XXX		XXX	XXX				XXX	XXX
7	Specific conductance	Specific conductance											
8	Suspended solids	Total suspended solids (TSS)	XXX		XXX	XXX		XXX				XXX	XXX
		Volatile suspended solids (VSS)											
9	Total metals (but see subsections 6(6), (7) and 7(3))	Aluminum			XXX			XXX					XXX
		Beryllium			XXX			XXX					XXX
		Cadmium		XXX	XXX		XXX	XXX					XXX
		Chromium			XXX			XXX					XXX
		Cobalt		XXX	XXX		XXX	XXX					XXX
		Copper	XXX		XXX	XXX		XXX					XXX
		Lead	XXX		XXX	XXX		XXX					XXX
		Molybdenum			XXX			XXX					XXX

SCHEDULE C - GOLD CATEGORY

Not Applicable

		EFFLUENT STREAM TYPE:	Process Effluent			Minewater Effluent			Smelter Refinery Effluent			Storm Water Effluent	
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED											
9	Total metals (but see subsections 6(6), (7) and 7(3)) (continued)	Nickel	XXX		XXX	XXX		XXX					XXX
		Silver			XXX			XXX					XXX
		Thallium			XXX			XXX					XXX
		Vanadium			XXX			XXX					XXX
		Zinc	XXX		XXX	XXX		XXX					XXX
10	Hydrides (but see subsections 6(6) and (7))	Antimony			XXX			XXX					XXX
		Arsenic	XXX		XXX	XXX		XXX				XXX	XXX
		Selenium			XXX			XXX					XXX
11	Chromium (Hexavalent)	Chromium (Hexavalent)			XXX			XXX					XXX
12	Mercury	Mercury		XXX	XXX		XXX	XXX				XXX	XXX
13	Total alkyl lead	Tetra-alkyl lead											
		Tri-alkyl lead											
14	Phenolics (4AAP)	Phenolics (4AAP)		XXX	XXX		XXX	XXX				XXX	XXX
15	Sulphide	Sulphide											
16	Volatiles, Halogenated	1,1,2,2-Tetrachloroethane			XXX			XXX					XXX
		1,1,2-Trichloroethane			XXX			XXX					XXX
		1,1-Dichloroethane			XXX			XXX					XXX
		1,1-Dichloroethylene			XXX			XXX					XXX
		1,2-Dichlorobenzene			XXX			XXX					XXX
		1,2-Dichloroethane (Ethylene dichloride)			XXX			XXX					XXX
		1,2-Dichloropropane			XXX			XXX					XXX
		1,3-Dichlorobenzene			XXX			XXX					XXX
		1,4-Dichlorobenzene			XXX			XXX					XXX
		Bromoform			XXX			XXX					XXX

SCHEDULE C - GOLD CATEGORY

Not Applicable

		EFFLUENT STREAM TYPE:	Process Effluent			Minewater Effluent			Smelter-Refinery Effluent			Storm Water Effluent	
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED											
16	Volatiles, Halogenated (continued)	Bromomethane			XXX			XXX					XXX
		Carbon tetrachloride			XXX			XXX					XXX
		Chlorobenzene			XXX			XXX					XXX
		Chloroform			XXX			XXX					XXX
		Chloromethane			XXX			XXX					XXX
		Cis-1,3-Dichloropropylene			XXX			XXX					XXX
		Dibromochloromethane			XXX			XXX					XXX
		Ethylene dibromide			XXX			XXX					XXX
		Methylene chloride			XXX			XXX					XXX
		Tetrachloroethylene (Perchloroethylene)			XXX			XXX					XXX
		Trans-1,2-Dichloroethylene			XXX			XXX					XXX
		Trans-1,3-Dichloropropylene			XXX			XXX					XXX
		Trichloroethylene			XXX			XXX					XXX
		Trichlorofluoromethane			XXX			XXX					XXX
		Vinyl chloride (Chloroethylene)			XXX			XXX					XXX
17	Volatiles, Non-Halogenated	Benzene			XXX			XXX					XXX
		Styrene			XXX			XXX					XXX
		Toluene			XXX			XXX					XXX
		o-Xylene			XXX			XXX					XXX
		m-Xylene and p-Xylene			XXX			XXX					XXX
18	Volatiles, Water Soluble	Acrolein			XXX			XXX					XXX
		Acrylonitrile			XXX			XXX					XXX
19	Extractables, Base Neutral	Acenaphthene			XXX			XXX					XXX
		5-nitro Acenaphthene			XXX			XXX					XXX
		Acenaphthylene			XXX			XXX					XXX
		Anthracene			XXX			XXX					XXX
		Benz(a)anthracene			XXX			XXX					XXX
		Benzo(a)pyrene			XXX			XXX					XXX

SCHEDULE C - GOLD CATEGORY

		EFFLUENT STREAM TYPE:	Process Effluent			Minewater Effluent			Not Applicable Smelter-Refinery Effluent			Storm Water Effluent	
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED											
19	Extractables, Base Neutral (continued)	Benzo(b)fluoranthene			XXX			XXX					XXX
		Benzo(g,h,i)perylene			XXX			XXX					XXX
		Benzo(k)fluoranthene			XXX			XXX					XXX
		Camphene			XXX			XXX					XXX
		1-Chloronaphthalene			XXX			XXX					XXX
		2-Chloronaphthalene			XXX			XXX					XXX
		Chrysene			XXX			XXX					XXX
		Dibenz(a,h)anthracene			XXX			XXX					XXX
		Fluoranthene			XXX			XXX					XXX
		Fluorene			XXX			XXX					XXX
		Indeno(1,2,3-cd)pyrene			XXX			XXX					XXX
		Indole			XXX			XXX					XXX
		1-Methylnaphthalene			XXX			XXX					XXX
		2-Methylnaphthalene			XXX			XXX					XXX
		Naphthalene			XXX			XXX					XXX
		Perylene			XXX			XXX					XXX
		Phenanthrene			XXX			XXX					XXX
		Pyrene			XXX			XXX					XXX
		Benzyl butyl phthalate			XXX			XXX					XXX
		Bis(2-Ethylhexyl) phthalate			XXX			XXX					XXX
		Di-n-butyl phthalate			XXX			XXX					XXX
		4-Bromophenyl phenyl ether			XXX			XXX					XXX
		4-Chlorophenyl phenyl ether			XXX			XXX					XXX
		Bis(2-Chloroisopropyl)ether			XXX			XXX					XXX
		Bis(2-Chloroethyl)ether			XXX			XXX					XXX
		2,4-Dinitrotoluene			XXX			XXX					XXX
		2,6-Dinitrotoluene			XXX			XXX					XXX
		Bis(2-Chloroethoxy)methane			XXX			XXX					XXX
		Diphenylamine			XXX			XXX					XXX
		N-Nitrosodiphenylamine			XXX			XXX					XXX
		N-Nitrosodi-n-propylamine			XXX			XXX					XXX

ONTARIO MINERAL INDUSTRY SECTOR - GROUP A REGULATION

SCHEDULE C - GOLD CATEGORY

Not Applicable

		EFFLUENT STREAM TYPE:	Process Effluent			Minewater Effluent			Smelter-Refinery Effluent			Storm Water Effluent	
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED											
20	Extractables, Acid (Phenolics)	2,3,4,5-Tetrachlorophenol			XXX			XXX					XXX
		2,3,4,6-Tetrachlorophenol			XXX			XXX					XXX
		2,3,5,6-Tetrachlorophenol			XXX			XXX					XXX
		2,3,4-Trichlorophenol			XXX			XXX					XXX
		2,3,5-Trichlorophenol			XXX			XXX					XXX
		2,4,5-Trichlorophenol			XXX			XXX					XXX
		2,4,6-Trichlorophenol			XXX			XXX					XXX
		2,4-Dimethyl phenol			XXX			XXX					XXX
		2,4-Dinitrophenol			XXX			XXX					XXX
		2,4-Dichlorophenol			XXX			XXX					XXX
		2,6-Dichlorophenol			XXX			XXX					XXX
		4,6-Dinitro-o-cresol			XXX			XXX					XXX
		2-Chlorophenol			XXX			XXX					XXX
		4-Chloro-3-methylphenol			XXX			XXX					XXX
		4-Nitrophenol			XXX			XXX					XXX
		m-Cresol			XXX			XXX					XXX
		o-Cresol			XXX			XXX					XXX
		p-Cresol			XXX			XXX					XXX
		Pentachlorophenol			XXX			XXX					XXX
		Phenol			XXX			XXX					XXX
21	Extractables, Phenoxy Acid Herbicides												
22	Extractables, Organochlorine Pesticides												
23	Extractables, Neutral -Chlorinated	1,2,3,4-Tetrachlorobenzene			XXX			XXX					XXX
		1,2,3,5-Tetrachlorobenzene			XXX			XXX					XXX
		1,2,4,5-Tetrachlorobenzene			XXX			XXX					XXX
		1,2,3-Trichlorobenzene			XXX			XXX					XXX

SCHEDULE C - GOLD CATEGORY

Not Applicable

		EFFLUENT STREAM TYPE:	Process Effluent			Minewater Effluent			Smelter-Refinery Effluent			Storm Water Effluent	
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED											
23	Extractables, Neutral -Chlonnated (continued)	1,2,4-Trichlorobenzene			XXX			XXX					XXX
		2,4,5-Trichlorotoluene			XXX			XXX					XXX
		Hexachlorobenzene			XXX			XXX					XXX
		Hexachlorobutadiene			XXX			XXX					XXX
		Hexachlorocyclopentadiene			XXX			XXX					XXX
		Hexachloroethane			XXX			XXX					XXX
		Octachlorostyrene			XXX			XXX					XXX
		Pentachlorobenzene			XXX			XXX					XXX
24	Chlorinated Dibenzo-p-dioxins and Dibenzofurans (but see section 10)	2,3,7,8-Tetrachlorodibenzo-p-dioxin											
		Octachlorodibenzo-p-dioxin											
		Octachlorodibenzofuran											
		Total heptachlorinated dibenzo-p-dioxins											
		Total heptachlorinated dibenzofurans											
		Total hexachlorinated dibenzo-p-dioxins											
		Total hexachlorinated dibenzofurans											
		Total pentachlorinated dibenzo-p-dioxins											
		Total pentachlorinated dibenzofurans											
		Total tetrachlorinated dibenzo-p-dioxins											
		Total tetrachlorinated dibenzofurans											
25	Solvent Extractables	Oil and grease	XXX		XXX	XXX		XXX				XXX	XXX
26	Fatty and Resin Acids												
27	Polychlonnated Biphenyls (PCBs) (but see subsection 9(4))	PCBs (Total)			XXX			XXX					XXX

SCHEDULE C - GOLD CATEGORY

Not Applicable

		EFFLUENT STREAM TYPE:	Process Effluent			Minewater Effluent			Smelter-Refinery Effluent			Storm Water Effluent	
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED											
28a	Open Characterization - Volatiles				XXX			XXX					XXX
28b	Open Characterization - Extractables				XXX			XXX					XXX
29	Open Characterization - Elemental	Aluminum			XXX			XXX					XXX
		Antimony			XXX			XXX					XXX
		Arsenic			XXX			XXX					XXX
		Barium			XXX			XXX					XXX
		Beryllium			XXX			XXX					XXX
		Bismuth			XXX			XXX					XXX
		Boron			XXX			XXX					XXX
		Cadmium			XXX			XXX					XXX
		Calcium			XXX			XXX					XXX
		Cerium			XXX			XXX					XXX
		Cesium			XXX			XXX					XXX
		Chromium			XXX			XXX					XXX
		Cobalt			XXX			XXX					XXX
		Copper			XXX			XXX					XXX
		Dysprosium			XXX			XXX					XXX
		Erbium			XXX			XXX					XXX
		Europium			XXX			XXX					XXX
		Gadolinium			XXX			XXX					XXX
		Gallium			XXX			XXX					XXX
		Germanium			XXX			XXX					XXX
		Gold			XXX			XXX					XXX
		Hafnium			XXX			XXX					XXX
		Holmium			XXX			XXX					XXX
		Indium			XXX			XXX					XXX
		Iridium			XXX			XXX					XXX

SCHEDULE C - GOLD CATEGORY

		EFFLUENT STREAM TYPE:	Process Effluent			Minewater Effluent			Not Applicable Smelter-Refinery Effluent			Storm Water Effluent	
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED											
29	Open Charactenzation - Elemental (continued)	Iron			XXX			XXX					XXX
		Lanthanum			XXX			XXX					XXX
		Lead			XXX			XXX					XXX
		Lithium			XXX			XXX					XXX
		Lutetium			XXX			XXX					XXX
		Magnesium			XXX			XXX					XXX
		Manganese			XXX			XXX					XXX
		Mercury			XXX			XXX					XXX
		Molybdenum			XXX			XXX					XXX
		Neodymium			XXX			XXX					XXX
		Nickel			XXX			XXX					XXX
		Niobium			XXX			XXX					XXX
		Osmium			XXX			XXX					XXX
		Palladium			XXX			XXX					XXX
		Phosphorus			XXX			XXX					XXX
		Platinum			XXX			XXX					XXX
		Potassium			XXX			XXX					XXX
		Praesodymium			XXX			XXX					XXX
		Rhenium			XXX			XXX					XXX
		Rhodium			XXX			XXX					XXX
		Rubidium			XXX			XXX					XXX
		Ruthenium			XXX			XXX					XXX
		Samarium			XXX			XXX					XXX
		Scandium			XXX			XXX					XXX
		Selenium			XXX			XXX					XXX
		Silicon			XXX			XXX					XXX
		Silver			XXX			XXX					XXX
		Sodium			XXX			XXX					XXX
		Strontium			XXX			XXX					XXX
		Sulfur			XXX			XXX					XXX
		Tantalum			XXX			XXX					XXX

SCHEDULE C - GOLD CATEGORY

Not Applicable

		EFFLUENT STREAM TYPE:	Process Effluent			Minewater Effluent			Smelter-Refinery Effluent			Storm Water Effluent	
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED											
29	Open Characterization - Elemental (continued)	Tellurium			XXX			XXX					XXX
		Terbium			XXX			XXX					XXX
		Thallium			XXX			XXX					XXX
		Thorium			XXX			XXX					XXX
		Thulium			XXX			XXX					XXX
		Tin			XXX			XXX					XXX
		Titanium			XXX			XXX					XXX
		Tungsten			XXX			XXX					XXX
		Uranium			XXX			XXX					XXX
		Vanadium			XXX			XXX					XXX
		Ytterbium			XXX			XXX					XXX
		Yttrium			XXX			XXX					XXX
		Zinc			XXX			XXX					XXX
		Zirconium			XXX			XXX					XXX
M1	Chlorides	Chlorides			XXX			XXX					XXX
M2	Cyanates	Cyanates		XXX	XXX			XXX					XXX
M3	Dissolved solids	Dissolved solids		XXX	XXX		XXX	XXX				XXX	XXX
M4	Sulphates	Sulphates			XXX			XXX					XXX
M5	Iron	Iron		XXX			XXX					XXX	
M6	Thiocyanates	Thiocyanates		XXX	XXX			XXX					XXX
M7	Uranium	Uranium											
M8	Weak acid dissociable cyanides (but see subsection 6(5))	Weak acid dissociable cyanides (Free cyanide)	XXX		XXX	XXX		XXX					XXX

SCHEDULE D - IRON CATEGORY

Not Applicable

		EFFLUENT STREAM TYPE:	Process Effluent			Minewater Effluent			Smelter-Refinery Effluent			Storm Water Effluent	
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED											
1	Chemical Oxygen Demand	Chemical oxygen demand (COD)		XXX	XXX		XXX	XXX				XXX	XXX
2	Total cyanide	Total cyanide			XXX			XXX					XXX
3	Hydrogen ion (pH)	Hydrogen ion (pH)	XXX		XXX	XXX		XXX				XXX	XXX
4a	Nitrogen	Ammonia plus Ammonium	XXX		XXX	XXX		XXX				XXX	XXX
		Total Kjeldahl nitrogen		XXX	XXX		XXX	XXX				XXX	XXX
4b		Nitrate + Nitrite		XXX	XXX		XXX	XXX				XXX	XXX
5a	Organic carbon	Dissolved organic carbon (DOC)			XXX			XXX					XXX
5b		Total organic carbon (TOC)			XXX			XXX					XXX
6	Total phosphorus	Total phosphorus		XXX	XXX		XXX	XXX				XXX	XXX
7	Specific conductance	Specific conductance											
8	Suspended solids	Total suspended solids (TSS)	XXX		XXX	XXX		XXX				XXX	XXX
		Volatile suspended solids (VSS)											
9	Total metals	Aluminum			XXX			XXX					XXX
		Beryllium			XXX			XXX					XXX
		Cadmium		XXX	XXX		XXX	XXX				XXX	XXX
		Chromium		XXX	XXX		XXX	XXX				XXX	XXX
		Cobalt		XXX	XXX		XXX	XXX				XXX	XXX
		Copper		XXX	XXX		XXX	XXX				XXX	XXX
		Lead		XXX	XXX		XXX	XXX				XXX	XXX
		Molybdenum			XXX			XXX					XXX
		Nickel		XXX	XXX		XXX	XXX				XXX	XXX

ONTARIO MINERAL INDUSTRY SECTOR - GROUP A REGULATION

SCHEDULE D - IRON CATEGORY

Not Applicable

		EFFLUENT STREAM TYPE:	Process Effluent			Minewater Effluent			Smelter-Refinery Effluent			Storm Water Effluent	
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED											
9	Total metals (continued)	Silver			XXX			XXX					XXX
		Thallium			XXX			XXX					XXX
		Vanadium		XXX	XXX		XXX	XXX				XXX	XXX
		Zinc		XXX	XXX		XXX	XXX				XXX	XXX
10	Hydrides	Antimony			XXX			XXX					XXX
		Arsenic		XXX	XXX		XXX	XXX				XXX	XXX
		Selenium			XXX			XXX					XXX
11	Chromium (Hexavalent)	Chromium (Hexavalent)			XXX			XXX					XXX
12	Mercury	Mercury		XXX	XXX		XXX	XXX				XXX	XXX
13	Total alkyl lead	Tetra-alkyl lead											
		Tri-alkyl lead											
14	Phenolics (4AAP)	Phenolics (4AAP)		XXX	XXX		XXX	XXX				XXX	XXX
15	Sulphide	Sulphide											
16	Volatiles, Halogenated	1,1,2,2-Tetrachloroethane			XXX			XXX					XXX
		1,1,2-Trichloroethane			XXX			XXX					XXX
		1,1-Dichloroethane			XXX			XXX					XXX
		1,1-Dichloroethylene			XXX			XXX					XXX
		1,2-Dichlorobenzene			XXX			XXX					XXX
		1,2-Dichloroethane (Ethylene dichloride)			XXX			XXX					XXX
		1,2-Dichloropropane			XXX			XXX					XXX
		1,3-Dichlorobenzene			XXX			XXX					XXX
		1,4-Dichlorobenzene			XXX			XXX					XXX
		Bromoform			XXX			XXX					XXX
		Bromomethane			XXX			XXX					XXX

SCHEDULE D - IRON CATEGORY

		EFFLUENT STREAM TYPE:	Process Effluent			Minewater Effluent			Smelter-Refinery Effluent			Storm Water Effluent	
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED											
16	Volatiles, Halogenated (continued)	Carbon tetrachloride			XXX			XXX					XXX
		Chlorobenzene			XXX			XXX					XXX
		Chloroform			XXX			XXX					XXX
		Chloromethane			XXX			XXX					XXX
		Cis-1,3-Dichloropropylene			XXX			XXX					XXX
		Dibromochloromethane			XXX			XXX					XXX
		Ethylene dibromide			XXX			XXX					XXX
		Methylene chloride			XXX			XXX					XXX
		Tetrachloroethylene (Perchloroethylene)			XXX			XXX					XXX
		Trans-1,2-Dichloroethylene			XXX			XXX					XXX
		Trans-1,3-Dichloropropylene			XXX			XXX					XXX
		Trichloroethylene			XXX			XXX					XXX
		Trichlorofluoromethane			XXX			XXX					XXX
		Vinyl chloride (Chloroethylene)			XXX			XXX					XXX
17	Volatiles, Non-Halogenated	Benzene			XXX			XXX					XXX
		Styrene			XXX			XXX					XXX
		Toluene			XXX			XXX					XXX
		o-Xylene			XXX			XXX					XXX
		m-Xylene and p-Xylene			XXX			XXX					XXX
18	Volatiles, Water Soluble	Acrolein			XXX			XXX					XXX
		Acrylonitrile			XXX			XXX					XXX
19	Extractables, Base Neutral	Acenaphthene			XXX			XXX					XXX
		5-nitro Acenaphthene			XXX			XXX					XXX
		Acenaphthylene			XXX			XXX					XXX
		Anthracene			XXX			XXX					XXX
		Benz(a)anthracene			XXX			XXX					XXX
		Benzo(a)pyrene			XXX			XXX					XXX
		Benzo(b)fluoranthene			XXX			XXX					XXX

ONTARIO MINERAL INDUSTRY SECTOR - GROUP A REGULATION

SCHEDULE D - IRON CATEGORY

Not Applicable

		EFFLUENT STREAM TYPE:	Process Effluent			Minewater Effluent			Smelter-Refinery Effluent			Storm Water Effluent	
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED											
19	Extractables, Base Neutral (continued)	Benzo(g,h,i)perylene			XXX			XXX					XXX
		Benzo(k)fluoranthene			XXX			XXX					XXX
		Camphene			XXX			XXX					XXX
		1-Chloronaphthalene			XXX			XXX					XXX
		2-Chloronaphthalene			XXX			XXX					XXX
		Chrysene			XXX			XXX					XXX
		Dibenz(a,h)anthracene			XXX			XXX					XXX
		Fluoranthene			XXX			XXX					XXX
		Fluorene			XXX			XXX					XXX
		Indeno(1,2,3-cd)pyrene			XXX			XXX					XXX
		Indole			XXX			XXX					XXX
		1-Methylnaphthalene			XXX			XXX					XXX
		2-Methylnaphthalene			XXX			XXX					XXX
		Naphthalene			XXX			XXX					XXX
		Perylene			XXX			XXX					XXX
		Phenanthrene			XXX			XXX					XXX
		Pyrene			XXX			XXX					XXX
		Benzyl butyl phthalate			XXX			XXX					XXX
		Bis(2-Ethylhexyl) phthalate			XXX			XXX					XXX
		Di-n-butyl phthalate			XXX			XXX					XXX
		4-Bromophenyl phenyl ether			XXX			XXX					XXX
		4-Chlorophenyl phenyl ether			XXX			XXX					XXX
		Bis(2-Chloroisopropyl)ether			XXX			XXX					XXX
		Bis(2-Chloroethyl)ether			XXX			XXX					XXX
		2,4-Dinitrotoluene			XXX			XXX					XXX
		2,6-Dinitrotoluene			XXX			XXX					XXX
		Bis(2-Chloroethoxy)methane			XXX			XXX					XXX
		Diphenylamine			XXX			XXX					XXX
		N-Nitrosodiphenylamine			XXX			XXX					XXX
		N-Nitrosodi-n-propylamine			XXX			XXX					XXX

