Fonds Restor-Action Nunavik

The ***Fonds Restor-Action Nunavik*** *has been created to contribute to the restoration of abandoned mining exploration sites in Northern Quebec (Nunavik Region), in cooperation with the provincial government and local Inuit participation.*

The ***Fonds Restor-Action Nunavik*** *brings together many mining and exploration companies currently active in Quebec, all working cooperatively towards the common purpose of the cleanup and restoration of abandoned mining exploration sites. Participants are cognizant that earlier restoration conventions were not in accordance with modern and responsible regulations. The new generation of mining and exploration companies wishes to demonstrate that social and environmental responsibilities are priorities and prove that they have adopted leading environmental management practices, and have taken concrete actions to remediate selected sites and ensure proper compliance during ongoing and future activities.*

It is hoped that this initiative, will inspire others to act in a similarly proactive and responsible manner in other jurisdictions. It is also hoped that through promotion of environmentally responsible practices the ***Fonds Restor-Action Nunavik*** *will demonstrate how Quebec's mining and exploration industries act as proactive leaders.*

The Fonds Restor-Action Nunavik
March 19, 2007

HISTORY AND BACKGROUND OF ABANDONED MINING EXPLORATION SITES

From the 1940's to 1980's, extensive mining exploration programs were carried out in Northern Quebec above the 55th parallel, especially in the Labrador and Ungava Troughs. Exploration was initiated in the Labrador Trough, from Schefferville, near Labrador, to Kangirsuk, a village located on the western coast of Ungava Bay. In the 1950's, mining exploration activities were extended to the Ungava Trough, oriented east-west from Kangiqsujuaq, along Ungava Bay, to Hudson Bay. This prospecting led to the opening of the Asbestos Hills and Raglan mines. A third smaller region, located along the Hudson Bay coast between, Umiujaq and Juujjuaraakip-Whapmagoostui was also explored for its mining potential, but for a more limited period of time.

Before 1976, some companies cleaned up the sites when they left, while others abandoned them as is, leaving buildings, motors, core trays, drilling and heavy equipment (generators, compressors, bulldozers, etc.), petroleum tanks and barrels (some of which still contain residue), batteries, transformers, chemical products, salts and acids. Today it is clear that the vicinities of these sites have become polluted; consequently having dangerous impacts upon wildlife, water and ultimately the diet of the Nunavik people.

On November 11, 1975, the signature of the *James Bay and Northern Québec Agreement (JBNQA) (Québec, 1997)*, followed by the signature of the *Northeastern Quebec Agreement (NEQA)* on January 31, 1978 (Canada, 1983), provided environmental regulations regarding development project including mining activities. Consequently, after 1976, mining companies were subject to more strict rules, obliging them to declare their activities to the Ministère des Ressources naturelles du Québec (MRNQ) and to remediate sites upon abandoning camps.

On March 9, 1995, the *Mining Act* (*Loi sur les mine)* was adopted by the Québec government. It affects mining exploration and exploitation activities. The provisions concerning the remedial measures of the sites include Articles 232.1 through 232.11. The latter specifies that the Minister may decide to go beyond the norms stipulated by the preceding articles and, therefore, "enjoin" the companies to clean up sites retroactively, with no time limit. However, as companies did not report their activities to MRNQ before 1976, it is impossible to identify those responsible for most exploration campaigns conducted in Nunavik before then (Duhaime and Comtois 2002 – see Annexe 1).

In the early 1990's, Inuit communities began to notice possible environmental contamination. In 1997, more than 100 litres of highly toxic concentrated acid, generally used for chemical exploration, were discovered improperly stored in an area accessible to the local population, 10 km south of the Katinniq mine. In 2000, abandoned dynamite was found close to Tasiujaq (Duhaime and Comtois 2002).

The presence of these materials left on the land is a great concern to the Inuit and Naskapi peoples. The fragility of arctic ecosystems, the threat posed by melting permafrost (destabilizing mining structures and tailings storage), and the immediate and long lasting effects to the food chain all pose direct threats to public and environmental health.