SCHEDULE D - IRON CATEGORY

Not Applicable

	EFFLUENT STREAM TYPE:	Process Effluent			Minewater Effluent			Smelter-Refinery Effluent			Storm Water Effluent	
	FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	M	Q
ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED											
20 Extractables, Acid (Phenolics)	2,3,4,5-Tetrachlorophenol			XXX			XXX					XXX
	2,3,4,6-Tetrachlorophenol			XXX			XXX					XXX
	2,3,5,6-Tetrachlorophenol			XXX			XXX					XXX
	2,3,4-Trichlorophenol			XXX			XXX					XXX
	2,3,5-Trichlorophenol			XXX			XXX					XXX
	2,4,5-Trichlorophenol			XXX			XXX					XXX
	2,4,6-Trichlorophenol			XXX			XXX					XXX
	2,4-Dimethyl phenol			XXX			XXX					XXX
	2,4-Dinitrophenol			XXX			XXX					XXX
	2,4-Dichlorophenol			XXX			XXX					XXX
	2,6-Dichlorophenol			XXX			XXX					XXX
	4,6-Dinitro-o-cresol			XXX			XXX					XXX
	2-Chlorophenol			XXX			XXX					XXX
	4-Chloro-3-methylphenol			XXX			XXX					XXX
	4-Nitrophenol			XXX			XXX					XXX
	m-Cresol			XXX			XXX					XXX
	o-Cresol			XXX			XXX					XXX
	p-Cresol			XXX			XXX					XXX
	Pentachlorophenol			XXX			XXX					XXX
	Phenol			XXX			XXX					XXX
21 Extractables, Phenoxy Acid Herbicides												
22 Extractables, Organochlorine Pesticides												
23 Extractables, Neutral -Chlorinated	1,2,3,4-Tetrachlorobenzene			XXX			XXX					XXX
	1,2,3,5-Tetrachlorobenzene			XXX			XXX					XXX
	1,2,4,5-Tetrachlorobenzene			XXX			XXX					XXX
	1,2,3-Trichlorobenzene			XXX			XXX					XXX

ONTARIO MINERAL INDUSTRY SECTOR - GROUP A REGULATION

SCHEDULE D - IRON CATEGORY

Not Applicable

		EFFLUENT STREAM TYPE:	Process Effluent			Minewater Effluent			Smelter-Refinery Effluent			Storm Water Effluent	
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED											
23	Extractables, Neutral -Chlorinated (continued)	1,2,4-Trichlorobenzene			XXX			XXX					XXX
		2,4,5-Trichlorotoluene			XXX			XXX					XXX
		Hexachlorobenzene			XXX			XXX					XXX
		Hexachlorobutadiene			XXX			XXX					XXX
		Hexachlorocyclopentadiene			XXX			XXX					XXX
		Hexachloroethane			XXX			XXX					XXX
		Octachlorostyrene			XXX			XXX					XXX
		Pentachlorobenzene			XXX			XXX					XXX
24	Chlorinated Dibenzo-p-dioxins and Dibenzofurans (but see section 10)	2,3,7,8-Tetrachlorodibenzo-p-dioxin											
		Octachlorodibenzo-p-dioxin											
		Octachlorodibenzofuran											
		Total heptachlorinated dibenzo-p-dioxins											
		Total heptachlorinated dibenzofurans											
		Total hexachlorinated dibenzo-p-dioxins											
		Total hexachlorinated dibenzofurans											
		Total pentachlorinated dibenzo-p-dioxins											
		Total pentachlorinated dibenzofurans											
		Total tetrachlorinated dibenzo-p-dioxins											
		Total tetrachlorinated dibenzofurans											
25	Solvent Extractables	Oil and grease	XXX		XXX	XXX		XXX				XXX	XXX
26	Fatty and Resin Acids												
27	Polychlorinated Biphenyls (PCBs) (but see subsection 9(4))	PCBs (Total)			XXX			XXX					XXX

SCHEDULE D - IRON CATEGORY

Not Applicable

EFFLUENT STREAM TYPE:			Process Effluent			Minewater Effluent			Smelter-Refinery Effluent			Storm Water Effluent	
FREQUENCY OF SAMPLING:			3W	M	Q	3W	M	Q	3W	M	Q	M	Q
ANALYTICAL TEST GROUP		PARAMETERS TO BE ANALYZED											
28a	Open Characterization - Volatiles				XXX			XXX					XXX
28b	Open Characterization - Extractables				XXX			XXX					XXX
29	Open Characterization - Elemental	Aluminum			XXX			XXX					XXX
		Antimony			XXX			XXX					XXX
		Arsenic			XXX			XXX					XXX
		Barium			XXX			XXX					XXX
		Beryllium			XXX			XXX					XXX
		Bismuth			XXX			XXX					XXX
		Boron			XXX			XXX					XXX
		Cadmium			XXX			XXX					XXX
		Calcium			XXX			XXX					XXX
		Cerium			XXX			XXX					XXX
		Cesium			XXX			XXX					XXX
		Chromium			XXX			XXX					XXX
		Cobalt			XXX			XXX					XXX
		Copper			XXX			XXX					XXX
		Dysprosium			XXX			XXX					XXX
		Erbium			XXX			XXX					XXX
		Europium			XXX			XXX					XXX
		Gadolinium			XXX			XXX					XXX
		Gallium			XXX			XXX					XXX
		Germanium			XXX			XXX					XXX
		Gold			XXX			XXX					XXX
		Hafnium			XXX			XXX					XXX
		Holmium			XXX			XXX					XXX
		Indium			XXX			XXX					XXX
		Iridium			XXX			XXX					XXX

SCHEDULE D - IRON CATEGORY

		EFFLUENT STREAM TYPE:	Process Effluent			Minewater Effluent			Not Applicable Smelter-Refinery Effluent			Storm Water Effluent	
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED											
29	Open Characterization - Elemental (continued)	Iron			XXX			XXX					XXX
		Lanthanum			XXX			XXX					XXX
		Lead			XXX			XXX					XXX
		Lithium			XXX			XXX					XXX
		Lutetium			XXX			XXX					XXX
		Magnesium			XXX			XXX					XXX
		Manganese			XXX			XXX					XXX
		Mercury			XXX			XXX					XXX
		Molybdenum			XXX			XXX					XXX
		Neodymium			XXX			XXX					XXX
		Nickel			XXX			XXX					XXX
		Niobium			XXX			XXX					XXX
		Osmium			XXX			XXX					XXX
		Palladium			XXX			XXX					XXX
		Phosphorus			XXX			XXX					XXX
		Platinum			XXX			XXX					XXX
		Potassium			XXX			XXX					XXX
		Praesodymium			XXX			XXX					XXX
		Rhenium			XXX			XXX					XXX
		Rhodium			XXX			XXX					XXX
		Rubidium			XXX			XXX					XXX
		Ruthenium			XXX			XXX					XXX
		Samarium			XXX			XXX					XXX
		Scandium			XXX			XXX					XXX
		Selenium			XXX			XXX					XXX
		Silicon			XXX			XXX					XXX
		Silver			XXX			XXX					XXX
		Sodium			XXX			XXX					XXX
		Strontium			XXX			XXX					XXX
		Sulfur			XXX			XXX					XXX
		Tantalum			XXX			XXX					XXX

SCHEDULE D - IRON CATEGORY

Not Applicable

		EFFLUENT STREAM TYPE:	Process Effluent			Minewater Effluent			Smelter-Refinery Effluent			Storm Water Effluent	
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED											
29	Open Characterization - Elemental (continued)	Tellurium			XXX			XXX					XXX
		Terbium			XXX			XXX					XXX
		Thallium			XXX			XXX					XXX
		Thorium			XXX			XXX					XXX
		Thulium			XXX			XXX					XXX
		Tin			XXX			XXX					XXX
		Titanium			XXX			XXX					XXX
		Tungsten			XXX			XXX					XXX
		Uranium			XXX			XXX					XXX
		Vanadium			XXX			XXX					XXX
		Ytterbium			XXX			XXX					XXX
		Yttrium			XXX			XXX					XXX
		Zinc			XXX			XXX					XXX
		Zirconium			XXX			XXX					XXX
M1	Chlorides	Chlorides			XXX			XXX					XXX
M2	Cyanates	Cyanates			XXX			XXX					XXX
M3	Dissolved solids	Dissolved solids		XXX	XXX		XXX	XXX				XXX	XXX
M4	Sulphates	Sulphates		XXX	XXX		XXX	XXX				XXX	XXX
M5	Iron	Iron	XXX			XXX						XXX	
M6	Thiocyanates	Thiocyanates			XXX			XXX					XXX
M7	Uranium	Uranium											
M8	Weak acid dissociable cyanides	Weak acid dissociable cyanides (Free cyanide)			XXX			XXX					XXX

ONTARIO MINERAL INDUSTRY SECTOR - GROUP A REGULATION

SCHEDULE E - SALT CATEGORY

		EFFLUENT STREAM TYPE:	Process Effluent			Minewater Effluent			Not Applicable Smelter-Refinery Effluent			Storm Water Effluent	
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED											
1	Chemical Oxygen Demand	Chemical oxygen demand (COD)			XXX			XXX				XXX	XXX
2	Total cyanide	Total cyanide		XXX	XXX			XXX				XXX	XXX
3	Hydrogen ion (pH)	Hydrogen ion (pH)	XXX		XXX	XXX		XXX				XXX	XXX
4a	Nitrogen	Ammonia plus Ammonium		XXX	XXX		XXX	XXX				XXX	XXX
		Total Kjeldahl nitrogen		XXX	XXX		XXX	XXX				XXX	XXX
4b		Nitrate + Nitrite		XXX	XXX		XXX	XXX				XXX	XXX
5a	Organic carbon	Dissolved organic carbon (DOC)			XXX			XXX					XXX
5b		Total organic carbon (TOC)			XXX			XXX					XXX
6	Total phosphorus	Total phosphorus		XXX	XXX		XXX	XXX				XXX	XXX
7	Specific conductance	Specific conductance											
8	Suspended solids	Total suspended solids (TSS)	XXX		XXX	XXX		XXX				XXX	XXX
		Volatile suspended solids (VSS)											
9	Total metals	Aluminum			XXX			XXX					XXX
		Beryllium			XXX			XXX					XXX
		Cadmium			XXX			XXX					XXX
		Chromium			XXX			XXX					XXX
		Cobalt			XXX			XXX					XXX
		Copper			XXX			XXX					XXX
		Lead			XXX			XXX					XXX
		Molybdenum			XXX			XXX					XXX
		Nickel			XXX			XXX					XXX

SCHEDULE E - SALT CATEGORY

		EFFLUENT STREAM TYPE:	Process Effluent			Minewater Effluent			Not Applicable Smelter-Refinery Effluent			Storm Water Effluent	
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED											
9	Total metals (continued)	Silver			XXX			XXX					XXX
		Thallium			XXX			XXX					XXX
		Vanadium			XXX			XXX					XXX
		Zinc			XXX			XXX					XXX
10	Hydrides	Antimony			XXX			XXX					XXX
		Arsenic			XXX			XXX					XXX
		Selenium			XXX			XXX					XXX
11	Chromium (Hexavalent)	Chromium (Hexavalent)			XXX			XXX					XXX
12	Mercury	Mercury			XXX			XXX					XXX
13	Total alkyl lead	Tetra-alkyl lead											
		Tri-alkyl lead											
14	Phenolics (4AAP)	Phenolics (4AAP)		XXX	XXX		XXX	XXX				XXX	XXX
15	Sulphide	Sulphide											
16	Volatiles, Halogenated	1,1,2,2-Tetrachloroethane			XXX			XXX					XXX
		1,1,2-Trichloroethane			XXX			XXX					XXX
		1,1-Dichloroethane			XXX			XXX					XXX
		1,1-Dichloroethylene			XXX			XXX					XXX
		1,2-Dichlorobenzene			XXX			XXX					XXX
		1,2-Dichloroethane (Ethylene dichloride)			XXX			XXX					XXX
		1,2-Dichloropropane			XXX			XXX					XXX
		1,3-Dichlorobenzene			XXX			XXX					XXX
		1,4-Dichlorobenzene			XXX			XXX					XXX
		Bromoform			XXX			XXX					XXX
		Bromomethane			XXX			XXX					XXX

Not Applicable

	EFFLUENT STREAM TYPE:	Process Effluent			Minewater Effluent			Smelter-Refinery Effluent			Storm Water Effluent	
	FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	M	Q
ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED											
16 Volatiles, Halogenated (continued)	Carbon tetrachloride			XXX			XXX					XXX
	Chlorobenzene			XXX			XXX					XXX
	Chloroform			XXX			XXX					XXX
	Chloromethane			XXX			XXX					XXX
	Cis-1,3-Dichloropropylene			XXX			XXX					XXX
	Dibromochloromethane			XXX			XXX					XXX
	Ethylene dibromide			XXX			XXX					XXX
	Methylene chloride			XXX			XXX					XXX
	Tetrachloroethylene (Perchloroethylene)			XXX			XXX					XXX
	Trans-1,2-Dichloroethylene			XXX			XXX					XXX
	Trans-1,3-Dichloropropylene			XXX			XXX					XXX
	Trichloroethylene			XXX			XXX					XXX
	Trichlorofluoromethane			XXX			XXX					XXX
	Vinyl chloride (Chloroethylene)			XXX			XXX					XXX
17 Volatiles, Non-Halogenated	Benzene			XXX			XXX					XXX
	Styrene			XXX			XXX					XXX
	Toluene			XXX			XXX					XXX
	o-Xylene			XXX			XXX					XXX
	m-Xylene and p-Xylene			XXX			XXX					XXX
18 Volatiles, Water Soluble	Acrolein			XXX			XXX					XXX
	Acrylonitrile			XXX			XXX					XXX
19 Extractables, Base Neutral	Acenaphthene			XXX			XXX					XXX
	5-nitro Acenaphthene			XXX			XXX					XXX
	Acenaphthylene			XXX			XXX					XXX
	Anthracene			XXX			XXX					XXX
	Benz(a)anthracene			XXX			XXX					XXX
	Benzo(a)pyrene			XXX			XXX					XXX
	Benzo(b)fluoranthene			XXX			XXX					XXX

SCHEDULE E - SALT CATEGORY

Not Applicable

	EFFLUENT STREAM TYPE:		Process Effluent			Minewater Effluent			Smelter-Refinery Effluent			Storm Water Effluent	
	FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED											
19	Extractables, Base Neutral (continued)	Benzo(g,h,i)perylene			XXX			XXX					XXX
		Benzo(k)fluoranthene			XXX			XXX					XXX
		Camphene			XXX			XXX					XXX
		1-Chloronaphthalene			XXX			XXX					XXX
		2-Chloronaphthalene			XXX			XXX					XXX
		Chrysene			XXX			XXX					XXX
		Dibenz(a,h)anthracene			XXX			XXX					XXX
		Fluoranthene			XXX			XXX					XXX
		Fluorene			XXX			XXX					XXX
		Indeno(1,2,3-cd)pyrene			XXX			XXX					XXX
		Indole			XXX			XXX					XXX
		1-Methylnaphthalene			XXX			XXX					XXX
		2-Methylnaphthalene			XXX			XXX					XXX
		Naphthalene			XXX			XXX					XXX
		Perylene			XXX			XXX					XXX
		Phenanthrene			XXX			XXX					XXX
		Pyrene			XXX			XXX					XXX
		Benzyl butyl phthalate			XXX			XXX					XXX
		Bis(2-Ethylhexyl) phthalate			XXX			XXX					XXX
		Di-n-butyl phthalate			XXX			XXX					XXX
		4-Bromophenyl phenyl ether			XXX			XXX					XXX
		4-Chlorophenyl phenyl ether			XXX			XXX					XXX
		Bis(2-Chloroisopropyl)ether			XXX			XXX					XXX
		Bis(2-Chloroethyl)ether			XXX			XXX					XXX
		2,4-Dinitrotoluene			XXX			XXX					XXX
		2,6-Dinitrotoluene			XXX			XXX					XXX
		Bis(2-Chloroethoxy)methane			XXX			XXX					XXX
		Diphenylamine			XXX			XXX					XXX
		N-Nitrosodiphenylamine			XXX			XXX					XXX
		N-Nitrosodi-n-propylamine			XXX			XXX					XXX

ONTARIO MINERAL INDUSTRY SECTOR - GROUP A REGULATION

SCHEDULE E - SALT CATEGORY

		EFFLUENT STREAM TYPE:	Process Effluent			Minewater Effluent			Not Applicable Smelter-Refinery Effluent			Storm Water Effluent	
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED											
20	Extractables, Acid (Phenolics)	2,3,4,5-Tetrachlorophenol			XXX			XXX					XXX
		2,3,4,6-Tetrachlorophenol			XXX			XXX					XXX
		2,3,5,6-Tetrachlorophenol			XXX			XXX					XXX
		2,3,4-Trichlorophenol			XXX			XXX					XXX
		2,3,5-Trichlorophenol			XXX			XXX					XXX
		2,4,5-Trichlorophenol			XXX			XXX					XXX
		2,4,6-Trichlorophenol			XXX			XXX					XXX
		2,4-Dimethyl phenol			XXX			XXX					XXX
		2,4-Dinitrophenol			XXX			XXX					XXX
		2,4-Dichlorophenol			XXX			XXX					XXX
		2,6-Dichlorophenol			XXX			XXX					XXX
		4,6-Dinitro-o-cresol			XXX			XXX					XXX
		2-Chlorophenol			XXX			XXX					XXX
		4-Chloro-3-methylphenol			XXX			XXX					XXX
		4-Nitrophenol			XXX			XXX					XXX
		m-Cresol			XXX			XXX					XXX
		o-Cresol			XXX			XXX					XXX
		p-Cresol			XXX			XXX					XXX
		Pentachlorophenol			XXX			XXX					XXX
		Phenol			XXX			XXX					XXX
21	Extractables, Phenoxy Acid Herbicides												
22	Extractables, Organochlorine Pesticides												
23	Extractables, Neutral -Chlorinated	1,2,3,4-Tetrachlorobenzene			XXX			XXX					XXX
		1,2,3,5-Tetrachlorobenzene			XXX			XXX					XXX
		1,2,4,5-Tetrachlorobenzene			XXX			XXX					XXX
		1,2,3-Trichlorobenzene			XXX			XXX					XXX

ONTARIO MINERAL INDUSTRY SECTOR - GROUP A REGULATION

SCHEDULE E - SALT CATEGORY

		EFFLUENT STREAM TYPE:	Process Effluent			Minewater Effluent			Not Applicable Smelter-Refinery Effluent			Storm Water Effluent	
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED											
23	Extractables, Neutral -Chlorinated	1,2,4-Trichlorobenzene			XXX			XXX					XXX
		2,4,5-Trichlorotoluene			XXX			XXX					XXX
		Hexachlorobenzene			XXX			XXX					XXX
		Hexachlorobutadiene			XXX			XXX					XXX
		Hexachlorocyclopentadiene			XXX			XXX					XXX
		Hexachloroethane			XXX			XXX					XXX
		Octachlorostyrene			XXX			XXX					XXX
		Pentachlorobenzene			XXX			XXX					XXX
24	Chlorinated Dibenzo-p-dioxins and Dibenzofurans (but see section 10)	2,3,7,8-Tetrachlorodibenzo-p-dioxin											
		Octachlorodibenzo-p-dioxin											
		Octachlorodibenzofuran											
		Total heptachlorinated dibenzo-p-dioxins											
		Total heptachlorinated dibenzofurans											
		Total hexachlorinated dibenzo-p-dioxins											
		Total hexachlorinated dibenzofurans											
		Total pentachlorinated dibenzo-p-dioxins											
		Total pentachlorinated dibenzofurans											
		Total tetrachlorinated dibenzo-p-dioxins											
		Total tetrachlorinated dibenzofurans											
25	Solvent Extractables	Oil and grease	XXX		XXX	XXX		XXX				XXX	XXX
26	Fatty and Resin Acids												
27	Polychlorinated Biphenyls (PCBs) (but see subsection 9(4))	PCBs (Total)			XXX			XXX					XXX

ONTARIO MINERAL INDUSTRY SECTOR - GROUP A REGULATION

SCHEDULE E - SALT CATEGORY

		EFFLUENT STREAM TYPE:	Process Effluent			Minewater Effluent			Not Applicable Smelter-Refinery Effluent			Storm Water Effluent	
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED											
28a	Open Characterization - Volatiles				XXX			XXX					XXX
28b	Open Characterization - Extractables				XXX			XXX					XXX
29	Open Characterization - Elemental	Aluminum			XXX			XXX					XXX
		Antimony			XXX			XXX					XXX
		Arsenic			XXX			XXX					XXX
		Barium			XXX			XXX					XXX
		Beryllium			XXX			XXX					XXX
		Bismuth			XXX			XXX					XXX
		Boron			XXX			XXX					XXX
		Cadmium			XXX			XXX					XXX
		Calcium			XXX			XXX					XXX
		Cerium			XXX			XXX					XXX
		Cesium			XXX			XXX					XXX
		Chromium			XXX			XXX					XXX
		Cobalt			XXX			XXX					XXX
		Copper			XXX			XXX					XXX
		Dysprosium			XXX			XXX					XXX
		Erbium			XXX			XXX					XXX
		Europium			XXX			XXX					XXX
		Gadolinium			XXX			XXX					XXX
		Gallium			XXX			XXX					XXX
		Germanium			XXX			XXX					XXX
		Gold			XXX			XXX					XXX
		Hafnium			XXX			XXX					XXX
		Holmium			XXX			XXX					XXX
		Indium			XXX			XXX					XXX
		Iridium			XXX			XXX					XXX

SCHEDULE E - SALT CATEGORY

		EFFLUENT STREAM TYPE:	Process Effluent			Minewater Effluent			Not Applicable Smelter-Refinery Effluent			Storm Water Effluent	
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED											
29	Open Characterization - Elemental (continued)	Iron			XXX			XXX					XXX
		Lanthanum			XXX			XXX					XXX
		Lead			XXX			XXX					XXX
		Lithium			XXX			XXX					XXX
		Lutetium			XXX			XXX					XXX
		Magnesium			XXX			XXX					XXX
		Manganese			XXX			XXX					XXX
		Mercury			XXX			XXX					XXX
		Molybdenum			XXX			XXX					XXX
		Neodymium			XXX			XXX					XXX
		Nickel			XXX			XXX					XXX
		Niobium			XXX			XXX					XXX
		Osmium			XXX			XXX					XXX
		Palladium			XXX			XXX					XXX
		Phosphorus			XXX			XXX					XXX
		Platinum			XXX			XXX					XXX
		Potassium			XXX			XXX					XXX
		Praesodymium			XXX			XXX					XXX
		Rhenium			XXX			XXX					XXX
		Rhodium			XXX			XXX					XXX
		Rubidium			XXX			XXX					XXX
		Ruthenium			XXX			XXX					XXX
		Samarium			XXX			XXX					XXX
		Scandium			XXX			XXX					XXX
		Selenium			XXX			XXX					XXX
		Silicon			XXX			XXX					XXX
		Silver			XXX			XXX					XXX
		Sodium			XXX			XXX					XXX
		Strontium			XXX			XXX					XXX
		Sulfur			XXX			XXX					XXX
		Tantalum			XXX			XXX					XXX

ONTARIO MINERAL INDUSTRY SECTOR - GROUP A REGULATION

SCHEDULE E - SALT CATEGORY

		EFFLUENT STREAM TYPE:	Process Effluent			Minewater Effluent			Not Applicable Smelter-Refinery Effluent			Storm Water Effluent	
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED											
29	Open Characterization - Elemental (continued)	Tellurium			XXX			XXX					XXX
		Terbium			XXX			XXX					XXX
		Thallium			XXX			XXX					XXX
		Thorium			XXX			XXX					XXX
		Thulium			XXX			XXX					XXX
		Tin			XXX			XXX					XXX
		Titanium			XXX			XXX					XXX
		Tungsten			XXX			XXX					XXX
		Uranium			XXX			XXX					XXX
		Vanadium			XXX			XXX					XXX
		Ytterbium			XXX			XXX					XXX
		Yttrium			XXX			XXX					XXX
		Zinc			XXX			XXX					XXX
		Zirconium			XXX			XXX					XXX
M1	Chlorides	Chlorides	XXX		XXX	XXX		XXX				XXX	XXX
M2	Cyanates	Cyanates			XXX			XXX					XXX
M3	Dissolved solids	Dissolved solids		XXX	XXX		XXX	XXX				XXX	XXX
M4	Sulphates	Sulphates			XXX			XXX					XXX
M5	Iron	Iron											
M6	Thiocyanates	Thiocyanates			XXX			XXX					XXX
M7	Uranium	Uranium											
M8	Weak acid dissociable cyanides	Weak acid dissociable cyanides (Free cyanide)			XXX			XXX					XXX