By 1997, the Kativik Regional Government and Makivik initiated community-oriented identification and remediation of some sites perceived as dangerous by the communities. However, given the large number of sites, the amount of debris and the threat some sites pose to the environment, it became clear that a more organized and systematic approach would be necessary. To this end, a four-phase programme was designed. The first phase consisted of a pilot project to test various methods to best inventory the abandoned mining exploration sites. The second phase was an inventory of abandoned mining exploration sites in the region North of the 55th parallel. The third phase was to evaluate these sites in order to determine the size and the hazards that each site posed to the ecosystem and to the users of the land. The fourth and final stage, which is the purpose of this proposal, is to carry out the remedial measures of the identified sites and to complete the evaluation undertaken in Phase 3.

In the summer of 2000, the combined results of the interviews conducted in 14 Inuit and Naskapi communities, along with a consultation of existing MRNQ documentation, revealed the possible existence of 595 abandoned mining exploration sites in Nunavik, most of them located in the Labrador and Ungava Troughs.

Beginning in 2001, a two-year project to assess and characterize the abandoned mining exploration sites was initiated. These sites were classified according to their content, contamination, and the risk they pose to the environment. Classification was based on a list of criteria adapted form the *National Classification System for Contaminated Sites* including the assessment of the quantity of material and equipment present at the sites, and the soil and surface water contamination.

Of the 193 assessed sites, 90 were confirmed as abandoned mining exploration sites. Of the 90, 18 sites were classified as “major”, 27 as “intermediate” and 45 as “minor”. Based on the ratio of 90 sites containing abandoned residual mining material out of the sample of 193 visited, it is projected that there is a total of 277 out of the 595 potential abandoned mining explorations sites in Nunavik: 25 major, 95 intermediated, and 157 minor.

Of the 90 abandoned exploration mining sites assessed in 2003, only one or two are currently being remediated. Further, basic scientific information and current research in the North are insufficient to fully predict the impacts of abandoned mining exploration sites to Nordic environments or to develop comprehensive technical solutions needed to address them (Office of the Auditor General, 2002). Thus, the potential for abandoned mining exploration sites to pollute underlying groundwater is present, and the safety of both public health and the surrounding ecosystem is at risk for the major sites. For these reasons, it is imperative to take action to clean up these sites.

The mining industry recognizes that the issues of abandoned mining exploration sites need to be resolved and will ascertain that appropriate project management protocols are implemented to ensure that the effectiveness and cost efficiency of clean up programs are measured, monitored and reported to the funding organizations.

FUND-RAISING

The Fonds Restor-Action is in the process of approaching as many mining companies as possible in order to raise enough money to achieve its main goal of cleaning at least the

25 major sites. Should there be any money left after remediation of major sites, cleaning of intermediate sites will be undertaken and so on. Each dollar will be totally committed to remediation of abandoned mining exploration sites.

We are also seeking the implication of both governments (federal and provincial) and hope to get from each of them at least $1 for each dollar spent by the mining industry. The Quebec government has already confirmed its participation to the fund and will match $1 to $3 for each dollar spent by the mining industry. The Kativik Regional Government will also participate by offering free services.

REMEDIAL MEASURES

It is proposed that the sites be cleaned up systematically by (1) removing all hazardous materials, petroleum, hydrocarbons, and chemical; (2) conducting on-site burns of all combustible, non-toxic debris; (3) recovering of scrap metal for recycling where possible; and (4) breaking down and carrying out of remaining debris to the nearest municipal disposal sites. The objective is to return the environment to its original condition by taking necessary actions to manage a safe and effective clean-up of abandoned mining sites.

CONCLUSION

The Fonds Restor-Action Nunavik has been created to ensure the commitment of the mining industry in restoring the environment by ensuring that remedial measures are taken. We all are conscious of the colossal amount of work to be done but we believe that in this direction together we can advance ideas and proposals that will help achieving our main goal of creating a safe and healthy environment for the Native communities and ensuring proper compliance with established rules by territory users during the ongoing and future mining activities.

An Inventory of Abandoned Mining Exploration Sites in Nunavik

Gérard Duhaime
Robert Comtois
Nick Bernard

Collection
RECHERCHE EN LIGNE

UNIVERSITÉ LAVAL

La **Chaire de recherche du Canada sur la condition autochtone comparée** est affiliée au Centre interuniversitaire d'études et de recherches autochtones (CIÉRA) et à la Faculté des sciences sociales de l'Université Laval.

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AN INVENTORY OF
ABANDONED MINING EXPLORATION SITES
IN NUNAVIK

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ABSTRACT

During the 1950s the Québec territory situated north of 55th parallel was the site of important mining exploration campaigns, following the discovery of major deposits. Prior to 1976, many companies did not clean the abandoned site and left a wide array of exploration equipment and utilities for the workers behind them. The objective of this research is to determine the level of importance of the problem of abandoned mining exploration sites in Nunavik. After having tested several methods among which aerial survey and remote sensing, this research is methodologically based on a combination of two techniques : interviews with key informants using topographical maps, and the data from the corpus on mining deposits from government sources. In Nunavik, a total of 595 mining exploration sites that contain equipment, dwellings, vehicles, or other abandoned items were identified. The Inuit and the Naskapi informants identified a total of 445 potential sites. They pointed a total of 379 sites associated directly with mining exploration. The overall number of sites, and the available information about the material they contain is a matter of concerns for Nunavik residents, and for government authorities of all levels. With the inventory, it is now possible to work with a better idea of the scale of the problem of abandoned mining exploration sites. Clearly, with hundreds of sites, this question can no longer be taken as a side problem.

KEYWORDS

Northern Territory, Nunavik, Inuit, Naskapi, Mining exploration, Abandoned sites, Key informants, Remote sensing, Aerial Survey, Environmental Risk

RÉSUMÉ

Au cours des années 1950, le territoire situé au nord du 55e parallèle au Québec a été le théâtre d'importantes campagnes d'exploration minière, à la suite de la découverte de gisements majeurs. Avant 1976, plusieurs entreprises ne nettoyaient pas les sites qu'elles abandonnaient, laissant derrière elles une grande variété d'équipements utilisés pour l'exploration et l'hébergement des travailleurs. L'objectif de cette recherche est de déterminer le nombre des sites abandonnés d'exploration minière au Nunavik. Après avoir expérimenté plusieurs méthodes dont le survol aérien et l'imagerie satellitaire, cette recherche combine les entrevues avec des informateurs clés utilisant des cartes topographiques, ainsi que les données de source gouvernementale sur les gisements minéralisés. Au Nunavik, 595 sites abandonnés d'exploration minière ont été identifiés, contenant de l'équipement, des abris, des véhicules et autres. Les informateurs Inuit et les Naskapis ont identifiés un total de 445 sites potentiels, dont 379 sont directement associés à l'exploration minière. Le nombre des sites identifiés, et les informations disponibles à propos des équipements et matériaux qu'ils recèlent, sont une source d'inquiétude pour les résidants du Nunavik et les autorités gouvernementales. Les résultats de cette recherche permettent d'obtenir un ordre de grandeur du problème des sites d'exploration minière, qui ne peut plus être négligé.

MOTS CLÉS

Territoire nordique, Nunavik, Inuit, Naskapi, exploration minière, sites abandonnés, informateur clé, imagerie satellite, survol aérien, risque environnemental.

PROBLEM

Mining exploration and exploitation have been a major endogenous activities in the Canadian Arctic for more than 100 years, starting with the Gold Rush (Bone, 1992; Coates, 1985; Hamelin, 1978). Successful explorations found some of the largest deposits in the world, and later on, gave birth to some of the large-scale mining plans. Built during an age without many concerns for environment, some of them generated large environment problem, such as the one million tonnes of uncontained mercury-laden tailings of the former Discovery Mines Ltd (gold – shut down in 1968) (Gibson, 1999), and the 237,000 metric tonnes of arsenic trioxide powder mixed in the tailings of the Giant Mines (gold – Royal Oaks) that it is now closed down without workable solution to get rid of that toxic material (SRK Consulting, 2002; INAC, 2002a; Knight *et al*., 1993)[1]. In Nunavik, the northernmost region of the Province of Québec, there were few industrial mines in operation, with the exception of the Purtuniq Mine (asbestos – closed down in 1983) and the Katinik Mine (nickel-copper – Raglan Mining Corp.) which has been extracting since 1997, both located in the Ungava Trough. However, exploration companies have been very active since the second half of the 20th century (Hamelin, 1953). During the 1950s the Québec territory situated north of the 55th parallel was the site of important mining exploration campaigns, following the discovery of major deposits in the Ungava Trough. Prior to 1976, mining companies were not legally required to clean up exploration sites. Mainly due to the high costs of transportation, many companies did not clean the abandoned site and left a wide array of exploration equipment and utilities for the workers behind them. Nowadays, it cannot be legally possible to explore or exploit mineral deposits in the Arctic in the same way that was authorised by the laissez-faire regime that prevailed (Myers, 2001; Charest, 1995; Udd and Keen, 1999). However in Nunavik, exploration activities are not regulated through the environmental protection regime put in place by the James Bay and Northern Québec Agreement of 1975, that regulates other developments, including mineral exploitation (JBNQA, 1997). In more than one way, remains of the past are still visible throughout the region.