NOTE: RE: Minewater Effluent - see subsection 9(2)

ONTARIO MINERAL INDUSTRY SECTOR - GROUP A REGULATION

SCHEDULE F - SILVER CATEGORY

		EFFLUENT STREAM TYPE:	Process Effluent			Minewater Effluent			Smelter-Refinery Effluent			Storm Water Effluent	
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED											
1	Chemical Oxygen Demand	Chemical oxygen demand (COD)		XXX	XXX		XXX	XXX		XXX	XXX	XXX	XXX
2	Total cyanide	Total cyanide			XXX			XXX			XXX		XXX
3	Hydrogen ion (pH)	Hydrogen ion (pH)	XXX		XXX	XXX		XXX	XXX		XXX	XXX	XXX
4a	Nitrogen	Ammonia plus Ammonium		XXX	XXX		XXX	XXX	XXX		XXX	XXX	XXX
		Total Kjeldahl nitrogen		XXX	XXX		XXX	XXX		XXX	XXX	XXX	XXX
4b		Nitrate + Nitrite		XXX	XXX		XXX	XXX		XXX	XXX	XXX	XXX
5a	Organic carbon	Dissolved organic carbon (DOC)			XXX			XXX			XXX		XXX
5b		Total organic carbon (TOC)			XXX			XXX			XXX		XXX
6	Total phosphorus	Total phosphorus		XXX	XXX		XXX	XXX		XXX	XXX	XXX	XXX
7	Specific conductance	Specific conductance											
8	Suspended solids	Total suspended solids (TSS)	XXX		XXX	XXX		XXX	XXX		XXX	XXX	XXX
		Volatile suspended solids (VSS)											
9	Total metals	Aluminum			XXX			XXX			XXX		XXX
		Beryllium			XXX			XXX			XXX		XXX
		Cadmium		XXX	XXX		XXX	XXX		XXX	XXX	XXX	XXX
		Chromium			XXX			XXX			XXX		XXX
		Cobalt		XXX	XXX		XXX	XXX		XXX	XXX	XXX	XXX
		Copper		XXX	XXX		XXX	XXX	XXX		XXX	XXX	XXX
		Lead		XXX	XXX		XXX	XXX	XXX		XXX	XXX	XXX
		Molybdenum			XXX			XXX			XXX		XXX
		Nickel		XXX	XXX		XXX	XXX	XXX		XXX	XXX	XXX

ONTARIO MINERAL INDUSTRY SECTOR - GROUP A REGULATION

SCHEDULE F - SILVER CATEGORY

		EFFLUENT STREAM TYPE:	Process Effluent			Minewater Effluent			Smelter-Refinery Effluent			Storm Water Effluent	
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED											
9	Total metals (continued)	Silver			XXX			XXX			XXX		XXX
		Thallium			XXX			XXX			XXX		XXX
		Vanadium			XXX			XXX			XXX		XXX
		Zinc		XXX	XXX		XXX	XXX	XXX		XXX	XXX	XXX
10	Hydrides	Antimony			XXX			XXX			XXX		XXX
		Arsenic	XXX		XXX	XXX		XXX	XXX		XXX	XXX	XXX
		Selenium			XXX			XXX			XXX		XXX
11	Chromium (Hexavalent)	Chromium (Hexavalent)			XXX			XXX			XXX		XXX
12	Mercury	Mercury		XXX	XXX		XXX	XXX		XXX	XXX	XXX	XXX
13	Total alkyl lead	Tetra-alkyl lead											
		Tri-alkyl lead											
14	Phenolics (4AAP)	Phenolics (4AAP)		XXX	XXX		XXX	XXX	XXX		XXX	XXX	XXX
15	Sulphide	Sulphide											
16	Volatiles, Halogenated	1,1,2,2-Tetrachloroethane			XXX			XXX			XXX		XXX
		1,1,2-Trichloroethane			XXX			XXX			XXX		XXX
		1,1-Dichloroethane			XXX			XXX			XXX		XXX
		1,1-Dichloroethylene			XXX			XXX			XXX		XXX
		1,2-Dichlorobenzene			XXX			XXX			XXX		XXX
		1,2-Dichloroethane (Ethylene dichloride)			XXX			XXX			XXX		XXX
		1,2-Dichloropropane			XXX			XXX			XXX		XXX
		1,3-Dichlorobenzene			XXX			XXX			XXX		XXX
		1,4-Dichlorobenzene			XXX			XXX			XXX		XXX
		Bromoform			XXX			XXX			XXX		XXX
		Bromomethane			XXX			XXX			XXX		XXX

SCHEDULE F - SILVER CATEGORY

		EFFLUENT STREAM TYPE:	Process Effluent			Minewater Effluent			Smelter-Refinery Effluent			Storm Water Effluent	
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED											
16	Volatiles, Halogenated (continued)	Carbon tetrachloride			XXX			XXX			XXX		XXX
		Chlorobenzene			XXX			XXX			XXX		XXX
		Chloroform			XXX			XXX			XXX		XXX
		Chloromethane			XXX			XXX			XXX		XXX
		Cis-1,3-Dichloropropylene			XXX			XXX			XXX		XXX
		Dibromochloromethane			XXX			XXX			XXX		XXX
		Ethylene dibromide			XXX			XXX			XXX		XXX
		Methylene chloride			XXX			XXX			XXX		XXX
		Tetrachloroethylene (Perchloroethylene)			XXX			XXX			XXX		XXX
		Trans-1,2-Dichloroethylene			XXX			XXX			XXX		XXX
		Trans-1,3-Dichloropropylene			XXX			XXX			XXX		XXX
		Trichloroethylene			XXX			XXX			XXX		XXX
		Trichlorofluoromethane			XXX			XXX			XXX		XXX
		Vinyl chloride (Chloroethylene)			XXX			XXX			XXX		XXX
17	Volatiles, Non-Halogenated	Benzene			XXX			XXX			XXX		XXX
		Styrene			XXX			XXX			XXX		XXX
		Toluene			XXX			XXX			XXX		XXX
		o-Xylene			XXX			XXX			XXX		XXX
		m-Xylene and p-Xylene			XXX			XXX			XXX		XXX
18	Volatiles, Water Soluble	Acrolein			XXX			XXX			XXX		XXX
		Acrylonitrile			XXX			XXX			XXX		XXX
19	Extractables, Base Neutral	Acenaphthene			XXX			XXX			XXX		XXX
		5-nitro Acenaphthene			XXX			XXX			XXX		XXX
		Acenaphthylene			XXX			XXX			XXX		XXX
		Anthracene			XXX			XXX			XXX		XXX
		Benz(a)anthracene			XXX			XXX			XXX		XXX
		Benzo(a)pyrene			XXX			XXX			XXX		XXX
		Benzo(b)fluoranthene			XXX			XXX			XXX		XXX

ONTARIO MINERAL INDUSTRY SECTOR - GROUP A REGULATION

SCHEDULE F - SILVER CATEGORY

		EFFLUENT STREAM TYPE:	Process Effluent			Minewater Effluent			Smelter-Refinery Effluent			Storm Water Effluent	
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED											
19	Extractables, Base Neutral (continued)	Benzo(g,h,i)perylene			XXX			XXX			XXX		XXX
		Benzo(k)fluoranthene			XXX			XXX			XXX		XXX
		Camphene			XXX			XXX			XXX		XXX
		1-Chloronaphthalene			XXX			XXX			XXX		XXX
		2-Chloronaphthalene			XXX			XXX			XXX		XXX
		Chrysene			XXX			XXX			XXX		XXX
		Dibenz(a,h)anthracene			XXX			XXX			XXX		XXX
		Fluoranthene			XXX			XXX			XXX		XXX
		Fluorene			XXX			XXX			XXX		XXX
		Indeno(1,2,3-cd)pyrene			XXX			XXX			XXX		XXX
		Indole			XXX			XXX			XXX		XXX
		1-Methylnaphthalene			XXX			XXX			XXX		XXX
		2-Methylnaphthalene			XXX			XXX			XXX		XXX
		Naphthalene			XXX			XXX			XXX		XXX
		Perylene			XXX			XXX			XXX		XXX
		Phenanthrene			XXX			XXX			XXX		XXX
		Pyrene			XXX			XXX			XXX		XXX
		Benzyl butyl phthalate			XXX			XXX			XXX		XXX
		Bis(2-Ethylhexyl) phthalate			XXX			XXX			XXX		XXX
		Di-n-butyl phthalate			XXX			XXX			XXX		XXX
		4-Bromophenyl phenyl ether			XXX			XXX			XXX		XXX
		4-Chlorophenyl phenyl ether			XXX			XXX			XXX		XXX
		Bis(2-Chloroisopropyl)ether			XXX			XXX			XXX		XXX
		Bis(2-Chloroethyl)ether			XXX			XXX			XXX		XXX
		2,4-Dinitrotoluene			XXX			XXX			XXX		XXX
		2,6-Dinitrotoluene			XXX			XXX			XXX		XXX
		Bis(2-Chloroethoxy)methane			XXX			XXX			XXX		XXX
		Diphenylamine			XXX			XXX			XXX		XXX
		N Nitrosodiphenylamine			XXX			XXX			XXX		XXX
		N-Nitrosodi-n-propylamine			XXX			XXX			XXX		XXX

ONTARIO MINERAL INDUSTRY SECTOR - GROUP A REGULATION

SCHEDULE F - SILVER CATEGORY

		EFFLUENT STREAM TYPE:	Process Effluent			Minewater Effluent			Smelter-Refinery Effluent			Storm Water Effluent	
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED											
20	Extractables, Acid (Phenolics)	2,3,4,5-Tetrachlorophenol			XXX			XXX			XXX		XXX
		2,3,4,6-Tetrachlorophenol			XXX			XXX			XXX		XXX
		2,3,5,6-Tetrachlorophenol			XXX			XXX			XXX		XXX
		2,3,4-Trichlorophenol			XXX			XXX			XXX		XXX
		2,3,5-Trichlorophenol			XXX			XXX			XXX		XXX
		2,4,5-Trichlorophenol			XXX			XXX			XXX		XXX
		2,4,6-Trichlorophenol			XXX			XXX			XXX		XXX
		2,4-Dimethyl phenol			XXX			XXX			XXX		XXX
		2,4-Dinitrophenol			XXX			XXX			XXX		XXX
		2,4-Dichlorophenol			XXX			XXX			XXX		XXX
		2,6-Dichlorophenol			XXX			XXX			XXX		XXX
		4,6-Dinitro-o-cresol			XXX			XXX			XXX		XXX
		2-Chlorophenol			XXX			XXX			XXX		XXX
		4-Chloro-3-methylphenol			XXX			XXX			XXX		XXX
		4-Nitrophenol			XXX			XXX			XXX		XXX
		m-Cresol			XXX			XXX			XXX		XXX
		o-Cresol			XXX			XXX			XXX		XXX
		p-Cresol			XXX			XXX			XXX		XXX
		Pentachlorophenol			XXX			XXX			XXX		XXX
		Phenol			XXX			XXX			XXX		XXX
21	Extractables, Phenoxy Acid Herbicides												
22	Extractables, Organochlorine Pesticides												
23	Extractables, Neutral -Chlorinated	1,2,3,4-Tetrachlorobenzene			XXX			XXX			XXX		XXX
		1,2,3,5-Tetrachlorobenzene			XXX			XXX			XXX		XXX
		1,2,4,5-Tetrachlorobenzene			XXX			XXX			XXX		XXX
		1,2,3-Trichlorobenzene			XXX			XXX			XXX		XXX

ONTARIO MINERAL INDUSTRY SECTOR - GROUP A REGULATION

SCHEDULE F - SILVER CATEGORY

		EFFLUENT STREAM TYPE:	Process Effluent			Minewater Effluent			Smelter-Refinery Effluent			Storm Water Effluent	
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED											
23	Extractables, Neutral -Chlorinated (continued)	1,2,4-Trichlorobenzene			XXX			XXX			XXX		XXX
		2,4,5-Trichlorotoluene			XXX			XXX			XXX		XXX
		Hexachlorobenzene			XXX			XXX			XXX		XXX
		Hexachlorobutadiene			XXX			XXX			XXX		XXX
		Hexachlorocyclopentadiene			XXX			XXX			XXX		XXX
		Hexachloroethane			XXX			XXX			XXX		XXX
		Octachlorostyrene			XXX			XXX			XXX		XXX
		Pentachlorobenzene			XXX			XXX			XXX		XXX
24	Chlorinated Dibenzo-p-dioxins and Dibenzofurans (but see section 10)	2,3,7,8-Tetrachlorodibenzo-p-dioxin											
		Octachlorodibenzo-p-dioxin											
		Octachlorodibenzofuran											
		Total heptachlorinated dibenzo-p-dioxins											
		Total heptachlorinated dibenzofurans											
		Total hexachlorinated dibenzo-p-dioxins											
		Total hexachlorinated dibenzofurans											
		Total pentachlorinated dibenzo-p-dioxins											
		Total pentachlorinated dibenzofurans											
		Total tetrachlorinated dibenzo-p-dioxins											
		Total tetrachlorinated dibenzofurans											
25	Solvent Extractables	Oil and grease	XXX		XXX	XXX		XXX	XXX		XXX	XXX	XXX
26	Fatty and Resin Acids												
27	Polychlorinated Biphenyls (PCBs) (but see subsection 9(4))	PCBs (Total)			XXX			XXX			XXX		XXX

SCHEDULE F - SILVER CATEGORY

		EFFLUENT STREAM TYPE:	Process Effluent			Minewater Effluent			Smelter-Refinery Effluent			Storm Water Effluent	
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED											
28a	Open Characterization - Volatiles				XXX			XXX			XXX		XXX
28b	Open Characterization - Extractables				XXX			XXX			XXX		XXX
29	Open Characterization - Elemental	Aluminum			XXX			XXX			XXX		XXX
		Antimony			XXX			XXX			XXX		XXX
		Arsenic			XXX			XXX			XXX		XXX
		Barium			XXX			XXX			XXX		XXX
		Beryllium			XXX			XXX			XXX		XXX
		Bismuth			XXX			XXX			XXX		XXX
		Boron			XXX			XXX			XXX		XXX
		Cadmium			XXX			XXX			XXX		XXX
		Calcium			XXX			XXX			XXX		XXX
		Cerium			XXX			XXX			XXX		XXX
		Cesium			XXX			XXX			XXX		XXX
		Chromium			XXX			XXX			XXX		XXX
		Cobalt			XXX			XXX			XXX		XXX
		Copper			XXX			XXX			XXX		XXX
		Dysprosium			XXX			XXX			XXX		XXX
		Erbium			XXX			XXX			XXX		XXX
		Europium			XXX			XXX			XXX		XXX
		Gadolinium			XXX			XXX			XXX		XXX
		Gallium			XXX			XXX			XXX		XXX
		Germanium			XXX			XXX			XXX		XXX
		Gold			XXX			XXX			XXX		XXX
		Hafnium			XXX			XXX			XXX		XXX
		Holmium			XXX			XXX			XXX		XXX
		Indium			XXX			XXX			XXX		XXX
		Iridium			XXX			XXX			XXX		XXX

SCHEDULE F - SILVER CATEGORY

		EFFLUENT STREAM TYPE:	Process Effluent			Minewater Effluent			Smelter-Refinery Effluent			Storm Water Effluent	
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED											
29	Open Characterization - Elemental (continued)	Iron			XXX			XXX			XXX		XXX
		Lanthanum			XXX			XXX			XXX		XXX
		Lead			XXX			XXX			XXX		XXX
		Lithium			XXX			XXX			XXX		XXX
		Lutetium			XXX			XXX			XXX		XXX
		Magnesium			XXX			XXX			XXX		XXX
		Manganese			XXX			XXX			XXX		XXX
		Mercury			XXX			XXX			XXX		XXX
		Molybdenum			XXX			XXX			XXX		XXX
		Neodymium			XXX			XXX			XXX		XXX
		Nickel			XXX			XXX			XXX		XXX
		Niobium			XXX			XXX			XXX		XXX
		Osmium			XXX			XXX			XXX		XXX
		Palladium			XXX			XXX			XXX		XXX
		Phosphorus			XXX			XXX			XXX		XXX
		Platinum			XXX			XXX			XXX		XXX
		Potassium			XXX			XXX			XXX		XXX
		Praesodymium			XXX			XXX			XXX		XXX
		Rhenium			XXX			XXX			XXX		XXX
		Rhodium			XXX			XXX			XXX		XXX
		Rubidium			XXX			XXX			XXX		XXX
		Ruthenium			XXX			XXX			XXX		XXX
		Samarium			XXX			XXX			XXX		XXX
		Scandium			XXX			XXX			XXX		XXX
		Selenium			XXX			XXX			XXX		XXX
		Silicon			XXX			XXX			XXX		XXX
		Silver			XXX			XXX			XXX		XXX
		Sodium			XXX			XXX			XXX		XXX
		Strontium			XXX			XXX			XXX		XXX
		Sulfur			XXX			XXX			XXX		XXX
		Tantalum			XXX			XXX			XXX		XXX

SCHEDULE F - SILVER CATEGORY

		EFFLUENT STREAM TYPE:	Process Effluent			Minewater Effluent			Smelter-Refinery Effluent			Storm Water Effluent	
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED											
29	Open Characterization - Elemental (continued)	Tellurium			XXX			XXX			XXX		XXX
		Terbium			XXX			XXX			XXX		XXX
		Thallium			XXX			XXX			XXX		XXX
		Thorium			XXX			XXX			XXX		XXX
		Thulium			XXX			XXX			XXX		XXX
		Tin			XXX			XXX			XXX		XXX
		Titanium			XXX			XXX			XXX		XXX
		Tungsten			XXX			XXX			XXX		XXX
		Uranium			XXX			XXX			XXX		XXX
		Vanadium			XXX			XXX			XXX		XXX
		Ytterbium			XXX			XXX			XXX		XXX
		Yttrium			XXX			XXX			XXX		XXX
		Zinc			XXX			XXX			XXX		XXX
		Zirconium			XXX			XXX			XXX		XXX
M1	Chlorides	Chlorides			XXX			XXX			XXX		XXX
M2	Cyanates	Cyanates			XXX			XXX			XXX		XXX
M3	Dissolved solids	Dissolved solids		XXX	XXX		XXX	XXX		XXX	XXX	XXX	XXX
M4	Sulphates	Sulphates			XXX			XXX		XXX	XXX	XXX	XXX
M5	Iron	Iron		XXX			XXX			XXX		XXX	
M6	Thiocyanates	Thiocyanates			XXX			XXX			XXX		XXX
M7	Uranium	Uranium											
M8	Weak acid dissociable cyanides	Weak acid dissociable cyanides (Free cyanide)			XXX			XXX			XXX		XXX

SCHEDULE G - URANIUM CATEGORY

		EFFLUENT STREAM TYPE:	Process Effluent			Minewater Effluent			Smelter Refinery Effluent			Storm Water Effluent	
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED											
1	Chemical Oxygen Demand	Chemical oxygen demand (COD)		XXX	XXX		XXX	XXX		XXX	XXX	XXX	XXX
2	Total cyanide	Total cyanide			XXX			XXX			XXX		XXX
3	Hydrogen ion (pH)	Hydrogen ion (pH)	XXX		XXX	XXX		XXX	XXX		XXX	XXX	XXX
4a	Nitrogen	Ammonia plus Ammonium	XXX		XXX	XXX		XXX	XXX		XXX	XXX	XXX
		Total Kjeldahl nitrogen		XXX	XXX		XXX	XXX		XXX	XXX	XXX	XXX
4b		Nitrate + Nitrite		XXX	XXX		XXX	XXX		XXX	XXX	XXX	XXX
5a	Organic carbon	Dissolved organic carbon (DOC)			XXX			XXX			XXX		XXX
5b		Total organic carbon (TOC)			XXX			XXX			XXX		XXX
6	Total phosphorus (but see subsections 7(4), (5), 9(5) and (6))	Total phosphorus		XXX	XXX		XXX	XXX		XXX	XXX	XXX	XXX
7	Specific conductance	Specific conductance											
8	Suspended solids	Total suspended solids (TSS)	XXX		XXX	XXX		XXX	XXX		XXX	XXX	XXX
		Volatile suspended solids (VSS)											
9	Total metals	Aluminum			XXX			XXX			XXX		XXX
		Beryllium			XXX			XXX			XXX		XXX
		Cadmium		XXX	XXX		XXX	XXX			XXX		XXX
		Chromium			XXX			XXX			XXX		XXX
		Cobalt		XXX	XXX		XXX	XXX			XXX	XXX	XXX
		Copper		XXX	XXX		XXX	XXX		XXX	XXX	XXX	XXX
		Lead		XXX	XXX		XXX	XXX		XXX	XXX	XXX	XXX
		Molybdenum			XXX			XXX			XXX		XXX

SCHEDULE G - URANIUM CATEGORY

		EFFLUENT STREAM TYPE:	Process Effluent			Minewater Effluent			Smelter-Refinery Effluent			Storm Water Effluent	
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED											
9	Total metals (continued)	Nickel		XXX	XXX		XXX	XXX		XXX	XXX	XXX	XXX
		Silver			XXX			XXX			XXX		XXX
		Thallium			XXX			XXX			XXX		XXX
		Vanadium			XXX			XXX			XXX		XXX
		Zinc		XXX	XXX		XXX	XXX		XXX	XXX	XXX	XXX
10	Hydrides	Antimony			XXX			XXX			XXX		XXX
		Arsenic		XXX	XXX		XXX	XXX		XXX	XXX	XXX	XXX
		Selenium			XXX			XXX			XXX		XXX
11	Chromium (Hexavalent)	Chromium (Hexavalent)			XXX			XXX			XXX		XXX
12	Mercury	Mercury		XXX	XXX		XXX	XXX			XXX	XXX	XXX
13	Total alkyl lead	Tetra-alkyl lead											
		Tri-alkyl lead											
14	Phenolics (4AAP)	Phenolics (4AAP)		XXX	XXX		XXX	XXX		XXX	XXX	XXX	XXX
15	Sulphide	Sulphide											
16	Volatiles, Halogenated	1,1,2,2-Tetrachloroethane			XXX			XXX			XXX		XXX
		1,1,2-Trichloroethane			XXX			XXX			XXX		XXX
		1,1-Dichloroethane			XXX			XXX			XXX		XXX
		1,1-Dichloroethylene			XXX			XXX			XXX		XXX
		1,2-Dichlorobenzene			XXX			XXX			XXX		XXX
		1,2-Dichloroethane (Ethylene dichloride)			XXX			XXX			XXX		XXX
		1,2-Dichloropropane			XXX			XXX			XXX		XXX
		1,3-Dichlorobenzene			XXX			XXX			XXX		XXX
		1,4-Dichlorobenzene			XXX			XXX			XXX		XXX
		Bromoform			XXX			XXX			XXX		XXX