Over the years, the local populations using the territory have discovered various equipment in numerous abandoned sites when travelling between their hunting and fishing areas. Inuit and Naskapi hunters reported different equipment on the sites, from cans of food to modular laboratories, heavy machinery and equipment for the storage and the transportation of oil products. From the mid-1990s, the Inuit population became increasingly concerned about the presence of abandoned chemical and oil wastes: the storage conditions have been deteriorated and the containers were no longer securely sealed. Hunters noticed on a regular basis various harmful environmental problems: the death of foxes apparently resulting from the consumption of various rotting food products, highly toxic chemical products near the water stream and close to some lakes and rivers, among others. In the absence of a comprehensive inventory of those sites over the territory, some large-scale environmental impacts are expected, giving rise to great concerns among the populations using these lands (Barrett, 2002; Barrett and Lepage, 1998).

The objective of this research is to determine the level of importance of the problem of abandoned mining exploration sites in Nunavik. More precisely, it aims at three phases: 1) determining the number of abandoned mining exploration sites, 2) identifying their exact location with their geographical co-ordinates, and 3) identifying the sites prior to December 31st 1975 and the ones that were explored after this date. The research was started because, at the time, no one was able to give even a proxy number for such sites; therefore, no one was able to figure out the extent of the environment problem, and the threat it posed to human and natural environment health. It is worth to notice that it was funded, at first, by a regional environmental committee (the Kativik Environmental Advisory Committee) set up following the JBNQA, and mainly by a private foundation (EJLB Foundation), when both the Canadian and Québec governments had no program whatsoever to support it. As we will mention later on, this attitude changed.

METHOD

Pilot Testing

The territory to be surveyed, now named Nunavik, is vast with its 500,000 km^2 (Map 1). Locating such equipment is therefore a difficult task. No method is known to be as both efficient and cost-effective in regard to the large size of that territory. In order to select a relevant method, or a combination of methods, a pilot project was first undertaken.

An exploration of the archives of the Ministère des Ressources naturelles du Québec (Ministry of Natural Resources, or MRN) turned out to be unsatisfactory,

[1] In his lightening recollections, Jack Grainge (1999) explains concerns about arsenic from Con, Negus and Giant mines in the environment of Yellowknife as early as 1948.

one factor being the excessive amount of time required to put them together, not to speak about analysing them. This has lead to the conclusion that there are no valid methods based on archives research that are appropriate for the problem of identifying the potential abandoned mining exploration sites. Therefore, other methods were tested. Three survey methods were tested in a pilot project conducted in the Kangiqsujuaq area in a 50 by 50 km (2500 km^2) hinterland area. These methods are: (i) interviews with key informants, (ii) aerial survey, and (iii) remote sensing.

The 50 by 50 km zone in the Kangiqsujuaq area was chosen for two reasons: firstly, it is well known that this area contains several abandoned mining exploration sites as the local residents have reported numerous abandoned sites and equipment; secondly, its location in the Ungava Trough is relevant as exploration works in this area were concentrated prior to 1975. Moreover, this delimitation is the minimal format for an image RADARSAT (see below).