SCHEDULE G - URANIUM CATEGORY

		EFFLUENT STREAM TYPE:	Process Effluent			Minewater Effluent			Smelter-Refinery Effluent			Storm Water Effluent	
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED											
16	Volatiles, Halogenated (continued)	Bromomethane			XXX			XXX			XXX		XXX
		Carbon tetrachloride			XXX			XXX			XXX		XXX
		Chlorobenzene			XXX			XXX			XXX		XXX
		Chloroform			XXX			XXX			XXX		XXX
		Chloromethane			XXX			XXX			XXX		XXX
		Cis-1,3-Dichloropropylene			XXX			XXX			XXX		XXX
		Dibromochloromethane			XXX			XXX			XXX		XXX
		Ethylene dibromide			XXX			XXX			XXX		XXX
		Methylene chloride			XXX			XXX			XXX		XXX
		Tetrachloroethylene (Perchloroethylene)			XXX			XXX			XXX		XXX
		Trans-1,2-Dichloroethylene			XXX			XXX			XXX		XXX
		Trans-1,3-Dichloropropylene			XXX			XXX			XXX		XXX
		Trichloroethylene			XXX			XXX			XXX		XXX
		Trichlorofluoromethane			XXX			XXX			XXX		XXX
		Vinyl chloride (Chloroethylene)			XXX			XXX			XXX		XXX
17	Volatiles, Non-Halogenated	Benzene			XXX			XXX			XXX		XXX
		Styrene			XXX			XXX			XXX		XXX
		Toluene			XXX			XXX			XXX		XXX
		o-Xylene			XXX			XXX			XXX		XXX
		m-Xylene and p-Xylene			XXX			XXX			XXX		XXX
18	Volatiles, Water Soluble	Acrolein			XXX			XXX			XXX		XXX
		Acrylonitrile			XXX			XXX			XXX		XXX
19	Extractables, Base Neutral	Acenaphthene			XXX			XXX			XXX		XXX
		5-nitro Acenaphthene			XXX			XXX			XXX		XXX
		Acenaphthylene			XXX			XXX			XXX		XXX
		Anthracene			XXX			XXX			XXX		XXX
		Benz(a)anthracene			XXX			XXX			XXX		XXX
		Benzo(a)pyrene			XXX			XXX			XXX		XXX

SCHEDULE G - URANIUM CATEGORY

		EFFLUENT STREAM TYPE:	Process Effluent			Minewater Effluent			Smelter-Refinery Effluent			Storm Water Effluent	
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED											
19	Extractables, Base Neutral (continued)	Benzo(b)fluoranthene			XXX			XXX			XXX		XXX
		Benzo(g,h,i)perylene			XXX			XXX			XXX		XXX
		Benzo(k)fluoranthene			XXX			XXX			XXX		XXX
		Camphene			XXX			XXX			XXX		XXX
		1-Chloronaphthalene			XXX			XXX			XXX		XXX
		2-Chloronaphthalene			XXX			XXX			XXX		XXX
		Chrysene			XXX			XXX			XXX		XXX
		Dibenz(a,h)anthracene			XXX			XXX			XXX		XXX
		Fluoranthene			XXX			XXX			XXX		XXX
		Fluorene			XXX			XXX			XXX		XXX
		Indeno(1,2,3-cd)pyrene			XXX			XXX			XXX		XXX
		Indole			XXX			XXX			XXX		XXX
		1-Methylnaphthalene			XXX			XXX			XXX		XXX
		2-Methylnaphthalene			XXX			XXX			XXX		XXX
		Naphthalene			XXX			XXX			XXX		XXX
		Perylene			XXX			XXX			XXX		XXX
		Phenanthrene			XXX			XXX			XXX		XXX
		Pyrene			XXX			XXX			XXX		XXX
		Benzyl butyl phthalate			XXX			XXX			XXX		XXX
		Bis(2-Ethylhexyl) phthalate			XXX			XXX			XXX		XXX
		Di-n-butyl phthalate			XXX			XXX			XXX		XXX
		4-Bromophenyl phenyl ether			XXX			XXX			XXX		XXX
		4-Chlorophenyl phenyl ether			XXX			XXX			XXX		XXX
		Bis(2-Chloroisopropyl)ether			XXX			XXX			XXX		XXX
		Bis(2-Chloroethyl)ether			XXX			XXX			XXX		XXX
		2,4-Dinitrotoluene			XXX			XXX			XXX		XXX
		2,6-Dinitrotoluene			XXX			XXX			XXX		XXX
		Bis(2-Chloroethoxy)methane			XXX			XXX			XXX		XXX
		Diphenylamine			XXX			XXX			XXX		XXX
		N-Nitrosodiphenylamine			XXX			XXX			XXX		XXX
		N-Nitrosodi-n-propylamine			XXX			XXX			XXX		XXX

		EFFLUENT STREAM TYPE:	Process Effluent			Minewater Effluent			Smelter-Refinery Effluent			Storm Water Effluent	
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED											
20	Extractables, Acid (Phenolics)	2,3,4,5-Tetrachlorophenol			XXX			XXX			XXX		XXX
		2,3,4,6-Tetrachlorophenol			XXX			XXX			XXX		XXX
		2,3,5,6-Tetrachlorophenol			XXX			XXX			XXX		XXX
		2,3,4-Trichlorophenol			XXX			XXX			XXX		XXX
		2,3,5-Trichlorophenol			XXX			XXX			XXX		XXX
		2,4,5-Trichlorophenol			XXX			XXX			XXX		XXX
		2,4,6-Trichlorophenol			XXX			XXX			XXX		XXX
		2,4-Dimethyl phenol			XXX			XXX			XXX		XXX
		2,4-Dinitrophenol			XXX			XXX			XXX		XXX
		2,4-Dichlorophenol			XXX			XXX			XXX		XXX
		2,6-Dichlorophenol			XXX			XXX			XXX		XXX
		4,6-Dinitro-o-cresol			XXX			XXX			XXX		XXX
		2-Chlorophenol			XXX			XXX			XXX		XXX
		4-Chloro-3-methylphenol			XXX			XXX			XXX		XXX
		4-Nitrophenol			XXX			XXX			XXX		XXX
		m-Cresol			XXX			XXX			XXX		XXX
		o-Cresol			XXX			XXX			XXX		XXX
		p-Cresol			XXX			XXX			XXX		XXX
		Pentachlorophenol			XXX			XXX			XXX		XXX
		Phenol			XXX			XXX			XXX		XXX
21	Extractables, Phenoxy Acid Herbicides												
22	Extractables, Organochlorine Pesticides												
23	Extractables, Neutral -Chlorinated	1,2,3,4-Tetrachlorobenzene			XXX			XXX			XXX		XXX
		1,2,3,5-Tetrachlorobenzene			XXX			XXX			XXX		XXX
		1,2,4,5-Tetrachlorobenzene			XXX			XXX			XXX		XXX
		1,2,3-Trichlorobenzene			XXX			XXX			XXX		XXX

SCHEDULE G - URANIUM CATEGORY

		EFFLUENT STREAM TYPE:	Process Effluent			Minewater Effluent			Smelter Refinery Effluent			Storm Water Effluent	
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED											
23	Extractables, Neutral -Chlonnated (continued)	1,2,4-Trichlorobenzene			XXX			XXX			XXX		XXX
		2,4,5-Trichlorotoluene			XXX			XXX			XXX		XXX
		Hexachlorobenzene			XXX			XXX			XXX		XXX
		Hexachlorobutadiene			XXX			XXX			XXX		XXX
		Hexachlorocyclopentadiene			XXX			XXX			XXX		XXX
		Hexachloroethane			XXX			XXX			XXX		XXX
		Octachlorostyrene			XXX			XXX			XXX		XXX
		Pentachlorobenzene			XXX			XXX			XXX		XXX
24	Chlorinated Dibenzo-p-dioxins and Dibenzofurans (but see section 10)	2,3,7,8-Tetrachlorodibenzo-p-dioxin											
		Octachlorodibenzo-p-dioxin											
		Octachlorodibenzofuran											
		Total heptachlorinated dibenzo-p-dioxins											
		Total heptachlorinated dibenzofurans											
		Total hexachlorinated dibenzo-p-dioxins											
		Total hexachlorinated dibenzofurans											
		Total pentachlorinated dibenzo-p-dioxins											
		Total pentachlorinated dibenzofurans											
		Total tetrachlorinated dibenzo-p-dioxins											
		Total tetrachlorinated dibenzofurans											
25	Solvent Extractables	Oil and grease	XXX		XXX	XXX		XXX	XXX		XXX	XXX	XXX
26	Fatty and Resin Acids												
27	Polychlorinated Biphenyls (PCBs) (but see subsection 9(4))	PCBs (Total)			XXX			XXX			XXX		XXX

ONTARIO MINERAL INDUSTRY SECTOR - GROUP A REGULATION

SCHEDULE G - URANIUM CATEGORY

		EFFLUENT STREAM TYPE:	Process Effluent			Minewater Effluent			Smelter-Refinery Effluent			Storm Water Effluent	
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED											
28a	Open Characterization - Volatiles				XXX			XXX			XXX		XXX
28b	Open Characterization - Extractables				XXX			XXX			XXX		XXX
29	Open Characterization - Elemental	Aluminum			XXX			XXX			XXX		XXX
		Antimony			XXX			XXX			XXX		XXX
		Arsenic			XXX			XXX			XXX		XXX
		Barium			XXX			XXX			XXX		XXX
		Beryllium			XXX			XXX			XXX		XXX
		Bismuth			XXX			XXX			XXX		XXX
		Boron			XXX			XXX			XXX		XXX
		Cadmium			XXX			XXX			XXX		XXX
		Calcium			XXX			XXX			XXX		XXX
		Cerium			XXX			XXX			XXX		XXX
		Cesium			XXX			XXX			XXX		XXX
		Chromium			XXX			XXX			XXX		XXX
		Cobalt			XXX			XXX			XXX		XXX
		Copper			XXX			XXX			XXX		XXX
		Dysprosium			XXX			XXX			XXX		XXX
		Erbium			XXX			XXX			XXX		XXX
		Europium			XXX			XXX			XXX		XXX
		Gadolinium			XXX			XXX			XXX		XXX
		Gallium			XXX			XXX			XXX		XXX
		Germanium			XXX			XXX			XXX		XXX
		Gold			XXX			XXX			XXX		XXX
		Hafnium			XXX			XXX			XXX		XXX
		Holmium			XXX			XXX			XXX		XXX
		Indium			XXX			XXX			XXX		XXX
		Iridium			XXX			XXX			XXX		XXX

SCHEDULE G - URANIUM CATEGORY

	EFFLUENT STREAM TYPE:	Process Effluent			Minewater Effluent			Smelter-Refinery Effluent			Storm Water Effluent	
	FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	M	Q
ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED											
29 Open Charactenzation - Elemental (continued)	Iron			XXX			XXX			XXX		XXX
	Lanthanum			XXX			XXX			XXX		XXX
	Lead			XXX			XXX			XXX		XXX
	Lithium			XXX			XXX			XXX		XXX
	Lutetium			XXX			XXX			XXX		XXX
	Magnesium			XXX			XXX			XXX		XXX
	Manganese			XXX			XXX			XXX		XXX
	Mercury			XXX			XXX			XXX		XXX
	Molybdenum			XXX			XXX			XXX		XXX
	Neodymium			XXX			XXX			XXX		XXX
	Nickel			XXX			XXX			XXX		XXX
	Niobium			XXX			XXX			XXX		XXX
	Osmium			XXX			XXX			XXX		XXX
	Palladium			XXX			XXX			XXX		XXX
	Phosphorus			XXX			XXX			XXX		XXX
	Platinum			XXX			XXX			XXX		XXX
	Potassium			XXX			XXX			XXX		XXX
	Praesodymium			XXX			XXX			XXX		XXX
	Rhenium			XXX			XXX			XXX		XXX
	Rhodium			XXX			XXX			XXX		XXX
	Rubidium			XXX			XXX			XXX		XXX
	Ruthenium			XXX			XXX			XXX		XXX
	Samarium			XXX			XXX			XXX		XXX
	Scandium			XXX			XXX			XXX		XXX
	Selenium			XXX			XXX			XXX		XXX
	Silicon			XXX			XXX			XXX		XXX
	Silver			XXX			XXX			XXX		XXX
	Sodium			XXX			XXX			XXX		XXX
	Strontium			XXX			XXX			XXX		XXX
	Sulfur			XXX			XXX			XXX		XXX
	Tantalum			XXX			XXX			XXX		XXX

SCHEDULE G - URANIUM CATEGORY

		EFFLUENT STREAM TYPE:	Process Effluent			Minewater Effluent			Smelter-Refinery Effluent			Storm Water Effluent	
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED											
29	Open Characterization - Elemental (continued)	Tellurium			XXX			XXX			XXX		XXX
		Terbium			XXX			XXX			XXX		XXX
		Thallium			XXX			XXX			XXX		XXX
		Thorium			XXX			XXX			XXX		XXX
		Thulium			XXX			XXX			XXX		XXX
		Tin			XXX			XXX			XXX		XXX
		Titanium			XXX			XXX			XXX		XXX
		Tungsten			XXX			XXX			XXX		XXX
		Uranium			XXX			XXX			XXX		XXX
		Vanadium			XXX			XXX			XXX		XXX
		Ytterbium			XXX			XXX			XXX		XXX
		Yttrium			XXX			XXX			XXX		XXX
		Zinc			XXX			XXX			XXX		XXX
		Zirconium			XXX			XXX			XXX		XXX
M1	Chlorides	Chlorides			XXX			XXX			XXX		XXX
M2	Cyanates	Cyanates			XXX			XXX			XXX		XXX
M3	Dissolved solids	Dissolved solids		XXX	XXX		XXX	XXX		XXX	XXX	XXX	XXX
M4	Sulphates	Sulphates		XXX	XXX		XXX	XXX		XXX	XXX	XXX	XXX
M5	Iron	Iron		XXX			XXX			XXX		XXX	
M6	Thiocyanates	Thiocyanates			XXX			XXX			XXX		XXX
M7	Uranium	Uranium		XXX			XXX			XXX		XXX	
M8	Weak acid dissociable cyanides	Weak acid dissociable cyanides (Free cyanide)			XXX			XXX			XXX		XXX

Column 1 ANALYTICAL TEST GROUP	Column 2 LABORATORY SAMPLE CONTAINER	Column 3 LABORATORY CONTAINER PRE-TREATMENT	Column 4 TEST SPECIFIC SAMPLING PRECAUTIONS	Col. 5 MIN SAM VOL.	Column 6 PRESERVATION METHOD	Column 7 MAX. STORAGE TIME (DAYS)
Chlorides M1	Sample containers and caps/ liners must be composed only of one or more of the following materials: fluorocarbon resin, polyethylene terephthalate, glass, polystyrene, polypropylene, high or low density polyethylene. Metallic foil should not be used.	Generally no pre-treatment required for new containers.	If sample is high (>5%) in hydrocarbons or organic solvents, use glass or fluorocarbon resin sample container only.	50mL	None	28
Cyanates M2	See Analytical Test Group M1	See Analytical Test Group M1	See Analytical Test Group M1	500mL	Add sodium hydroxide (NaOH) (cyanide free) to raise pH to 12.	7
Dissolved Solids M3	See Analytical Test Group M1	See Analytical Test Group M1	See Analytical Test Group M1	100mL	None	7
Sulphates M4	See Analytical Test Group M1	See Analytical Test Group M1	See Analytical Test Group M1	50mL	None	28

Column 1 ANALYTICAL TEST GROUP	Column 2 LABORATORY SAMPLE CONTAINER	Column 3 LABORATORY CONTAINER PRE-TREATMENT	Column 4 TEST SPECIFIC SAMPLING PRECAUTIONS	Col. 5 MIN. SAM. VOL.	Column 6 PRESERVATION METHOD	Column 7 MAX. STORAGE TIME (DAYS)
Iron						
M5	See Analytical Test Group M1	If pre-treatment necessary, soak overnight in a 5% solution of nitric acid (HNO3), followed by several rinses in distilled water.	See Analytical Test Group M1	100mL	Add nitric acid (HNO3) (containing <1mg/L of all analytes) to lower pH to <2.	30
Thiocyanates						
M6	See Analytical Test Group M1	See Analytical Test Group M1	See Analytical Test Group M1	100mL	None	7
Uranium						
M7	See Analytical Test Group M1	See Analytical Test Group M5	See Analytical Test Group M1	100mL	See Analytical Test Group M5	30
Weak Acid Dissociable Cyanides (Free Cyanide)						
M8	See Analytical Test Group M1	See Analytical Test Group M1	See Analytical Test Group M1 If high cyanide suspected in sample, sample containers must be labelled "HAZARDOUS"	500mL	See Analytical Test Group M2	7

SCHEDULE I - ANALYTICAL PRINCIPLES & ANALY.ICAL METHOD DETECTION LIMITS

Column 1 ANALYTICAL TEST GROUP #	Column 2 PARAMETERS CONVENTIONAL AND METAL PARAMETERS	Column 3 SAMPLE PREPARATION METHOD PRINCIPLES	Column 4 INSTRUMENTAL MEASUREMENT METHOD PRINCIPLES	Column 5 ALTERNATE INSTRUMENTAL MEASUREMENT METHOD PRINCIPLES	Column 6 ANALYTICAL METHOD DETECTION LIMITS mg/L
M1	Chlorides	Preparation for measurement system as appropriate	Ion Chromatography or Colourimetry or Titration	N/A	2
M2	Cyanates	See Analytical Test Group M1	Ion Chromatography subject to chloride interferences	Colourimetry	-
M3	Dissolved Solids	Filter through glass fibre filter (particle retention size ≤ 2 micrometres)	Gravimetry, after drying at 103°C ± 3°C	N/A	20
M4	Sulphates	See Analytical Test Group M1	Ion Chromatography		5 as sulphate
M5	Iron	Nitric evaporation or aqua regia digestion	Atomic absorption spectrometry and/or Emission Spectrometry - Inductively Coupled Plasma (ICP) or Direct Current Argon Plasma Spectrometry (DCP)	Polarography via the method of standard addition in the presence of suitable electrolyte	0.02
M6	Thiocyanates	See Analytical Test Group M1	Ion Chromatography subject to chloride interferences	Colourimetry	-
M7	Uranium	See Analytical Test Group M5	Fluorescence Spectroscopy	N/A	0.02

SCHEDULE I - ANALYTICAL PRINCIPLES & ANALYTICAL METHOD DETECTION LIMITS

Column 1 ANALYTICAL TEST GROUP #	Column 2 PARAMETERS CONVENTIONAL AND METAL PARAMETERS	Column 3 SAMPLE PREPARATION METHOD PRINCIPLES	Column 4 INSTRUMENTAL MEASUREMENT METHOD PRINCIPLES	Column 5 ALTERNATE INSTRUMENTAL MEASUREMENT METHOD PRINCIPLES	Column 6 ANALYTICAL METHOD DETECTION LIMITS mg/L
M8	Weak acid dissociable cyanides (Free cyanide)	See Analytical Test Group M1	Colourimetry	Ion Chromotogaphy with Electro Chemical Detection	-

PART IV

EXPLANATORY NOTES TO THE EFFLUENT MONITORING REGULATION FOR THE ONTARIO MINERAL INDUSTRY: GROUP A

PART IV EXPLANATORY NOTES TO THE EFFLUENT MONITORING REGULATION FOR THE ONTARIO MINERAL INDUSTRY: GROUP A

Introduction

The Explanatory Notes are meant to provide, where appropriate, an expanded description of each of the sections in the Effluent Monitoring Regulation for Group A in order to further the reader's understanding of the requirements.

In conjunction with the protocols and procedures outlined in Ontario Regulation 695/88, the General Effluent Monitoring Regulation, the Group A Regulation specifies the effluent monitoring requirements for each discharger, including sampling, analysis, flow measurement, toxicity testing and reporting.

Section 1: Definitions

This section of the Regulation provides:

- clarification of terms used in the Regulation having several possible interpretations;
- definitions of technical terms used in the Regulation which may not be in common usage;
- definitions for those terms which have a different meaning in the Regulation than those found in a dictionary or through common use;
- definitions of terms with an alternate use in the Group A Regulation from that in the General Regulation; and
- definitions of terms specific to Group A.

Subsections 1(2) and (3) states that the definitions in section 1 of the General Regulation also apply to this Regulation. However, a re-defined term in the Group A Regulation supersedes that of the General Regulation.

The Group A monitoring regulation follows as closely as possible Ontario Regulation 695/88. Consequently, terminology that is commonly used in the mining industry has been largely dropped in favour of the definitions that are found in Ontario Regulation 695/88. For example, a mine or mineral property including all associated facilities becomes a "plant", a tailings area decant becomes a "process effluent", a designated control point becomes a "process effluent sampling point" and runoff becomes "storm water". One term that has been retained is that of "minewater effluent" since this effluent is unique to the industry.

Changes to definitions found in the General Regulation have been made for the purposes of the Group A Regulation as follows:

"grab sample" has been redefined to increase the time period to one hour over which the sample may be collected. The reason for this is that , in many cases, Group A plants simply may not be able to collect a sufficient volume of sample or a sufficient number of samples within the 15 minutes that the General Regulation calls for;

"process effluent" has been redefined to mean only those effluents being discharged from an active tailings area or treatment facilities associated with an active tailings area;

"storm water" has been redefined to mean runoff from inactive tailings areas.

The following definitions are included in the Group A Regulation rather than the General Regulation as they are referred to only in the context of the Group A Regulation:

- "Group A";
- "minewater effluent";
- "minewater effluent sampling point";
- "minewater effluent stream";
- "smelter-refinery effluent";
- "smelter-refinery sampling point";
- "smelter-refinery effluent stream";
- "tailings area".

Section 2: Purpose

The purpose of the Group A Regulation is to establish a data base on effluent quality in the Ontario Mineral Industry Sector that, along with other pertinent information such as available treatment technology, will be used in the development of effluent limits for Group A and to quantify the mass loadings of monitored contaminants discharged into surface watercourses.

Section 3: Application

All plants and effluents covered under the Ontario Mineral Industry Sector: Group A Effluent Monitoring Regulation are listed in Schedule A of the Regulation. A plant is exempt from the Effluent Monitoring Regulation if the name of the plant does not appear in Schedule A. Schedule A also gives the category that a plant falls under and notes the effluent stream names and types.

Schedule A is being kept open as long as possible before the monitoring regulation is promulgated. The reason for this is to allow plants to be added to or deleted from Schedule A in order to reflect the most current operating status of the plants on the date of promulgation of the regulation. Unlike most other types of industry, mines may have a short life. This is due to the fact that ore reserves are finite in nature and, once exhausted, they no longer exist. In Ontario, many mines are in production for less than ten years. In addition, mines in Ontario, like most mines, are greatly influenced by international market prices and demand. Because of this, mines that are active can be quickly forced into an inactive state and vice versa. Also to be noted is the fact that many mining properties are subject to frequent changes in ownership and, as a result, the maintenance of an up-to-date list of plants is difficult.

It is the intent of the Ministry that the MISA Regulation requirements shall replace the monitoring requirements for those effluent streams that are named in Schedule A and are under Certificates of Approval or Control Orders for the duration of the Regulation in cases of duplicate requirements. This override will not extend to any effluent stream not monitored in the Regulation and for which monitoring is required to assess the performance of various treatment systems or processes.

For the purposes of the Group A Effluent Monitoring Regulation, an "exploration or development plant" means a plant at which,

(a) the purpose of activities at the property is to explore a geological structure, to determine potential ore reserves, or to prepare a geological structure for commercial production,

(b) the total effluent volume being discharged is more than 50,000 litres per day averaged over any 30 operating days in any quarter, and

(c) that is identified in Schedule A by the notation EXP/DEV.

Section 4: Sampling Points

This section specifies that a sampling point must be established by the direct discharger for each effluent stream type specified in the site-specific monitoring schedules. These sampling points must be used for all sampling required by the Group A Regulation unless an alternate sampling location is deemed acceptable by a Regional Director of the Ministry of the Environment.

There are only four types of effluent streams on which sampling points are to be established. These are:

- minewater effluent streams
- smelter-refinery effluent streams
- process effluent streams
- storm water effluent streams

It must be noted that all samples must be collected and analyzed according to the principles and protocols outlined in sections 3 and 4 of the General Regulation for sampling and analysis

respectively. In addition, the category specific monitoring schedules (called Schedules B to G in the Group A Regulation) indicate the monitoring frequency required at each sampling point.

Section 5: Sample Types

Grab samples are permitted as follows providing that the effluent, prior to sampling, has been retained for at least the prescribed period of time:

Effluent Stream Type	Required Calculated Retention Time
Process Effluent	30 days
Minewater Effluent	5 days
Smelter-Refinery Effluent	5 days
Storm Water Effluent	0 days

The above grab samples are permitted only for samples that are being taken on a thrice weekly or monthly basis. Composite samples are required in all other cases and for all samples being taken on a quarterly basis. One exception to this rule is storm water effluent. Grab samples are permitted for all types of storm water samples.

When grab samples are to be taken, each direct discharger must report the "calculated retention time" and the method of calculation of the "calculated retention time" for all process effluents, minewater effluents and smelter-refinery effluents from which grab samples are to be taken.

Section 6: Thrice Weekly Monitoring

Thrice weekly monitoring is required in all categories on all existing effluent stream types. The nature of the monitoring varies from category to category (see Schedules B to G in the Group A Regulation). In general, thrice weekly parameters include: pH, suspended solids, ammonia, cyanide, copper, nickel, lead, zinc, arsenic, oil and grease, dissolved solids, sulphates, iron and chlorides and may include weak acid dissociable cyanides.

It should be noted that analytical data from thrice weekly and monthly sampling may be used towards fulfilling quarterly requirements, provided that all samples are taken on the same day and that all protocols required for quarterly samples are followed. Similarly, data from quarterly samples may be used towards monthly and thrice weekly requirements. In addition, in cases of duplicate analytical requirements, the method that yields the lowest detection limit may be used to fulfill the requirements of a less precise method for the same parameter.

Section 7: Monthly Monitoring - General

Monthly monitoring is required in all categories on all existing effluent stream types. The nature of the monitoring varies from category to category (see Schedules B to G in the Group A Regulation). In general, monthly parameters include: chemical oxygen demand, total kjeldahl nitrogen, nitrates, nitrites, phosphorus, phenols and mercury and may include cadmium, cobalt, uranium, cyanates and thiocyanates.

Section 8: Monthly Monitoring - Storm Water

Nearly all storm water effluents found in Group A result from runoff at inactive tailings areas. These effluents tend to be continuous in nature since large areas of land are usually involved. However, during very dry periods or long periods of sub-zero temperatures, the presence of these effluents cannot be guaranteed. As a result, sampling of these effluents at a frequency no greater than once per month is required.

Section 9: Quarterly Monitoring

Quarterly monitoring is required in all categories on all existing effluent stream types. Again, it must be emphasized that analytical data from thrice weekly and monthly sampling may be used towards fulfilling quarterly requirements and vice versa provided that all samples are taken on the same day and that protocols required for all samples are followed.

With one exception, quarterly sampling requirements are constant across all categories. The one exception is minewater effluent requirements in the salt category. Here, because of the very small effluent volumes involved and the routine nature of the effluent (saturated brine), only two "quarterly" samples are required at each of the two mines over the life of the regulation. In all other cases, 4 "quarterly" samples are required.

All quarterly samples involve the following parameters:

(a) the full EMPPL excluding sulphides, fatty and resin acids, alkyl leads, pesticides and herbicides. PCBs are to be run only at plants that use or store PCBs. Dioxins are to be done on a one-time basis only;

(b) open characterization for elements (Analytical Test Group 29) with detection limits set at 50 part per billion and open characterization for organics outside of EMPPL with detection and identification limits set as close to 10 parts per billion as is possible;

(c) fish toxicity test and Daphnia magna acute lethality toxicity test.

With regard to sections 6, 7 and 9 above, many process effluents associated with the Ontario Mineral Industry are discharged to a receiving stream after being retained for lengthy periods of time. Discharge episodes are timed to take advantage of natural physical, biological and chemical processes that, depending on climatic conditions and, therefore, the time of year, reduce levels of some contaminants in the effluent. In these systems, discharge episodes can

vary from a few days to a few months. A discharger is exempt from the requirements of the Effluent Monitoring Regulation during the period of time that a process effluent is being retained and no discharge occurs. However, during any period of discharge equal to or less than 15 days in any one or through two quarters, a discharger will be expected to obtain and analyze samples of its process effluent at the required frequency and for all parameters listed under the column "3W" in Schedules B to G as they apply. During any period of discharge greater than 15 days and equal to or less than 45 days in any one or through two quarters, a discharger will be expected to obtain and analyze samples of its process effluent at the required frequencies and for all parameters listed in the columns under "3W" and "M" in Schedules B to G as they apply. For any period of discharge greater than 45 days in any one or through two quarters, a discharger will be expected to obtain and analyze samples of its process effluent at the required frequencies and for all parameters listed in the columns under "3W", "M" and "Q" in Schedules B to G as they apply to the discharger.

Section 10: Monitoring for Parameters in Analytical Test Group 24

Section 10 states that monitoring for parameters in analytical test group 24 (dioxins) need only be carried out once during the life of the regulation at any particular sampling point and if monitoring for parameters in analytical test group 24 has already been carried out at any particular sampling point during the MISA pre-regulation monitoring program, this monitoring need not be repeated during the life of the regulation.

Section 11: Quality Control Monitoring

Each of the quality control samples to be collected provides information about the quality of the effluent samples collected and indicates possible field contamination. Quality control samples are to be taken with each quarterly sample taken at all effluent sampling points.

A travelling blank sample will provide an indication of any problems with sample contamination due to extraneous volatile fractions of contaminants in the atmosphere and any contaminants introduced by handling of the sample containers. Analytical test groups 1, 3 , 8, 28a, 28b and 29 are excluded from the analysis.

Travelling blanks for COD and TSS/VSS are relatively ineffective. Gross contamination would be required to be detected at the ppm levels of detection for these tests. No information relevant to samples is to be gained for pH on a travelling blank of distilled water.

A travelling spiked blank sample should provide an indication of the degree of degradation of the parameters from sampling to analysis, which in turn may indicate degradation of the parameters in the effluent sample itself. Only analytical test groups 16 to 20, 23 and 27 are to be analyzed.

The travelling spiked blank samples must be prepared with a standard solution which contains all of the parameters in the analytical test groups for which analyses are required.

Additional quality control samples are to be analyzed and prepared by the laboratory, as outlined in section 4 of the General Regulation. These samples will provide an indication of analytical variability and laboratory contamination due to the analytical procedures.

The General Regulation requires that good maintenance and calibration practices for the measurement devices be followed.

Section 12: Toxicity Testing

Section 5 of the General Regulation specifies the test protocols which must be followed for the fish toxicity test and the Daphnia magna acute lethality toxicity test.

Toxicity test samples are to be collected quarterly at each effluent sampling point. If at all possible, these samples should be collected on the same day as the routine quarterly samples in order to aid in the interpretation and possible correlation of the chemical analyses and the resultant biological effects.

Effluent samples used for the fish toxicity and Daphnia magna tests should be taken from the same sample container or set of containers in order to minimize the likelihood of sample differences.

It is not unusual for one fish in a serial dilution sample to suffer mortality due to natural causes. Therefore, mortality greater than two fish in most cases would be an indication of some effluent lethality.

Section 13: Flow Measurement

Protocols and procedures are outlined in section 6 of the General Regulation.

All Group A plants are required to use methods, devices or calculations for the measurement or estimation of flow that are capable of accuracy to plus or minus 20% of actual flow. The foregoing statement applies to all flows that are measured at a plant.

Because of the remote nature of many Group A sampling points, the lack of power at many sites, the severe weather conditions at many sampling points that exist for several months of the year and the generic nature of the Group A effluent monitoring regulation, continuous flow measurement is not required. Flow measurement must take place at the time of sampling.

Accurate flow measurement is expected to be an integral part of future limits regulations for Group A plants.

Section 14: Reporting

Section 7 of the General Regulation outlines the reporting requirements for each direct discharger. The contents of an Initial Report to be submitted prior to monitoring under the Regulation are outlined in the General Regulation.

All information which is considered by the plant to be confidential business information must be so identified on each page submitted to the Ministry.

The Initial Report must be submitted to the Regional Director of the Ministry by November 1, 1989 or by the first day of the third month following the month in which the discharger's plant was added to Schedule A. This report is intended to provide the Ministry with a clear understanding of plant processes and the procedures each plant will follow in carrying out the requirements of this Regulation. Five copies of the Initial Report, including any attachments, should be provided.

A guidance document entitled "Guide for the Preparation of Initial Reports" is available from the Ministry to provide assistance in preparing the Initial Report.

Results from all analyses performed by a laboratory must be reported, including all positive numerical values at or above the laboratory calculated method detection limit.

In cases where a laboratory has a method detection limit lower than the maximum allowed by the Regulation, all positive values below the MISA method detection limit must be reported. This will ensure that accurate data is reported.

Flow measurement information must be reported for all effluent stream types.

The date of each storm event and the amount of precipitation involved are to be reported. This information is required in order to correlate the analytical data with storm events that occur.

A schedule of all sampling dates and times is required for Ministry inspection purposes. It should be noted that the Ministry will be collecting its own samples at random for audit purposes. Sampling procedures used at any plant will also be inspected during Ministry inspections.

A report detailing any equipment malfunctions or any other problems which interfere with carrying out the requirements of both the General and Group A Regulations, and the remedial action taken, must be provided. The reasons for non-compliance with the requirements, as documented in this report, may be taken into consideration by abatement and enforcement staff investigating an act of non-compliance.

It is prudent to have backup systems available for critical elements to minimize the chances of non-compliance.

All records which are required to be kept by this section are primarily for inspection purposes to ensure compliance with this Regulation. The records should be kept for a period of two years beyond the submission of the last report in compliance with the requirements of the Group A Regulation.

Section 15: Exploration or Development Plants

Exploration or development plants as designated in Schedule A of the Effluent Monitoring Regulation for Group A plants are exempt from the extensive monitoring requirements of the Group A Regulation. Special requirements for these plants are found in Section 15. Although an Initial Report is required, the content of the Initial Report is different than that required for other Group A plants and is outlined in Section 15. In addition, a short monthly report that describes operations at a property in a very basic way is also required. Again, the nature of

these reports is outlined in Section 15. Exploration or development plants are required to report the results of all flow measurements and chemical analyses that are required by the Ministry on Permits to Take Water or on Certificates of Approval that are in effect during the life of the Group A Effluent Monitoring Regulation. The frequency of reporting and the parameters to be reported and the methods of analysis to be used are dictated by the Permits to Take Water and by the Certificates of Approval that are in effect.

Section 16: Commencement

The Initial Report is required within three months following promulgation of the Regulation.

The sampling, analytical, flow measurement, toxicity testing and reporting requirements come into force five months after promulgation of the Regulation. The five month implementation period is intended to provide sufficient time to allow the plant site to purchase and install equipment, negotiate contracts with laboratories, set up their monitoring programs and train personnel.

Section 17: Revocation

In general, the Group A Regulation is revoked one year after the day that sampling commences.

Subsection 14(22) provides for GAP monitoring. Gap monitoring is the monitoring that is required in the period that occurs after the Effluent Monitoring Regulation and before the Limits Regulation. Group A Gap monitoring involves the reporting of all analyses and flow measurement data required under the Ontario Water Resources Act on existing Certificates of Approval.

PART V

A SUMMARY OF CATEGORY MONITORING REQUIREMENTS

PART V A SUMMARY OF CATEGORY MONITORING REQUIREMENTS

Part V serves to summarize and to compare the effluent monitoring requirements for each category on the basis of each type of effluent stream being monitored. There are six categories:

1. Cu, Ni, Pb, Zn
2. Gold
3. Iron
4. Salt (sodium chloride)
5. Silver, and
6. Uranium

and four effluent stream types:

1. Mine Water Effluent
2. Process Effluent
3. Smelter-Refinery Effluent, and
4. Storm Water Effluent

In the summaries that follow:

3W	means 3 times per week
M	means monthly
Q	means quarterly
Y	means that the parameter is being monitored at that frequency
N	means that the parameter is not being monitored at that frequency

Asterisks or similar devices refer to footnotes found following Analytical Test Group M8

CATEGORY SUMMARY FOR PROCESS EFFLUENTS

		CATEGORY:	Cu, Ni, Pb, Zn			Gold			Iron			Salt			Silver			Uranium		
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED																		
1	Chemical Oxygen Demand	Chemical oxygen demand (COD)	N	Y	Y	N	Y	Y	N	Y	Y	N	N	Y	N	Y	Y	N	Y	Y
2	Total cyanide	Total cyanide	Y *	N	Y	Y	N	Y	N	N	Y	N	Y	Y	N	N	Y	N	N	Y
3	Hydrogen ion (pH)	Hydrogen ion (pH)	Y	N	Y	Y	N	Y	Y	N	Y	Y	N	Y	Y	N	Y	Y	N	Y
4a	Nitrogen	Ammonia plus Ammonium	Y	N	Y	Y	N	Y	Y	N	Y	N	Y	Y	N	Y	Y	Y	N	Y
		Total Kjeldahl nitrogen	N	Y	Y	N	Y	Y	N	Y	Y	N	Y	Y	N	Y	Y	N	Y	Y
4b		Nitrate + Nitrite	N	Y	Y	N	Y	Y	N	Y	Y	N	Y	Y	N	Y	Y	N	Y	Y
5a	Organic carbon	Dissolved organic carbon (DOC)	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
5b		Total organic carbon (TOC)	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
6	Total phosphorus	Total phosphorus	N	Y	Y	N	Y	Y	N	Y	Y	N	Y	Y	N	Y	Y	N	Y	Y
7	Specific conductance	Specific conductance	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
8	Suspended solids	Total suspended solids (TSS)	Y	N	Y	Y	N	Y	Y	N	Y	Y	N	Y	Y	N	Y	Y	N	Y
		Volatile suspended solids (VSS)	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
9	Total metals	Aluminum	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Beryllium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Cadmium	N	Y	Y	N	Y	Y	N	Y	Y	N	N	Y	N	Y	Y	N	Y	Y
		Chromium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Cobalt	N	Y	Y	N	Y	Y	N	Y	Y	N	N	Y	N	Y	Y	N	Y	Y
		Copper	Y	N	Y	Y†	N	Y	N	Y	Y	N	N	Y	N	Y	Y	N	Y	Y
		Lead	Y	N	Y	Y†	N	Y	N	Y	Y	N	N	Y	N	Y	Y	N	Y	Y
		Molybdenum	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Nickel	Y	N	Y	Y†	N	Y	N	Y	Y	N	N	Y	N	Y	Y	N	Y	Y
		Silver	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Thallium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Vanadium	N	N	Y	N	N	Y	N	Y	Y	N	N	Y	N	N	Y	N	N	Y
		Zinc	Y	N	Y	Y†	N	Y	N	Y	Y	N	N	Y	N	Y	Y	N	Y	Y

		CATEGORY:	Cu, Ni, Pb, Zn			Gold			Iron			Salt			Silver			Uranium		
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q
ANALYTICAL TEST GROUP		PARAMETERS TO BE ANALYZED																		
10	Hydrides	Antimony	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Arsenic	Y	N	Y	Y†	N	Y	N	Y	Y	N	N	Y	Y	N	Y	N	Y	Y
		Selenium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
11	Chromium (Hexavalent)	Chromium (Hexavalent)	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
12	Mercury	Mercury	N	Y	Y	N	Y	Y	N	Y	Y	N	N	Y	N	Y	Y	N	Y	Y
13	Total alkyl lead	Tetra-alkyl lead	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
		Tri-alkyl lead	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
14	Phenolics (4AAP)	Phenolics (4AAP)	N	Y	Y	N	Y	Y	N	Y	Y	N	Y	Y	N	Y	Y	N	Y	Y
15	Sulphide	Sulphide	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
16	Volatiles, Halogenated	1,1,2,2-Tetrachloroethane	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		1,1,2-Trichloroethane	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		1,1-Dichloroethane	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		1,1-Dichloroethylene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		1,2-Dichlorobenzene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		1,2-Dichloroethane (Ethylene dichloride)	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		1,2-Dichloropropane	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		1,3-Dichlorobenzene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		1,4-Dichlorobenzene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Bromoform	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Bromomethane	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Carbon tetrachloride	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Chlorobenzene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Chloroform	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Chloromethane	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Cis-1,3-Dichloropropylene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Dibromochloromethane	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Ethylene dibromide	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Methylene chloride	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Tetrachloroethylene (Perchloroethylene)	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Trans-1,2-Dichloroethylene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y

CATEGORY SUMMARY FOR PROCESS EFFLUENTS

		CATEGORY:	Cu, Ni, Pb, Zn			Gold			Iron			Salt			Silver			Uranium		
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q
ANALYTICAL TEST GROUP		PARAMETERS TO BE ANALYZED																		
16	Volatiles, Halogenated (continued)	Trans-1,3-Dichloropropylene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Trichloroethylene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Trichlorofluoromethane	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Vinyl chloride (Chloroethylene)	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
17	Volatiles, Non-Halogenated	Benzene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Styrene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Toluene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		o-Xylene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		m-Xylene and p-Xylene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
18	Volatiles, Water Soluble	Acrolein	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Acrylonitrile	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
19	Extractables, Base Neutral	Acenaphthene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		5-nitro Acenaphthene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Acenaphthylene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Anthracene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Benz(a)anthracene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Benzo(a)pyrene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Benzo(b)fluoranthene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Benzo(g,h,i)perylene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Benzo(k)fluoranthene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Biphenyl	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Camphene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		1-Chloronaphthalene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		2-Chloronaphthalene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Chrysene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Dibenz(a,h)anthracene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Fluoranthene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Fluorene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Indeno(1,2,3-cd)pyrene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Indole	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		1-Methylnaphthalene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		2-Methylnaphthalene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Naphthalene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y

CATEGORY SUMMARY FOR PROCESS EFFLUENTS

		CATEGORY:	Cu, Ni, Pb, Zn			Gold			Iron			Salt			Silver			Uranium		
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q
ANALYTICAL TEST GROUP		PARAMETERS TO BE ANALYZED																		
19	Extractables, Base Neutral (continued)	Perylene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Phenanthrene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Pyrene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Benzyl butyl phthalate	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Bis(2-Ethylhexyl) phthalate	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Di-n-butyl phthalate	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		4-Bromophenyl phenyl ether	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		4-Chlorophenyl phenyl ether	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Bis(2-Chloroisopropyl)ether	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Bis(2-Chloroethyl)ether	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Diphenyl ether	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		2,4-Dinitrotoluene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		2,6-Dinitrotoluene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Bis(2-Chloroethoxy)methane	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Diphenylamine	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		N-Nitrosodiphenylamine	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		N-Nitrosodi-n-propylamine	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
20	Extractables, Acid (Phenolics)	2,3,4,5-Tetrachlorophenol	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		2,3,4,6-Tetrachlorophenol	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		2,3,5,6-Tetrachlorophenol	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		2,3,4-Trichlorophenol	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		2,3,5-Trichlorophenol	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		2,4,5-Trichlorophenol	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		2,4,6-Trichlorophenol	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		2,4-Dimethyl phenol	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		2,4-Dinitrophenol	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		2,4-Dichlorophenol	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		2,6-Dichlorophenol	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		4,6-Dinitro-o-cresol	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		2-Chlorophenol	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		4-Chloro-3-methylphenol	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		4-Nitrophenol	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		m-Cresol	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		o-Cresol	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y

CATEGORY SUMMARY FOR PROCESS EFFLUENTS

		CATEGORY:	Cu, Ni, Pb, Zn			Gold			Iron			Salt			Silver			Uranium		
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED																		
20	Extractables, Acid (Phenolics) (continued)	p-Cresol	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Pentachlorophenol	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Phenol	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
21	Extractables, Phenoxy Acid Herbicides		N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
22	Extractables, Organochlorine Pesticides		N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
23	Extractables, Neutral -Chlorinated	1,2,3,4-Tetrachlorobenzene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		1,2,3,5-Tetrachlorobenzene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		1,2,4,5-Tetrachlorobenzene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		1,2,3-Trichlorobenzene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		1,2,4-Trichlorobenzene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		2,4,5-Trichlorotoluene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Hexachlorobenzene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Hexachlorobutadiene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Hexachlorocyclopentadiene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Hexachloroethane	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Octachlorostyrene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Pentachlorobenzene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
24	Chlorinated Dibenzo-p-dioxins and Dibenzofurans **	2,3,7,8-Tetrachlorodibenzo-p-dioxin	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Octachlorodibenzo-p-dioxin	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Octachlorodibenzofuran	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Total heptachlorinated dibenzo-p-dioxins	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Total heptachlorinated dibenzofurans	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Total hexachlorinated dibenzo-p-dioxins	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Total hexachlorinated dibenzofurans	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Total pentachlorinated dibenzo-p-dioxins	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Total pentachlorinated dibenzofurans	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Total tetrachlorinated dibenzo-p-dioxins	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Total tetrachlorinated dibenzofurans	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
25	Solvent Extractables	Oil and grease	Y	N	Y	Y	N	Y	Y	N	Y	Y	N	Y	Y	N	Y	Y	N	Y

CATEGORY SUMMARY FOR PROCESS EFFLUENTS

		CATEGORY:	Cu, Ni, Pb, Zn			Gold			Iron			Salt			Silver			Uranium		
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED																		
26	Fatty and Resin Acids		N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
27	Polychlorinated Biphenyls ††	PCBs (Total)	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
28a	Open Characterization - Volatiles		N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
28b	Open Characterization - Extractables		N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
29	Open Characterization - Elemental	Aluminum	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Antimony	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Arsenic	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Barium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Beryllium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Bismuth	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Boron	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Cadmium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Calcium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Cerium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Cesium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Chromium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Cobalt	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Copper	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Dysprosium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Erbium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Europium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Gadolinium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Gallium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Germanium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Gold	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Hafnium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Holmium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Indium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Iridium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Iron	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y

CATEGORY SUMMARY FOR PROCESS EFFLUENTS

		CATEGORY:	Cu, Ni, Pb, Zn			Gold			Iron			Salt			Silver			Uranium		
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q
ANALYTICAL TEST GROUP		PARAMETERS TO BE ANALYZED																		
29	Open Characterization - Elemental (continued)	Lanthanum	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Lead	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Lithium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Lutetium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Magnesium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Manganese	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Mercury	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Molybdenum	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Neodymium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Nickel	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Niobium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Osmium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Palladium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Phosphorus	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Platinum	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Potassium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Praesodymium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Rhenium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Rhodium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Rubidium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Ruthenium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Samarium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Scandium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Selenium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Silicon	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Silver	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Sodium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Strontium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Sulfur	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Tantalum	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Tellurium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Terbium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Thallium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Thorium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Thulium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Tin	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y

CATEGORY SUMMARY FOR PROCESS EFFLUENTS

		CATEGORY:	Cu, Ni, Pb, Zn			Gold			Iron			Salt			Silver			Uranium		
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q
ANALYTICAL TEST GROUP		PARAMETERS TO BE ANALYZED																		
29	Open Characterization - Elemental (continued)	Titanium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Tungsten	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Uranium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Vanadium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Ytterbium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Yttrium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Zinc	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Zirconium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
M1	Chlorides	Chlorides	N	N	Y	N	N	Y	N	N	Y	Y	N	Y	N	N	Y	N	N	Y
M2	Cyanates	Cyanates	N	N	Y	N	Y	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
M3	Dissolved solids	Dissolved solids	N	Y	Y	N	Y	Y	N	Y	Y	N	Y	Y	N	Y	Y	N	Y	Y
M4	Sulphates	Sulphates	N	Y	Y	N	N	Y	N	Y	Y	N	N	Y	N	N	Y	N	Y	Y
M5	Iron	Iron	N	Y	N	N	Y	N	Y	N	N	N	N	N	N	Y	N	N	Y	N
M6	Thiocyanates	Thiocyanates	N	N	Y	N	Y	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
M7	Uranium	Uranium	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Y	N
M8	Weak acid dissociable cyanides	Weak acid dissociable cyanides (Free cyanide)	N	N	Y	Y	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y

* Only when used as a process reagent.

† Only for companies mining or milling more than 1,000 tonnes of ore per day. For all others, these parameters are monthly.

** One analysis only for Group 24 required during the life of this Regulation. Plants that have already carried out a Group 24 analysis under pre-regulation monitoring do not need to repeat this analysis.

†† Required only at those plants that use or store PCBs.

CATEGORY SUMMARY FOR MINEWATER EFFLUENTS

		CATEGORY:	Cu, Ni, Pb, Zn			Gold			Iron			Salt			Silver			Uranium		
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED																		
1	Chemical Oxygen Demand	Chemical oxygen demand (COD)	N	Y	Y	N	Y	Y	N	Y	Y	N	N	Y	N	Y	Y	N	Y	Y
2	Total cyanide	Total cyanide	Y *	N	Y	Y *	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
3	Hydrogen ion (pH)	Hydrogen ion (pH)	Y	N	Y	Y	N	Y	Y	N	Y	Y	N	Y	Y	N	Y	Y	N	Y
4a	Nitrogen	Ammonia plus Ammonium	Y	N	Y	Y	N	Y	Y	N	Y	N	Y	Y	N	Y	Y	Y	N	Y
		Total Kjeldahl nitrogen	N	Y	Y	N	Y	Y	N	Y	Y	N	Y	Y	N	Y	Y	N	Y	Y
4b		Nitrate + Nitrite	N	Y	Y	N	Y	Y	N	Y	Y	N	Y	Y	N	Y	Y	N	Y	Y
5a	Organic carbon	Dissolved organic carbon (DOC)	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
5b		Total organic carbon (TOC)	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
6	Total phosphorus	Total phosphorus	N	Y	Y	N	Y	Y	N	Y	Y	N	Y	Y	N	Y	Y	N	Y	Y
7	Specific conductance	Specific conductance	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
8	Suspended solids	Total suspended solids (TSS)	Y	N	Y	Y	N	Y	Y	N	Y	Y	N	Y	Y	N	Y	Y	N	Y
		Volatile suspended solids (VSS)	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
9	Total metals	Aluminum	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Beryllium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Cadmium	N	Y	Y	N	Y	Y	N	Y	Y	N	N	Y	N	Y	Y	N	Y	Y
		Chromium	N	N	Y	N	N	Y	N	Y	Y	N	N	Y	N	N	Y	N	N	Y
		Cobalt	N	Y	Y	N	Y	Y	N	Y	Y	N	N	Y	N	Y	Y	N	Y	Y
		Copper	Y	N	Y	Y†	N	Y	N	Y	Y	N	N	Y	N	Y	Y	N	Y	Y
		Lead	Y	N	Y	Y†	N	Y	N	Y	Y	N	N	Y	N	Y	Y	N	Y	Y
		Molybdenum	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Nickel	Y	N	Y	Y†	N	Y	N	Y	Y	N	N	Y	N	Y	Y	N	Y	Y
		Silver	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Thallium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Vanadium	N	N	Y	N	N	Y	N	Y	Y	N	N	Y	N	N	Y	N	N	Y
		Zinc	Y	N	Y	Y†	N	Y	N	Y	Y	N	N	Y	N	Y	Y	N	Y	Y

CATEGORY SUMMARY FOR MINEWATER EFFLUENTS

		CATEGORY:	Cu, Ni, Pb, Zn			Gold			Iron			Salt			Silver			Uranium		
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q
ANALYTICAL TEST GROUP		PARAMETERS TO BE ANALYZED																		
10	Hydrides	Antimony	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Arsenic	Y	N	Y	Y†	N	Y	N	Y	Y	N	N	Y	N	N	Y	N	Y	Y
		Selenium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
11	Chromium (Hexavalent)	Chromium (Hexavalent)	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
12	Mercury	Mercury	N	Y	Y	N	Y	Y	N	Y	Y	N	N	Y	N	Y	Y	N	Y	Y
13	Total alkyl lead	Tetra-alkyl lead	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
		Tri-alkyl lead	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
14	Phenolics (4AAP)	Phenolics (4AAP)	N	Y	Y	N	Y	Y	N	Y	Y	N	Y	Y	N	Y	Y	N	Y	Y
15	Sulphide	Sulphide	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
16	Volatiles, Halogenated	1,1,2,2-Tetrachloroethane	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		1,1,2-Trichloroethane	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		1,1-Dichloroethane	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		1,1-Dichloroethylene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		1,2-Dichlorobenzene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		1,2-Dichloroethane (Ethylene dichloride)	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		1,2-Dichloropropane	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		1,3-Dichlorobenzene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		1,4-Dichlorobenzene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Bromoform	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Bromomethane	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Carbon tetrachloride	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Chlorobenzene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Chloroform	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Chloromethane	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Cis-1,3-Dichloropropylene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Dibromochloromethane	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Ethylene dibromide	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Methylene chloride	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Tetrachloroethylene (Perchloroethylene)	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Trans-1,2-Dichloroethylene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y

CATEGORY SUMMARY FOR MINEWATER EFFLUENTS

		CATEGORY:	Cu, Ni, Pb, Zn			Gold			Iron			Salt			Silver			Uranium		
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED																		
16	Volatiles, Halogenated (continued)	Trans-1,3-Dichloropropylene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Trichloroethylene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Trichlorofluoromethane	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Vinyl chloride (Chloroethylene)	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
17	Volatiles, Non-Halogenated	Benzene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Styrene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Toluene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		o-Xylene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		m-Xylene and p-Xylene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
18	Volatiles, Water Soluble	Acrolein	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Acrylonitrile	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
19	Extractables, Base Neutral	Acenaphthene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		5-nitro Acenaphthene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Acenaphthylene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Anthracene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Benz(a)anthracene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Benzo(a)pyrene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Benzo(b)fluoranthene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Benzo(g,h,i)perylene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Benzo(k)fluoranthene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Biphenyl	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Camphene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		1-Chloronaphthalene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		2-Chloronaphthalene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Chrysene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Dibenz(a,h)anthracene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Fluoranthene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Fluorene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Indeno(1,2,3-cd)pyrene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Indole	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		1-Methylnaphthalene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		2-Methylnaphthalene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Naphthalene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y

CATEGORY SUMMARY FOR MINEWATER EFFLUENTS

		CATEGORY:	Cu, Ni, Pb, Zn			Gold			Iron			Salt			Silver			Uranium		
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED																		
19	Extractables, Base Neutral (continued)	Perylene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Phenanthrene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Pyrene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Benzyl butyl phthalate	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Bis(2-Ethylhexyl) phthalate	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Di-n-butyl phthalate	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		4-Bromophenyl phenyl ether	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		4-Chlorophenyl phenyl ether	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Bis(2-Chloroisopropyl)ether	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Bis(2-Chloroethyl)ether	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Diphenyl ether	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		2,4-Dinitrotoluene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		2,6-Dinitrotoluene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Bis(2-Chloroethoxy)methane	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Diphenylamine	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		N-Nitrosodiphenylamine	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		N-Nitrosodi-n-propylamine	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
20	Extractables, Acid (Phenolics)	2,3,4,5-Tetrachlorophenol	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		2,3,4,6-Tetrachlorophenol	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		2,3,5,6-Tetrachlorophenol	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		2,3,4-Trichlorophenol	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		2,3,5-Trichlorophenol	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		2,4,5-Trichlorophenol	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		2,4,6-Trichlorophenol	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		2,4-Dimethyl phenol	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		2,4-Dinitrophenol	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		2,4-Dichlorophenol	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		2,6-Dichlorophenol	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		4,6-Dinitro-o-cresol	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		2-Chlorophenol	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		4-Chloro-3-methylphenol	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		4-Nitrophenol	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		m-Cresol	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		o-Cresol	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y

CATEGORY SUMMARY FOR MINEWATER EFFLUENTS

		CATEGORY:	Cu, Ni, Pb, Zn			Gold			Iron			Salt			Silver			Uranium		
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q
ANALYTICAL TEST GROUP		PARAMETERS TO BE ANALYZED																		
20	Extractables, Acid (Phenolics) (continued)	p-Cresol	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Pentachlorophenol	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Phenol	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
21	Extractables, Phenoxy Acid Herbicides		N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
22	Extractables, Organochlorine Pesticides		N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
23	Extractables, Neutral -Chlorinated	1,2,3,4-Tetrachlorobenzene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		1,2,3,5-Tetrachlorobenzene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		1,2,4,5-Tetrachlorobenzene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		1,2,3-Trichlorobenzene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		1,2,4-Trichlorobenzene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		2,4,5-Trichlorotoluene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Hexachlorobenzene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Hexachlorobutadiene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Hexachlorocyclopentadiene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Hexachloroethane	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Octachlorostyrene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Pentachlorobenzene	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
24	Chlorinated Dibenzo-p-dioxins and Dibenzofurans †	2,3,7,8-Tetrachlorodibenzo-p-dioxin	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Octachlorodibenzo-p-dioxin	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Octachlorodibenzofuran	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Total heptachlorinated dibenzo-p-dioxins	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Total heptachlorinated dibenzofurans	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Total hexachlorinated dibenzo-p-dioxins	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Total hexachlorinated dibenzofurans	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Total pentachlorinated dibenzo-p-dioxins	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Total pentachlorinated dibenzofurans	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Total tetrachlorinated dibenzo-p-dioxins	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Total tetrachlorinated dibenzofurans	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
25	Solvent Extractables	Oil and grease	Y	N	Y	Y	N	Y	Y	N	Y	Y	N	Y	Y	N	Y	Y	N	Y

CATEGORY SUMMARY FOR MINEWATER EFFLUENTS

		CATEGORY:	Cu, Ni, Pb, Zn			Gold			Iron			Salt			Silver			Uranium		
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q
ANALYTICAL TEST GROUP		PARAMETERS TO BE ANALYZED																		
26	Fatty and Resin Acids		N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
27	Polychlorinated Biphenyls **	PCBs (Total)	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
28a	Open Characterization - Volatiles		N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
28b	Open Characterization - Extractables		N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
29	Open Characterization - Elemental	Aluminum	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Antimony	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Arsenic	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Barium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Beryllium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Bismuth	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Boron	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Cadmium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Calcium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Cerium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Cesium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Chromium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Cobalt	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Copper	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Dysprosium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Erbium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Europium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Gadolinium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Gallium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Germanium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Gold	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Hafnium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Holmium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Indium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Iridium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Iron	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y

CATEGORY SUMMARY FOR MINEWATER EFFLUENTS

		CATEGORY:	Cu, Ni, Pb, Zn			Gold			Iron			Salt			Silver			Uranium		
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED																		
29	Open Characterization - Elemental (continued)	Lanthanum	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Lead	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Lithium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Lutetium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Magnesium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Manganese	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Mercury	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Molybdenum	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Neodymium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Nickel	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Niobium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Osmium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Palladium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Phosphorus	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Platinum	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Potassium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Praesodymium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Rhenium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Rhodium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Rubidium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Ruthenium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Samarium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Scandium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Selenium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Silicon	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Silver	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Sodium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Strontium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Sulfur	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Tantalum	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Tellurium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Terbium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Thallium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Thorium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Thulium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Tin	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y

CATEGORY SUMMARY FOR MINEWATER EFFLUENTS

		CATEGORY:	Cu, Ni, Pb, Zn			Gold			Iron			Salt			Silver			Uranium		
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q
ANALYTICAL TEST GROUP		PARAMETERS TO BE ANALYZED																		
29	Open Characterization - Elemental (continued)	Titanium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Tungsten	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Uranium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Vanadium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Ytterbium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Yttrium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Zinc	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
		Zirconium	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
M1	Chlorides	Chlorides	N	N	Y	N	N	Y	N	N	Y	Y	N	Y	N	N	Y	N	N	Y
M2	Cyanates	Cyanates	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
M3	Dissolved solids	Dissolved solids	N	Y	Y	N	Y	Y	N	Y	Y	N	Y	Y	N	Y	Y	N	Y	Y
M4	Sulphates	Sulphates	N	Y	Y	N	N	Y	N	Y	Y	N	N	Y	N	N	Y	N	Y	Y
M5	Iron	Iron	N	Y	N	N	Y	N	Y	N	N	N	N	N	N	Y	N	N	Y	N
M6	Thiocyanates	Thiocyanates	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y
M7	Uranium	Uranium	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Y	N
M8	Weak acid dissociable cyanides	Weak acid dissociable cyanides (Free cyanide)	N	N	Y	Y *	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N	Y

* Only when the mine is using backfill from a mill that uses the parameter as a reagent.

† One analysis only for Group 24 required during the life of this Regulation. Plants that have already carried out a Group 24 analysis under pre-regulation monitoring do not need to repeat this analysis.

** Required only at those plants that use or store PCBs.

CATEGORY SUMMARY FOR SMELTER-REFINERY EFFLUENTS

			Not Applicable			Not Applicable			Not Applicable											
		CATEGORY:	Cu, Ni, Pb, Zn			Gold			Iron			Salt			Silver			Uranium		
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED																		
1	Chemical Oxygen Demand	Chemical oxygen demand (COD)	N	Y	Y										N	Y	Y	N	Y	Y
2	Total cyanide	Total cyanide	Y *	N	Y										N	N	Y	N	N	Y
3	Hydrogen ion (pH)	Hydrogen ion (pH)	Y	N	Y										Y	N	Y	Y	N	Y
4a	Nitrogen	Ammonia plus Ammonium	Y	N	Y										Y	N	Y	Y	N	Y
		Total Kjeldahl nitrogen	N	Y	Y										N	Y	Y	N	Y	Y
4b		Nitrate + Nitrite	N	Y	Y										N	Y	Y	N	Y	Y
5a	Organic carbon	Dissolved organic carbon (DOC)	N	N	Y										N	N	Y	N	N	Y
5b		Total organic carbon (TOC)	N	N	Y										N	N	Y	N	N	Y
6	Total phosphorus	Total phosphorus	N	Y	Y										N	Y	Y	N	Y *	Y
7	Specific conductance	Specific conductance	N	N	N										N	N	N	N	N	N
8	Suspended solids	Total suspended solids (TSS)	Y	N	Y										Y	N	Y	Y	N	Y
		Volatile suspended solids (VSS)	N	N	N										N	N	N	N	N	N
9	Total metals	Aluminum	N	N	Y										N	N	Y	N	N	Y
		Beryllium	N	N	Y										N	N	Y	N	N	Y
		Cadmium	N	Y	Y										N	Y	Y	N	N	Y
		Chromium	N	N	Y										N	N	Y	N	N	Y
		Cobalt	N	Y	Y										N	Y	Y	N	N	Y
		Copper	Y	N	Y										Y	N	Y	N	Y	Y
		Lead	Y	N	Y										Y	N	Y	N	Y	Y
		Molybdenum	N	N	Y										N	N	Y	N	N	Y
		Nickel	Y	N	Y										Y	N	Y	N	Y	Y
		Silver	N	N	Y										N	N	Y	N	N	Y

CATEGORY SUMMARY FOR SMELTER-REFINERY EFFLUENTS

			Cu, Ni, Pb, Zn			Not Applicable Gold			Not Applicable Iron			Not Applicable Salt			Silver			Uranium		
		CATEGORY:																		
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q
ANALYTICAL TEST GROUP		**PARAMETERS TO BE ANALYZED**																		
9	Total metals (continued)	Thallium	N	N	Y										N	N	Y	N	N	Y
		Vanadium	N	N	Y										N	N	Y	N	N	Y
		Zinc	Y	N	Y										Y	N	Y	N	Y	Y
10	Hydrides	Antimony	N	N	Y										N	N	Y	N	N	Y
		Arsenic	Y	N	Y										Y	N	Y	N	Y	Y
		Selenium	N	N	Y										N	N	Y	N	N	Y
11	Chromium (Hexavalent)	Chromium (Hexavalent)	N	N	Y										N	N	Y	N	N	Y
12	Mercury	Mercury	N	Y	Y										N	Y	Y	N	N	Y
13	Total alkyl lead	Tetra-alkyl lead	N	N	N										N	N	N	N	N	N
		Tri-alkyl lead	N	N	N										N	N	N	N	N	N
14	Phenolics (4AAP)	Phenolics (4AAP)	N	Y	Y										Y	N	Y	N	Y	Y
15	Sulphide	Sulphide	N	N	N										N	N	N	N	N	N
16	Volatiles, Halogenated	1,1,2,2-Tetrachloroethane	N	N	Y										N	N	Y	N	N	Y
		1,1,2-Trichloroethane	N	N	Y										N	N	Y	N	N	Y
		1,1-Dichloroethane	N	N	Y										N	N	Y	N	N	Y
		1,1-Dichloroethylene	N	N	Y										N	N	Y	N	N	Y
		1,2-Dichlorobenzene	N	N	Y										N	N	Y	N	N	Y
		1,2-Dichloroethane (Ethylene dichloride)	N	N	Y										N	N	Y	N	N	Y
		1,2-Dichloropropane	N	N	Y										N	N	Y	N	N	Y
		1,3-Dichlorobenzene	N	N	Y										N	N	Y	N	N	Y
		1,4-Dichlorobenzene	N	N	Y										N	N	Y	N	N	Y
		Bromoform	N	N	Y										N	N	Y	N	N	Y
		Bromomethane	N	N	Y										N	N	Y	N	N	Y
		Carbon tetrachloride	N	N	Y										N	N	Y	N	N	Y
		Chlorobenzene	N	N	Y										N	N	Y	N	N	Y
		Chloroform	N	N	Y										N	N	Y	N	N	Y
		Chloromethane	N	N	Y										N	N	Y	N	N	Y

CATEGORY SUMMARY FOR SMELTER-REFINERY EFFLUENTS

			Not Applicable			Not Applicable			Not Applicable								
		CATEGORY:	Cu, Ni, Pb, Zn			Gold			Iron			Salt			Silver			Uranium		
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED																		
16	Volatiles, Halogenated (continued)	Cis-1,3-Dichloropropylene	N	N	Y										N	N	Y	N	N	Y
		Dibromochloromethane	N	N	Y										N	N	Y	N	N	Y
		Ethylene dibromide	N	N	Y										N	N	Y	N	N	Y
		Methylene chloride	N	N	Y										N	N	Y	N	N	Y
		Tetrachloroethylene (Perchloroethylene)	N	N	Y										N	N	Y	N	N	Y
		Trans-1,2-Dichloroethylene	N	N	Y										N	N	Y	N	N	Y
		Trans-1,3-Dichloropropylene	N	N	Y										N	N	Y	N	N	Y
		Trichloroethylene	N	N	Y										N	N	Y	N	N	Y
		Trichlorofluoromethane	N	N	Y										N	N	Y	N	N	Y
		Vinyl chloride (Chloroethylene)	N	N	Y										N	N	Y	N	N	Y
17	Volatiles Non-Halogenated	Benzene	N	N	Y										N	N	Y	N	N	Y
		Styrene	N	N	Y										N	N	Y	N	N	Y
		Toluene	N	N	Y										N	N	Y	N	N	Y
		o-Xylene	N	N	Y										N	N	Y	N	N	Y
		m-Xylene and p-Xylene	N	N	Y										N	N	Y	N	N	Y
18	Volatiles, Water Soluble	Acrolein	N	N	Y										N	N	Y	N	N	Y
		Acrylonitrile	N	N	Y										N	N	Y	N	N	Y
19	Extractables, Base Neutral	Acenaphthene	N	N	Y										N	N	Y	N	N	Y
		5-nitro Acenaphthene	N	N	Y										N	N	Y	N	N	Y
		Acenaphthylene	N	N	Y										N	N	Y	N	N	Y
		Anthracene	N	N	Y										N	N	Y	N	N	Y
		Benz(a)anthracene	N	N	Y										N	N	Y	N	N	Y
		Benzo(a)pyrene	N	N	Y										N	N	Y	N	N	Y
		Benzo(b)fluoranthene	N	N	Y										N	N	Y	N	N	Y
		Benzo(g,h,i)perylene	N	N	Y										N	N	Y	N	N	Y
		Benzo(k)fluoranthene	N	N	Y										N	N	Y	N	N	Y
		Biphenyl	N	N	Y										N	N	Y	N	N	Y
		Camphene	N	N	Y										N	N	Y	N	N	Y
		1-Chloronaphthalene	N	N	Y										N	N	Y	N	N	Y
		2-Chloronaphthalene	N	N	Y										N	N	Y	N	N	Y
		Chrysene	N	N	Y										N	N	Y	N	N	Y

		CATEGORY:	Cu, Ni, Pb, Zn			Not Applicable Gold			Not Applicable Iron			Not Applicable Salt			Silver			Uranium		
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED																		
19	Extractables, Base Neutral (continued)	Dibenz(a,h)anthracene	N	N	Y										N	N	Y	N	N	Y
		Fluoranthene	N	N	Y										N	N	Y	N	N	Y
		Fluorene	N	N	Y										N	N	Y	N	N	Y
		Indeno(1,2,3-cd)pyrene	N	N	Y										N	N	Y	N	N	Y
		Indole	N	N	Y										N	N	Y	N	N	Y
		1-Methylnaphthalene	N	N	Y										N	N	Y	N	N	Y
		2-Methylnaphthalene	N	N	Y										N	N	Y	N	N	Y
		Naphthalene	N	N	Y										N	N	Y	N	N	Y
		Perylene	N	N	Y										N	N	Y	N	N	Y
		Phenanthrene	N	N	Y										N	N	Y	N	N	Y
		Pyrene	N	N	Y										N	N	Y	N	N	Y
		Benzyl butyl phthalate	N	N	Y										N	N	Y	N	N	Y
		Bis(2-Ethylhexyl) phthalate	N	N	Y										N	N	Y	N	N	Y
		Di-n-butyl phthalate	N	N	Y										N	N	Y	N	N	Y
		4-Bromophenyl phenyl ether	N	N	Y										N	N	Y	N	N	Y
		4-Chlorophenyl phenyl ether	N	N	Y										N	N	Y	N	N	Y
		Bis(2-Chloroisopropyl)ether	N	N	Y										N	N	Y	N	N	Y
		Bis(2-Chloroethyl)ether	N	N	Y										N	N	Y	N	N	Y
		Diphenyl ether	N	N	Y										N	N	Y	N	N	Y
		2,4-Dinitrotoluene	N	N	Y										N	N	Y	N	N	Y
		2,6-Dinitrotoluene	N	N	Y										N	N	Y	N	N	Y
		Bis(2-Chloroethoxy)methane	N	N	Y										N	N	Y	N	N	Y
		Diphenylamine	N	N	Y										N	N	Y	N	N	Y
		N-Nitrosodiphenylamine	N	N	Y										N	N	Y	N	N	Y
		N-Nitrosodi-n-propylamine	N	N	Y										N	N	Y	N	N	Y
20	Extractables, Acid (Phenolics)	2,3,4,5-Tetrachlorophenol	N	N	Y										N	N	Y	N	N	Y
		2,3,4,6-Tetrachlorophenol	N	N	Y										N	N	Y	N	N	Y
		2,3,5,6-Tetrachlorophenol	N	N	Y										N	N	Y	N	N	Y
		2,3,4-Trichlorophenol	N	N	Y										N	N	Y	N	N	Y
		2,3,5-Trichlorophenol	N	N	Y										N	N	Y	N	N	Y
		2,4,5-Trichlorophenol	N	N	Y										N	N	Y	N	N	Y
		2,4,6-Trichlorophenol	N	N	Y										N	N	Y	N	N	Y
		2,4-Dimethyl phenol	N	N	Y										N	N	Y	N	N	Y

								Not Applicable			Not Applicable			Not Applicable								
		CATEGORY:	Cu, Ni, Pb, Zn					Gold			Iron			Salt			Silver			Uranium		
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED																				
20	Extractables, Acid (Phenolics) (continued)	2,4-Dinitrophenol	N	N	Y												N	N	Y	N	N	Y
		2,4-Dichlorophenol	N	N	Y												N	N	Y	N	N	Y
		2,6-Dichlorophenol	N	N	Y												N	N	Y	N	N	Y
		4,6-Dinitro-o-cresol	N	N	Y												N	N	Y	N	N	Y
		2-Chlorophenol	N	N	Y												N	N	Y	N	N	Y
		4-Chloro-3-methylphenol	N	N	Y												N	N	Y	N	N	Y
		4-Nitrophenol	N	N	Y												N	N	Y	N	N	Y
		m-Cresol	N	N	Y												N	N	Y	N	N	Y
		o-Cresol	N	N	Y												N	N	Y	N	N	Y
		p-Cresol	N	N	Y												N	N	Y	N	N	Y
		Pentachlorophenol	N	N	Y												N	N	Y	N	N	Y
		Phenol	N	N	Y												N	N	Y	N	N	Y
21	Extractables, Phenoxy Acid Herbicides		N	N	N												N	N	N	N	N	N
22	Extractables, Organochlorine Pesticides		N	N	N												N	N	N	N	N	N
23	Extractables, Neutral -Chlorinated	1,2,3,4-Tetrachlorobenzene	N	N	Y												N	N	Y	N	N	Y
		1,2,3,5-Tetrachlorobenzene	N	N	Y												N	N	Y	N	N	Y
		1,2,4,5-Tetrachlorobenzene	N	N	Y												N	N	Y	N	N	Y
		1,2,3-Trichlorobenzene	N	N	Y												N	N	Y	N	N	Y
		1,2,4-Trichlorobenzene	N	N	Y												N	N	Y	N	N	Y
		2,4,5-Trichlorotoluene	N	N	Y												N	N	Y	N	N	Y
		Hexachlorobenzene	N	N	Y												N	N	Y	N	N	Y
		Hexachlorobutadiene	N	N	Y												N	N	Y	N	N	Y
		Hexachlorocyclopentadiene	N	N	Y												N	N	Y	N	N	Y
		Hexachloroethane	N	N	Y												N	N	Y	N	N	Y
		Octachlorostyrene	N	N	Y												N	N	Y	N	N	Y
		Pentachlorobenzene	N	N	Y												N	N	Y	N	N	Y

CATEGORY SUMMARY FOR SMELTER-REFINERY EFFLUENTS

			Not Applicable						Not Applicable						Not Applicable								
		CATEGORY:	Cu, Ni, Pb, Zn			Gold			Iron			Salt			Silver			Uranium		
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED																		
24	Chlorinated Dibenzo-p-dioxins and Dibenzofurans †	2,3,7,8-Tetrachlorodibenzo-p-dioxin	N	N	Y										N	N	Y	N	N	Y
		Octachlorodibenzo-p-dioxin	N	N	Y										N	N	Y	N	N	Y
		Octachlorodibenzofuran	N	N	Y										N	N	Y	N	N	Y
		Total heptachlorinated dibenzo-p-dioxins	N	N	Y										N	N	Y	N	N	Y
		Total heptachlorinated dibenzofurans	N	N	Y										N	N	Y	N	N	Y
		Total hexachlorinated dibenzo-p-dioxins	N	N	Y										N	N	Y	N	N	Y
		Total hexachlorinated dibenzofurans	N	N	Y										N	N	Y	N	N	Y
		Total pentachlorinated dibenzo-p-dioxins	N	N	Y										N	N	Y	N	N	Y
		Total pentachlorinated dibenzofurans	N	N	Y										N	N	Y	N	N	Y
		Total tetrachlorinated dibenzo-p-dioxins	N	N	Y										N	N	Y	N	N	Y
		Total tetrachlorinated dibenzofurans	N	N	Y										N	N	Y	N	N	Y
25	Solvent Extractables	Oil and grease	Y	N	Y										Y	N	Y	Y	N	Y
26	Fatty and Resin Acids		N	N	N										N	N	N	N	N	N
27	Polychlorinated Biphenyls **	PCBs (Total)	N	N	Y										N	N	Y	N	N	Y
28a	Open Characterization - Volatiles		N	N	Y										N	N	Y	N	N	Y
28b	Open Characterization - Extractables		N	N	Y										N	N	Y	N	N	Y
29	Open Characterization - Elemental	Aluminum	N	N	Y										N	N	Y	N	N	Y
		Antimony	N	N	Y										N	N	Y	N	N	Y
		Arsenic	N	N	Y										N	N	Y	N	N	Y
		Barium	N	N	Y										N	N	Y	N	N	Y
		Beryllium	N	N	Y										N	N	Y	N	N	Y
		Bismuth	N	N	Y										N	N	Y	N	N	Y
		Boron	N	N	Y										N	N	Y	N	N	Y
		Cadmium	N	N	Y										N	N	Y	N	N	Y
		Calcium	N	N	Y										N	N	Y	N	N	Y
		Cerium	N	N	Y										N	N	Y	N	N	Y

		CATEGORY:	Cu, Ni, Pb, Zn			Not Applicable Gold			Not Applicable Iron			Not Applicable Salt			Silver			Uranium		
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED																		
29	Open Characterization Elemental (continued)	Cesium	N	N	Y										N	N	Y	N	N	Y
		Chromium	N	N	Y										N	N	Y	N	N	Y
		Cobalt	N	N	Y										N	N	Y	N	N	Y
		Copper	N	N	Y										N	N	Y	N	N	Y
		Dysprosium	N	N	Y										N	N	Y	N	N	Y
		Erbium	N	N	Y										N	N	Y	N	N	Y
		Europium	N	N	Y										N	N	Y	N	N	Y
		Gadolinium	N	N	Y										N	N	Y	N	N	Y
		Gallium	N	N	Y										N	N	Y	N	N	Y
		Germanium	N	N	Y										N	N	Y	N	N	Y
		Gold	N	N	Y										N	N	Y	N	N	Y
		Hafnium	N	N	Y										N	N	Y	N	N	Y
		Holmium	N	N	Y										N	N	Y	N	N	Y
		Indium	N	N	Y										N	N	Y	N	N	Y
		Iridium	N	N	Y										N	N	Y	N	N	Y
		Iron	N	N	Y										N	N	Y	N	N	Y
		Lanthanum	N	N	Y										N	N	Y	N	N	Y
		Lead	N	N	Y										N	N	Y	N	N	Y
		Lithium	N	N	Y										N	N	Y	N	N	Y
		Lutetium	N	N	Y										N	N	Y	N	N	Y
		Magnesium	N	N	Y										N	N	Y	N	N	Y
		Manganese	N	N	Y										N	N	Y	N	N	Y
		Mercury	N	N	Y										N	N	Y	N	N	Y
		Molybdenum	N	N	Y										N	N	Y	N	N	Y
		Neodymium	N	N	Y										N	N	Y	N	N	Y
		Nickel	N	N	Y										N	N	Y	N	N	Y
		Niobium	N	N	Y										N	N	Y	N	N	Y
		Osmium	N	N	Y										N	N	Y	N	N	Y
		Palladium	N	N	Y										N	N	Y	N	N	Y
		Phosphorus	N	N	Y										N	N	Y	N	N	Y
		Platinum	N	N	Y										N	N	Y	N	N	Y
		Potassium	N	N	Y										N	N	Y	N	N	Y
		Praesodymium	N	N	Y										N	N	Y	N	N	Y
		Rhenium	N	N	Y										N	N	Y	N	N	Y

			Not Applicable			Not Applicable			Not Applicable											
		CATEGORY:	Cu, Ni, Pb, Zn			Gold			Iron			Salt			Silver			Uranium		
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED																		
29	Open Characterization - Elemental (continued)	Rhodium	N	N	Y										N	N	Y	N	N	Y
		Rubidium	N	N	Y										N	N	Y	N	N	Y
		Ruthenium	N	N	Y										N	N	Y	N	N	Y
		Samarium	N	N	Y										N	N	Y	N	N	Y
		Scandium	N	N	Y										N	N	Y	N	N	Y
		Selenium	N	N	Y										N	N	Y	N	N	Y
		Silicon	N	N	Y										N	N	Y	N	N	Y
		Silver	N	N	Y										N	N	Y	N	N	Y
		Sodium	N	N	Y										N	N	Y	N	N	Y
		Strontium	N	N	Y										N	N	Y	N	N	Y
		Sulfur	N	N	Y										N	N	Y	N	N	Y
		Tantalum	N	N	Y										N	N	Y	N	N	Y
		Tellurium	N	N	Y										N	N	Y	N	N	Y
		Terbium	N	N	Y										N	N	Y	N	N	Y
		Thallium	N	N	Y										N	N	Y	N	N	Y
		Thorium	N	N	Y										N	N	Y	N	N	Y
		Thulium	N	N	Y										N	N	Y	N	N	Y
		Tin	N	N	Y										N	N	Y	N	N	Y
		Titanium	N	N	Y										N	N	Y	N	N	Y
		Tungsten	N	N	Y										N	N	Y	N	N	Y
		Uranium	N	N	Y										N	N	Y	N	N	Y
		Vanadium	N	N	Y										N	N	Y	N	N	Y
		Ytterbium	N	N	Y										N	N	Y	N	N	Y
		Yttrium	N	N	Y										N	N	Y	N	N	Y
		Zinc	N	N	Y										N	N	Y	N	N	Y
		Zirconium	N	N	Y										N	N	Y	N	N	Y

CATEGORY SUMMARY FOR SMELTER-REFINERY EFFLUENTS

			Cu, Ni, Pb, Zn			Not Applicable Gold			Not Applicable Iron			Not Applicable Salt			Silver			Uranium		
		FREQUENCY OF SAMPLING:	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q	3W	M	Q
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED																		
M1	Chlorides	Chlorides	N	N	Y										N	N	Y	N	N	Y
M2	Cyanates	Cyanates	N	N	Y										N	N	Y	N	N	Y
M3	Dissolved solids	Dissolved solids	N	Y	Y										N	Y	Y	N	Y	Y
M4	Sulphates	Sulphates	N	Y	Y										N	N	Y	N	Y	Y
M5	Iron	Iron	N	Y	N										N	Y	N	N	Y	N
M6	Thiocyanates	Thiocyanates	N	N	Y										N	N	Y	N	N	Y
M7	Uranium	Uranium	N	N	N										N	N	N	N	Y	N
M8	Weak acid dissociable cyanides	Weak acid dissociable cyanides (Free cyanide)	N	N	Y										N	N	Y	N	N	Y

* Port Hope Refinery only.

† One analysis only for Group 24 required during the life of this Regulation. Plants that have already carried out a Group 24 analysis under pre-regulation monitoring do not need to repeat this analysis.

** Required only at those plants that use or store PCBs.

CATEGORY SUMMARY FOR STORM WATER EFFLUENTS

		CATEGORY:	Cu, Ni, Pb, Zn		Gold		Iron		Salt		Silver		Uranium	
		FREQUENCY OF SAMPLING:	M	Q*	M	Q*	M	Q*	M	Q*	M	Q*	M	Q*
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED												
1	Chemical Oxygen Demand	Chemical oxygen demand (COD)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
2	Total cyanide	Total cyanide	N	Y	Y	Y	N	Y	Y	Y	N	Y	N	Y
3	Hydrogen ion (pH)	Hydrogen ion (pH)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
4a	Nitrogen	Ammonia plus Ammonium	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
		Total Kjeldahl nitrogen	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
4b		Nitrate + Nitrite	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
5a	Organic carbon	Dissolved organic carbon (DOC)	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
5b		Total organic carbon (TOC)	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
6	Total phosphorus	Total phosphorus	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
7	Specific conductance	Specific conductance	N	N	N	N	N	N	N	N	N	N	N	N
8	Suspended solids	Total suspended solids (TSS)	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y
		Volatile suspended solids (VSS)	N	N	N	N	N	N	N	N	N	N	N	N
9	Total metals	Aluminum	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Beryllium	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Cadmium	Y	Y	N	Y	Y	Y	N	Y	Y	Y	N	Y
		Chromium	N	Y	N	Y	Y	Y	N	Y	N	Y	N	Y
		Cobalt	Y	Y	N	Y	Y	Y	N	Y	Y	Y	Y	Y
		Copper	Y	Y	N	Y	Y	Y	N	Y	Y	Y	Y	Y
		Lead	Y	Y	N	Y	Y	Y	N	Y	Y	Y	Y	Y
		Molybdenum	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Nickel	Y	Y	N	Y	Y	Y	N	Y	Y	Y	Y	Y
		Silver	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Thallium	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Vanadium	N	Y	N	Y	Y	Y	N	Y	N	Y	N	Y
		Zinc	Y	Y	N	Y	Y	Y	N	Y	Y	Y	Y	Y

CATEGORY SUMMARY FOR STORM WATER EFFLUENTS

		CATEGORY:	Cu, Ni, Pb, Zn		Gold		Iron		Salt		Silver		Uranium	
		FREQUENCY OF SAMPLING:	M	Q*	M	Q*	M	Q*	M	Q*	M	Q*	M	Q*
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED												
10	Hydrides	Antimony	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Arsenic	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y
		Selenium	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
11	Chromium (Hexavalent)	Chromium (Hexavalent)	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
12	Mercury	Mercury	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y
13	Total alkyl lead	Tetra-alkyl lead	N	N	N	N	N	N	N	N	N	N	N	N
		Tri-alkyl lead	N	N	N	N	N	N	N	N	N	N	N	N
14	Phenolics (4AAP)	Phenolics (4AAP)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
15	Sulphide	Sulphide	N	N	N	N	N	N	N	N	N	N	N	N
16	Volatiles, Halogenated	1,1,2,2-Tetrachloroethane	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		1,1,2-Trichloroethane	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		1,1-Dichloroethane	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		1,1-Dichloroethylene	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		1,2-Dichlorobenzene	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		1,2-Dichloroethane (Ethylene dichloride)	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		1,2-Dichloropropane	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		1,3-Dichlorobenzene	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		1,4-Dichlorobenzene	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Bromoform	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Bromomethane	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Carbon tetrachloride	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Chlorobenzene	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Chloroform	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Chloromethane	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Cis-1,3-Dichloropropylene	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Dibromochloromethane	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Ethylene dibromide	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Methylene chloride	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Tetrachloroethylene (Perchloroethylene)	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Trans-1,2-Dichloroethylene	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Trans-1,3-Dichloropropylene	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y

CATEGORY SUMMARY FOR STORM WATER EFFLUENTS

		CATEGORY:	Cu, Ni, Pb, Zn		Gold		Iron		Salt		Silver		Uranium	
		FREQUENCY OF SAMPLING:	M	Q*	M	Q*	M	Q*	M	Q*	M	Q*	M	Q*
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED												
16	Volatiles, Halogenated (continued)	Trichloroethylene	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Trichlorofluoromethane	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Vinyl chloride (Chloroethylene)	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
17	Volatiles, Non-Halogenated	Benzene	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Styrene	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Toluene	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		o-Xylene	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		m-Xylene and p-Xylene	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
18	Volatiles, Water Soluble	Acrolein	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Acrylonitrile	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
19	Extractables, Base Neutral	Acenaphthene	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		5-nitro Acenaphthene	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Acenaphthylene	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Anthracene	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Benz(a)anthracene	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Benzo(a)pyrene	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Benzo(b)fluoranthene	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Benzo(g,h,i)perylene	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Benzo(k)fluoranthene	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Biphenyl	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Camphene	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		1-Chloronaphthalene	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		2-Chloronaphthalene	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Chrysene	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Dibenz(a,h)anthracene	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Fluoranthene	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Fluorene	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Indeno(1,2,3-cd)pyrene	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Indole	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		1-Methylnaphthalene	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		2-Methylnaphthalene	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Naphthalene	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Perylene	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Phenanthrene	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y

CATEGORY SUMMARY FOR STORM WATER EFFLUENTS

		CATEGORY:	Cu, Ni, Pb, Zn		Gold		Iron		Salt		Silver		Uranium	
		FREQUENCY OF SAMPLING:	M	Q*	M	Q*	M	Q*	M	Q*	M	Q*	M	Q*
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED												
19	Extractables, Base Neutral (continued)	Pyrene	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Benzyl butyl phthalate	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Bis(2-Ethylhexyl) phthalate	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Di-n-butyl phthalate	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		4-Bromophenyl phenyl ether	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		4-Chlorophenyl phenyl ether	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Bis(2-Chloroisopropyl)ether	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Bis(2-Chloroethyl)ether	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Diphenyl ether	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		2,4-Dinitrotoluene	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		2,6-Dinitrotoluene	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Bis(2-Chloroethoxy)methane	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Diphenylamine	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		N-Nitrosodiphenylamine	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		N-Nitrosodi-n-propylamine	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
20	Extractables, Acid (Phenolics)	2,3,4,5-Tetrachlorophenol	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		2,3,4,6-Tetrachlorophenol	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		2,3,5,6-Tetrachlorophenol	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		2,3,4-Trichlorophenol	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		2,3,5-Trichlorophenol	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		2,4,5-Trichlorophenol	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		2,4,6-Trichlorophenol	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		2,4-Dimethyl phenol	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		2,4-Dinitrophenol	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		2,4-Dichlorophenol	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		2,6-Dichlorophenol	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		4,6-Dinitro-o-cresol	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		2-Chlorophenol	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		4-Chloro-3-methylphenol	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		4-Nitrophenol	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		m-Cresol	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		o-Cresol	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		p-Cresol	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Pentachlorophenol	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Phenol	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y

CATEGORY SUMMARY FOR STORM WATER EFFLUENTS

		CATEGORY:	Cu, Ni, Pb, Zn		Gold		Iron		Salt		Silver		Uranium	
		FREQUENCY OF SAMPLING:	M	Q*	M	Q*	M	Q*	M	Q*	M	Q*	M	Q*
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED												
21	Extractables, Phenoxy Acid Herbicides		N	N	N	N	N	N	N	N	N	N	N	N
22	Extractables, Organochlorine Pesticides		N	N	N	N	N	N	N	N	N	N	N	N
23	Extractables, Neutral -Chlonnated	1,2,3,4-Tetrachlorobenzene	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		1,2,3,5-Tetrachlorobenzene	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		1,2,4,5-Tetrachlorobenzene	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		1,2,3-Trichlorobenzene	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		1,2,4-Trichlorobenzene	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		2,4,5-Trichlorotoluene	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Hexachlorobenzene	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Hexachlorobutadiene	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Hexachlorocyclopentadiene	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Hexachloroethane	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Octachlorostyrene	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Pentachlorobenzene	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
24	Chlorinated Dibenzo-p-dioxins and Dibenzofurans †	2,3,7,8-Tetrachlorodibenzo-p-dioxin	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Octachlorodibenzo-p-dioxin	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Octachlorodibenzofuran	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Total heptachlorinated dibenzo-p-dioxins	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Total heptachlorinated dibenzofurans	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Total hexachlorinated dibenzo-p-dioxins	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Total hexachlorinated dibenzofurans	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Total pentachlorinated dibenzo-p-dioxins	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Total pentachlorinated dibenzofurans	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Total tetrachlorinated dibenzo-p-dioxins	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Total tetrachlorinated dibenzofurans	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
25	Solvent Extractables	Oil and grease	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
26	Fatty and Resin Acids		N	N	N	N	N	N	N	N	N	N	N	N
27	Polychlorinated Biphenyls **	PCBs (Total)	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y

CATEGORY SUMMARY FOR STORM WATER EFFLUENTS

	CATEGORY:	Cu, Ni, Pb, Zn		Gold		Iron		Salt		Silver		Uranium	
	FREQUENCY OF SAMPLING:	M	Q*	M	Q*	M	Q*	M	Q*	M	Q*	M	Q*
ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED												
28a Open Characterization - Volatiles		N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
28b Open Characterization - Extractables		N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
29 Open Characterization - Elemental	Aluminum	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
	Antimony	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
	Arsenic	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
	Barium	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
	Beryllium	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
	Bismuth	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
	Boron	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
	Cadmium	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
	Calcium	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
	Cerium	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
	Cesium	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
	Chromium	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
	Cobalt	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
	Copper	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
	Dysprosium	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
	Erbium	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
	Europium	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
	Gadolinium	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
	Gallium	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
	Germanium	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
	Gold	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
	Hafnium	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
	Holmium	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
	Indium	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
	Iridium	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
	Iron	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
	Lanthanum	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
	Lead	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
	Lithium	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
	Lutetium	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
	Magnesium	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y

		CATEGORY:	Cu, Ni, Pb, Zn		Gold		Iron		Salt		Silver		Uranium	
		FREQUENCY OF SAMPLING:	M	Q*	M	Q*	M	Q*	M	Q*	M	Q*	M	Q*
ANALYTICAL TEST GROUP		PARAMETERS TO BE ANALYZED												
29	Open Characterization - Elemental (continued)	Manganese	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Mercury	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Molybdenum	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Neodymium	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Nickel	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Niobium	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Osmium	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Palladium	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Phosphorus	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Platinum	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Potassium	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Praesodymium	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Rhenium	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Rhodium	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Rubidium	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Ruthenium	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Samarium	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Scandium	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Selenium	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Silicon	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Silver	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Sodium	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Strontium	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Sulfur	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Tantalum	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Tellurium	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Terbium	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Thallium	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Thorium	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Thulium	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Tin	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Titanium	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Tungsten	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Uranium	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Vanadium	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Ytterbium	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y

CATEGORY SUMMARY FOR STORM WATER EFFLUENTS

		CATEGORY:	Cu, Ni, Pb, Zn		Gold		Iron		Salt		Silver		Uranium	
		FREQUENCY OF SAMPLING:	M	Q*	M	Q*	M	Q*	M	Q*	M	Q*	M	Q*
	ANALYTICAL TEST GROUP	PARAMETERS TO BE ANALYZED												
29	Open Characterization - Elemental (continued)	Yttrium	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Zinc	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
		Zirconium	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
M1	Chlorides	Chlorides	N	Y	N	Y	N	Y	Y	Y	N	Y	N	Y
M2	Cyanates	Cyanates	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
M3	Dissolved solids	Dissolved solids	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
M4	Sulphates	Sulphates	Y	Y	N	Y	Y	Y	N	Y	Y	Y	Y	Y
M5	Iron	Iron	Y	N	Y	N	Y	N	N	N	Y	N	Y	N
M6	Thiocyanates	Thiocyanates	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
M7	Uranium	Uranium	N	N	N	N	N	N	N	N	N	N	Y	N
M8	Weak acid dissociable cyanides	Weak acid dissociable cyanides (Free cyanide)	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y

* Only when an effluent exists.

† One analysis only for Group 24 required during the life of this Regulation. Plants that have already carried out a Group 24 analysis under pre-regulation monitoring do not need to repeat this analysis.

** Required only at those plants that use or store PCBs.

PART VI

A SUMMARY OF THE RESULTS OF THE ONTARIO MINERAL INDUSTRY:

GROUP A MISA PRE-REGULATION MONITORING PROGRAM

PART VI - A SUMMARY OF THE RESULTS OF THE ONTARIO MINERAL INDUSTRY: GROUP A MISA PRE-REGULATION MONITORING PROGRAM

In 1987, ZENON Environmental Inc undertook a project on behalf of the Ontario Mining Association (OMA) to characterize effluent stream types from ten mining and milling operations in Ontario as requested by the Ministry of the Environment (MOE) under the MISA pre-regulation monitoring program. The first round of sampling, or Phase I, was undertaken in July, 1987, by ZENON personnel with Phase II samples taken by the individual mines and mills in September, 1987. The sampling and analytical procedures were approved by MOE prior to commencing the work.

The scope of analytical work carried out in two sampling campaigns included a list of conventional pollutants, the MOE EMPPL as published at the time of collection, an open organic scan and an elemental scan.

Operations were chosen from each category of Group A which could be shown to represent the processing aspects of the category. In each phase of the program a total of ten "characterization scans" were carried out: the five base metal producers, two mines from the fifteen gold producers, one mine from the four uranium producers, one from the three iron producers, and one salt producer.

The following mining operations were sampled at the noted locations. The sampling sites selected, unless otherwise noted, are currently the IMIS sampling sites.

Base Metal Sulphides

i) Kidd Creek metallurgical complex, representing copper, zinc, lead and silver producers, was sampled at the final discharge to the Porcupine River.

ii) Inco central tailings complex, representing copper, nickel producers, was sampled at the final discharge to Copper Cliff Creek. This discharge continues down Copper Cliff Creek into Kelley Lake.

iii) Mattabi Mines, representing copper, zinc, lead concentrate producers, was sampled at the outfall of the reclaim pond, going to the Bell River.

iv) Geco (Noranda) Mines, representing copper, zinc, lead concentrate producers was sampled at the outfall of the wastewater treatment plant going to Mose Lake.

v) Falconbridge Nickel Mines representing the copper, nickel producers, was sampled at the Falconbridge Mine site at the outfall from the control gate into Coniston Creek.

Iron Ore Operations

i) Sherman Mines, was sampled at the discharge weir outfall to the Tetapaga River and Lake Temagami.

Uranium

i) Denison Mines, was sampled at the Stollery Lake weir, designated sampling spot D-2. The overflow from this weir goes into the rest of Stollery Lake and thence to the Serpent River.

Gold

i) Hemlo Gold Mines Inc. representing carbon-in-pulp gold technology. The final effluent was sampled where the treated effluent enters the White River watershed.

ii) Pamour/Schumacher representing Merrill-Crowe treatment technology combined with flotation, was sampled at N.E. outlet from tailings areas at T-3 - No. 3 decant pier discharging to the Porcupine River.

SAMPLING LOCATIONS: EFFLUENT STREAM TYPE (see Table 1)

At all sites sampled, with the exception of Mine #4, single grab samples were collected. At Mine #4, six sub-samples were taken every two hours providing a 12 hour composite sample; two such samples were collected.

The sampling procedure was divided into two sections, those being: training and sampling. The first section consisted of a training lecture with the representatives of each mine/milling operation. The second part of the sampling procedure was a hands-on demonstration as the samples were collected, labelled, preserved and packed. Each mine was provided with a written sampling manual and data sheets for future sampling programs.

Note: At Joint Technical Committee (JTC) meetings, Eldorado Resources Limited was not represented by the Ontario Mining Association. Eldorado Resources Limited acted as an independent member of the JTC and carried out pre-characterization (two runs) of effluents at its Blind River and Port Hope plants (four effluents appear in Schedule B of the Sector Effluent Monitoring Regulation: all effluents are categorized as Smelter-Refinery Effluents.) The general timing, methodology and laboratory used for this work were identical with the OMA pre-characterization work.

TABLE 1 - SAMPLING LOCATIONS: EFFLUENT STREAM TYPES

MINE #	MINE	SAMPLE POINT	EFFLUENT STREAM TYPE
Base Metal Mines (Cu, Ni, Pb, Zn)			
1	Falconbridge	Treated tailings NIR road effluent	Process
2	Noranda GECO	Overflow from reacter clarifier	Process
3	Mattabi	Treated effluent pond overflow	Process
		Lyon Lake mine effluent	Mine Water
4	Kidd Creek	Overflow from pond D weir	Process
		Mine effluent	Mine Water
5	Inco	Copper Cliff Treatment plant effluent	Process
		Nolan Creek effluent plant overflow	Storm Water
		Levack Mine effluent	Mine Water
Gold Mines			
6	Noranda Hemlo	Treatment plant effluent	Process
7	Pamour Schumacher	Final effluent at T3 discharge weir	Process
Uranium Mine			
8	Denison	D2 at weir	Process
Iron Ore Mine			
9	Sherman	Weir overflow to Tetapaga River	Process
		Duplicate	
Salt Mine			
10	Canadian Salt	Waste stream composite	Process

SUMMARY

Pre-characterization Data - Conventional Parameters

On a category basis, all conventional parameters that were expected to be present were detected, on a site specific basis, at the effluent sampling points and at the concentrations that were expected. These parameters, on a site specific basis, included one or more of the following:

- pH
- suspended solids
- solvent extractables
- phenols
- ammonia
- copper
- nickel
- lead
- zinc
- cyanide
- chlorides
- arsenic

Small amounts (generally much less than 1 milligram per litre) of parameters not listed above were found, as expected, on a site specific basis and were generally related to ore chemistry. Examples of these parameters include mercury, selenium and molybdenum.

Boron at levels in excess of 100 milligrams per litre was detected at one plant. The source of the boron has not been definitively traced but is thought to be due to the use of borax (sodium tetraborate) or a substance that contains borax at the plant.

Pre-characterization Data - Organics

Group A plants do not manufacture organic compounds. A few of the plants use organic compounds during the processing of ore or concentrate. In most cases, the organics are used only in "starvation" quantities. That is, only a few grams of the organic compounds are used in the processing of each tonne of ore.

Very few organic compounds were detected even though the detection limit was set at 1 part per billion. Compounds detected included the following:

- dibromochloromethane
- chloroform
- trichloroethylene
- trichlorofluoromethane
- methylene chloride
- benzene
- ethylbenzene
- toluene
- aniline

- o-xylene
- m- p-xylene
- 1-methylnapthalene
- 2-methylnapthalene
- napthalene
- phenanthrene
- o-cresol
- p-cresol

Of the above list, only the following appeared in concentrations at or above 10 parts per billion:

• methylene chloride	(two plants: 10 and 16 ppb)
• aniline	(one plant: 230 ppb)
• o-xylene	(one plant: 12 ppb)
• 2-methylnapthalene	(one plant: 15 ppb)
• napthalene	(one plant: 11 ppb)
• o-cresol	(one plant: 15 ppb)
• p-cresol	(one plant: 40 ppb)

The aniline noted above could not be traced to the plant itself. The source of the aniline is possibly municipal sewage treatment sludge that is being discharged to a tailings area by a Regional Municipality.

Terpenes, detected at one plant, were known to have, as their source, the reagent called "pine oil". This reagent is being replaced by methyl amyl alcohol at the plant.

A trace level of OCDD below the Ministry required detection limit of 0.3 nanograms per litre was observed at one plant during the first run. No positives were observed during the second run. One smelter-refinery effluent contained a trace of OCDD at 0.044 nanograms per litre (44 parts per quadrillion).

PCBs were not detected in any samples.

It should be noted that the pre-characterization program that was carried out included all major users of organic compounds in Group A.

PART VII

MISA ADVISORY COMMITTEE REPORT REGARDING THE DRAFT EFFLUENT MONITORING REGULATION FOR THE ONTARIO MINERAL INDUSTRY SECTOR: GROUP A

Ontario
Environment
de l'Environnement

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Toronto (Ontario)
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December 20, 1988

The Honourable Jim Bradley
Minister of the Environment
135 St. Clair Avenue West
Toronto, Ontario
M4V 1P5

Dear Mr. Minister:

The MISA Advisory Committee is pleased to submit the attached Report Regarding the Draft Effluent Monitoring Regulations for the Ontario Mineral Industry "Group A". It is provided in response to your letter of November 18, 1988.

The report has the unanimous support of all MISA Advisory Committee members, including the representative of the Ontario Mineral Industry, Mr. Brian Bell.

The Ministry and Industry are to be commended for working diligently in developing a comprehensive regulation package. The Committee would be pleased to discuss the report with you and your staff at any time.

Respectfully submitted,

for.

Jim MacLaren, Chairman
for the MISA Advisory Committee

ONTARIO MINISTRY OF THE ENVIRONMENT
MUNICIPAL/INDUSTRIAL STRATEGY FOR ABATEMENT

MISA ADVISORY COMMITTEE

REPORT regarding the EFFLUENT MONITORING REGULATIONS FOR THE ONTARIO MINERAL INDUSTRY "GROUP A"

December 1988

Jim MacLaren
Chairman

Toby Vigod
Vice-Chairman

MISA ADVISORY COMMITTEE (MAC) December 1988
REPORT REGARDING
THE DRAFT EFFLUENT MONITORING REGULATIONS for the
ONTARIO MINERAL INDUSTRY "GROUP A"

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1. INTRODUCTION

The Development Document for the Draft Effluent Monitoring Regulation for the Ontario Mineral Industry: Group "A", was provided to the MISA Advisory Committee on November 4, 1988 (Committee Meeting 39) and tabled on that date in advance of Meeting 40 on November 10, 1988. At Meeting 40, Ministry staff, namely Nars Borodczak, MISA Assistant Director, and John Hawley, Senior Sector Specialist, explained the document and answered questions. Mr. Brian Bell, the Mining Sector Representative to the Committee, attended the meeting and provided the industrial perspective to the development of the regulation.

The MISA Advisory Committee had been briefed on the nature of the Mineral Industry and the regulation-development process at previous meetings:

- June 12, 1987 - MAC Meeting 11
  - "Sector overview" briefing provided by OMA
- September 30 to October 2,1987
  - MAC site tour hosted by OMA and participating companies at mines in Sudbury and Timmins; 'Interim report for MISA pre-regulation monitoring program' provided to MAC members by sector representatives.
- May 27, 1988 - MAC Meeting 32
  - presentation of conceptual "Principles document" (May 9) to form the basis of the sector monitoring regulation.

As well, Harvey Clare participated as the MISA Advisory Committee observer on the Sector Joint Technical Committee.

At the November 10 meeting, committee members expressed the concern that one omission in the development document was a suitably detailed description of the pre-regulation monitoring program and an explanation of the use of the results to form the regulatory requirements. At its meeting on November 25, additional tables and explanation were provided to address this concern.

2. ADVICE TO THE MINISTER

The MISA Advisory Committee has reviewed the Development Document and generally supports the regulation. The Joint Technical Committee should be commended for preparing a comprehensive development document.

The MISA Advisory Committee recommends this regulation package be released for public review.

3. REGULATION-SPECIFIC RECOMMENDATIONS

The MISA Advisory Committee recommends that the effluent monitoring regulation include a requirement for the continuing monitoring of a select list of parameters to cover the period which may elapse between effluent monitoring requirements and effluent limits enforcement.

MISA Advisory Committee Report regarding the Draft Effluent Monitori
Regulations for the Ontario Mineral Industry: Group "A"

Submitted, December 6, 1988

MISA ADVISORY COMMITTEE

Jim MacLaren, Chairman

Toby Vigod, Vice-Chairman

Harvey Clare, Member

Isobel Heathcote, Member

Paul Hebert, Member

Don Mackay, Member

Kai Millyard, Member

Brian Bell, Member, representing
the Ontario Mineral Industry Group "A"

PART VIII

MINISTRY OF THE ENVIRONMENT'S RESPONSE TO THE MISA ADVISORY COMMITTEE REPORT

Ontario

Office of the Minister

Ministry of the Environment

135 St. Clair Avenue West
Toronto, Ontario
M4V 1P5
416/323-4359

Mr. J. MacLaren
Chairman
MISA Advisory Committee
Suite 502
112 St. Clair Avenue West
Toronto, Ontario
M4V 1N3

Dear Mr. MacLaren:

I would like to thank you and the members of the MISA Advisory Committee (MAC) for your review of the Draft Effluent Monitoring Regulation for the Ontario Mineral Industry: Group "A" Sector.

I am attaching the Ministry's response to the specific recommendation made by MAC on the Ontario Mineral Industry: Group "A" monitoring regulation.

I hope that the statements made will assist members of the public in reviewing the regulation and providing comments to make it the best regulation possible.

Yours sincerely,

Jim Bradley

Jim Bradley
Minister

Enclosure

RESPONSE TO THE MISA ADVISORY COMMITTEE RECOMMENDATION ON THE ONTARIO MINERAL INDUSTRY: GROUP "A" DRAFT REGULATION

Throughout the regulation development process, the MISA Advisory Committee (MAC) has reviewed selected drafts of the regulation and provided comments to the Joint Industry/Government Technical Committee for the Ontario Mineral Industry: Group "A" Sector (JTC). Many of these comments have been accepted and incorporated into successive versions of the Draft Regulation package. The MAC, after reviewing the penultimate draft, has submitted its final report which is available for public review.

The major recommendation from MAC and the corresponding MOE response is provided as follows:

MAC Recommendation

The MISA Advisory Committee recommends that the effluent monitoring regulation include a requirement for the continuing monitoring of a select list of parameters to cover the period which may elapse between effluent monitoring requirements and effluent limits enforcement.

MOE Response

The draft regulation has been modified to include a requirement for the continuing monitoring of a select list of parameters to cover the period which may elapse between effluent monitoring requirements and effluent limits enforcement.

PART IX

THE PUBLIC REVIEW PERIOD

PART IX THE PUBLIC REVIEW PERIOD

"The Development Document for the Draft Effluent Monitoring Regulation for the Ontario Mineral Industry Sector: Group A" was released for public comment on February 23, 1989. Because the document was not immediately available to all parties, the period for review of the document was extended to April 10, 1989. The document received extensive media coverage (newspapers, radio, television and trade journals) within the Province.

No written comments were received from the general public by the end of the review period in spite of the intensive effort that had been made to involve the general public in the review of the document.

Written comments were received from the Ontario Mining Association and from a limited number of individual companies in the Province.

The Ministry of the Environment used the public review period to update the status of all companies listed in Schedule B of the draft regulation.

GENERAL COMMENTS FROM INDUSTRY

General comments received from the Ontario Mining Association and from individual companies in the Province fell into the following broad areas:

1. comments on the amount of data that will be generated by the regulation;
2. comments on the cost of the program;
3. comments on the ultimate use of the data that will be generated by the regulation, and;
4. comments on potential problems with transportation, sampling and analysis due to the remote nature of some plants and the severe weather that may be encountered during winter months.

Comments on the amount of data, the use of the data and the overall cost of the program to industry were phrased as follows:

- the industry is "concerned that the large number of monitoring points will generate more data than is actually required to meet the goals of the Regulation."

- the industry "seriously questions whether the 20 - 30 million dollar expenditure to gather these data is required in order to meet the objectives. A portion of this money would be better spent on treatment."

- "the Monitoring Regulation will produce a staggering amount of data. The mining industry of Ontario will spend from 20 - 30 million dollars to characterize the effluent from the mines. We are naturally concerned that this is money well spent and that the data itself is meaningful."

The Ministry replied, in writing, to all written comments received.

The general Ministry response to the high stated cost of the Monitoring Regulation was that "this cost, in part, is due to the large number of companies in Group A and, in part, to factors such as the remote locations of some Group A companies. In general, however, on a company by company basis, the cost of the Group A Regulation is comparable to the costs involved in the other major industrial sectors being regulated under the MISA program." In addition, the predicted total costs of the Regulation to the industry is now somewhat less (perhaps 26 per cent less) due to the closure of some plants and the subsequent elimination of sampling points from Schedule B of the draft regulations.

With regard to comments concerning the amount and use of data, the Ministry replied that "the Group A monitoring schedules were set up so that statistically valid results would be achieved whenever and wherever possible. Since 12 data points are necessary in the program to calculate valid monthly loadings, sampling for the parameters that most commonly define Group A effluents is on a "three times per week" basis (12 data points per month). In order to calculate valid yearly loadings, 12 data points are required. In other words, in order to calculate valid yearly loadings, one representative sample per month is required. Normally, sampling on a quarterly basis would not give rise to results that would or could lead to the calculation of valid yearly loadings. However, the Joint Technical Committee recognized that, in general, Group A effluents are held for a varying but substantial length of time (unlike most effluents in other MISA sectors). As a result, it was felt that quarterly sampling of Group A effluents would result in data that would be statistically valid."

The above represents the minimum amount of data per sampling point that is necessary to allow the Ministry to use the data with confidence. The data will be used, along with other relevant statistically valid data, to derive an equitable limits regulation that will be applied to Group A plants. The data will be used in a constructive and reasonable manner for the purposes of the MISA program.

With regard to potential problems that might be encountered by some Group A plants due to severe (winter) weather or remote locations, the Monitoring Regulation was written in a manner that should permit most of these problems to be avoided or minimized. For example:

- Remote Locations: The time available for a plant to report test results is never less than two months and, in many cases, is three months.

- Varying Work Schedules: The times of the day and the days on which samples are to be taken are not specified. Sampling on a "three times per week" basis, for example, can take place on any day of the week as long as a minimum interval between samples is maintained. This allows samples to be taken when transportation and staff are available and when sampling conditions are acceptable.

- Poor Weather: When sampling or flow measurement become dangerous due to poor weather, only reporting of the situation is required. However, such situations are largely avoided by the flexibility provided in the sampling requirements as noted above.

SPECIFIC COMMENTS FROM INDUSTRY

A number of specific comments were received from the Ontario Mining Association and from industry that related to technical aspects of the Monitoring Regulation. The results of these comments as they impact on the Monitoring Regulation are noted below:

1. Specific Conductance: It was noted that while specific conductance (Analytical Test Group 7) had been replaced by a "dissolved solids" requirement within the regulation, a requirement for specific conductance still remained within the quarterly sampling requirements. This has been corrected and, as a result, specific conductance has been eliminated from the quarterly sampling requirements.

2. M5 Iron and M7 Uranium: In the draft development document, a duplicate requirement for the quarterly monitoring of iron and uranium occurred. Monitoring for iron and uranium on a quarterly basis was required both in M5, M7 and in Analytical Test Group 29. The M5 and M7 quarterly requirements for these substances have been dropped.

3. Under "Quality Control Monitoring", a phrase that originally read "one travelling spiked blank sample for each sample collected under section 7 for analysis for parameters in analytical test groups 16 to 21" has been corrected to read "analytical test groups 16 to 20, 23 and 27".

4. Under "Reporting" (13-3), the phrase "and under subsection 4(12) of the General Regulation" has been removed. It had no relevance to the Group A regulation.

5. Under "Timing" (14-3), subsection 3(4) was missed and is now included.

CHANGES MADE TO SCHEDULE B (LIST OF PLANTS) OF THE DRAFT EFFLUENT MONITORING REGULATION

During the public review period, Schedule B (the list of plants) of the Effluent Monitoring Regulation was updated (now Schedule A). This was necessary in order to reflect the many changes that had occurred within the Ontario Mineral Industry over the previous 12 months.

In order for a plant to appear on Schedule A, the plant must discharge an average total effluent volume of 50,000 litres or more per day. In the early stages of the preparation of the regulation, a plant was on the formerly called Schedule B if the plant had a Ministry of the Environment Permit to Take Water (a Permit was needed if more than 50,000 litres per day of water were to be taken). However, the Joint Technical Committee came to realize that several plants in the province held Permits to Take Water but did not actually take water or took less than the minimum amount for which a Permit is required. Since the Monitoring Regulation is only concerned with documenting the chemical nature of significant flows of industrial wastewater, the criteria for the inclusion of a plant on Schedule B (now Schedule A) became the fact that 50,000 litres per day of effluent was being discharged rather than the fact that a plant held a Permit to Take Water. Technically speaking, the average effluent volume of a plant

is based on the average effluent volume being discharged by a plant over any 30 representative operating days in any quarter (3 month period).

While a plant that discharges 50,000 litres per day or more is subject to the Monitoring Regulation, some plants are given Exploration or Development status. This status exempts a plant from almost all aspects of the Regulation. A plant with this status only has to report monitoring or flow data requirements that are already on existing Ministry of the Environment Certificates of Approval or Control Orders. A plant is given Exploration or Development status if and only if all conditions outlined under the definition of "exploration or development property" are met.

A plant should not be listed in Schedule A when there is a documented reasonable expectation that the plant will close permanently before or during the sampling life of the Monitoring Regulation. Similarly, plants commencing production during the sampling life of the Monitoring Regulation will not be added to Schedule A. The reason for the above is that all data being generated by the regulation must be statistically valid and a full data set (spring, summer, fall and winter) is normally required. Partial data sets are acceptable when a plant is in full operation over the life of the regulation but discharges effluents on a seasonal basis.

Since all major active properties are being sampled under the MISA program using identical protocols and techniques, data from one plant cannot be extrapolated to another existing plant since that plant will have already been sampled under identical circumstances. As a result, data collected at a plant will only be specifically applicable to that plant. All complete data sets will be pooled so that industry-wide averages and conditions can be calculated and noted.

The basic criteria for the acceptance of data by the MISA office for use in the limits regulation discussions is that normal plant operations existed during the sampling period. "Normal" includes strikes, vacation shutdowns and shutdowns for normal maintenance. In essence, the program is documenting the detailed chemical nature of representative effluents within Group A over a 12 month period.

With regard to all of the above, the following changes were made to Schedule A (formerly Schedule B) of the Draft Effluent Monitoring Regulation:

PLANT	CHANGE
Mattabi Mines Limited and Noranda Lyon Lake Division	- deleted - property to close during life of regulation due to lack of ore - if additional ore found to keep mill running, will again be added to list
Detour Lake Mines Limited	- name change - to Placer-Dome, Detour Lake Mine
Ateba Mines Limited Beardmore, Ontario	- EXP/DEV status
Renabie Gold Mines Limited	- additional minewater sampling point

Emerald Lake Resources Golden Rose	-	deleted inactive
Canamax Resources Incorporated Matheson East Zone and Clavos	-	deleted inactive
St. Joe Canada Limited Muskegsagagen Lake	-	name change to Bond Gold Canada Limited
McFinley Red Lake Mines Limited	-	EXP/DEV status
Muscocho Explorations Limited Magnacon Mine	-	effluent category changed from minewater effluent to process effluent
Muscocho Explorations Limited Jerome Mine	-	EXP/DEV status
Citadel Gold Mines Incorporated McMurray Township	-	effluent category changed from minewater effluent to process effluent
Granges Exploration Limited Mishibishu Lake	-	EXP/DEV status
Tandem Resources/Storimin Exploration	-	deleted inactive
Sandy K Mines Limited Gowganda	-	deleted inactive
Diepdaume Mines Limited Timmins	-	deleted inactive
Chesbar Resources Incorporated Chester Township	-	added to list
Belmoral Mines Limited Broulan Reef	-	EXP/DEV status
Belmoral Mines Limited Vedron	-	deleted inactive
Associated Porcupine Mines Limited Paymaster	-	added to list
Eastmaque Gold Mines Limited Kirkland Lake	-	added to list

Getty Resources Davidson-Tisdale	deleted inactive
St. Andrew Gold Fields Taylor Township	deleted inactive
Wabigoon Development Incorporated Hunter Mine	deleted inactive
Maude Lake Mine Carr Township	deleted inactive
Victoria Porcupine Resources Naybob	deleted inactive
Madeleine Mines Limited/ Boise Minerals Incorporated Scramble Mine	deleted inactive
Orofino Resources Limited Silk Township	deleted inactive
Dofasco Incorporated Adams Mine Sherman Mine	deleted to close permanently during life of regulation
Agnico-Eagle Mines Limited Penn Mill Langis Mine Beaver-Timiskaming Mine Refinery Silver Century Decline	deleted inactive
Agnico-Eagle Mines Limited Penna Mine	added to list
Hellens-Eplett Mining Incorporated Cobalt	deleted inactive
McFinley Red Lake Mines Limited Bateman Township	deleted inactive
Golden Shield Resources Limited Virginiatown	inactive
Falconbridge Limited Owl Creek Mine Timmins	production terminated EXP/DEV status

Giant Yellowknife Mines Limited
Ross Mine
Timmins

- EXP/DEV status