As a first tested method, a researcher spent one week in June 1999 in the area for interviewing key informants in collaboration with the Corporation of the Northern Village of Kangiqsujuaq. The goal was to map sites known to residents of this community. In addition to validating the pilot area, the interviews allowed the collection of information on the knowledge acquired during site cleanup carried out to date. Interviews were then conducted with key informants who had relevant knowledge of the studied area. This method allowed the localisation of 34 sites that were directly related to the abandonment of exploration equipment.

A second method was tested, using aerial surveys for identifying potential abandoned sites. The recognition of sites by aerial survey consisted of a series of flights aboard a seaplane, following parallel and equidistant flight lines one kilometre apart and flying at an altitude of 300 metres at the speed of 100 miles per hour. The observers posted at the backside windows were in charge of taking photographs, writing down the co-ordinates of the sites as they were picked up and displayed by the Global Positioning System (GPS), and briefly describing the abandoned equipment. Two 35mm cameras were used for the photography, one of which was equipped with a 38-140mm zoom lens. The two observers in the front side windows, including the pilot, ensured constant observation of the ground below. The first ground observation of a site would allow the pilot to slow down and begin the necessary turns in order to pick out the geographical co-ordinates of the site with the GPS as well as to take photographs. Each person, equipped with binoculars, had to observe and scrutinise the surface for a distance of 500 metres from the side of the plane. In all, 55 records of site position were completed during the aerial surveys.

As a third method, remote sensing was then tested. The verification of the potential of remote sensing took advantage of SPOT PLA (precision of ten metres, 1997) and LANDSAT (precision of thirty metres, 1995) optical satellite images, as well as summer and winter RADARSAT (precision of eight metres, 1999) radar satellite images. All images are of medium resolution. The high-resolution optical images, with a precision of one to two metres, were simulated using aerial photographs; simulation was a necessary procedure since there was no available data with such precision in 1999 for that area of the Nunavik territory. The objective of this test was an attempt to establish a clear correspondence between the tested satellite data and the mining exploration equipment. If positive, the results must allow the identification of equipment on abandoned sites without any further field-based verification being necessary to validate the results.

The test proved that no medium-resolution satellite data could be associated with any piece of equipment identified during the fieldwork conducted in 1999. The simulation of high-resolution images did allow for the association of shapes to pieces of equipment larger than one to two square metres: buildings of different sizes and transportation equipment are easily distinguished. However, the aerial photographs used to simulate these satellite data were taken outside the pilot zone, which excludes any possibility of furthering the analysis of a correspondence between the field data (not available) and the simulated satellite data. The availability of these field data, for example, could have led to better results concerning the recognition of small pieces of equipment such as barrels of hydrocarbons and pipes used for drilling, which are the most frequently observed on the ground.

In sum, the techniques of interviews with key informants and aerial surveys allowed for the discovery and count of various pieces of equipment on the territory. However, an undetermined number of sites were missed using these two techniques given the fact that multiple sites are composed of rusted drums that tend to be indistinguishable in the rust-coloured environment of the Arctic tundra. On site, fieldwork proved that, for certain sites, it is necessary to be quite close to notice the heap of drums.

In the testing zone of the project, the combination of interviews with topographical maps and aerial surveys of the area allow for the identification of 47 abandoned

mining exploration sites. However, despite its efficiency, aerial survey technique was put aside due to its prohibitive costs.

During the pilot testing, the discovery at the MNR of the *Catalogue des gîtes minéraux du Québec* (Avramtchev, 1982a, 1982c, 1990a), and the *Carte des gîtes mineraux du Québec* (Avramtchev, 1982b, 1982d, 1990b) gave new perspectives as to the successful completion of the inventory. The most important sites that were identified during the aerial survey were also identified into two out of three categories of exploration sites within the pilot zone: prospect and deposit. These two fundamental sources, published in 1982 (Ungava Trough and Hudson Bay regions) and in 1990 (Labrador Trough region) form a whole that is available for each of the regions of Nunavik. Consequently the chosen method combines two techniques that proved their efficiency: the combination of interviews with key informants and the data from the corpus on mining deposits of the MRN offers great potential at the least cost to complete the inventory (Duhaime and Comtois, 2000).

The inventory

All the Inuit and Naskapi municipalities were visited between June and October 2000. Preparatory meetings aimed at presenting the results of the pilot project carried out in 1999 as well as to raise awareness of the participants about the presence of various mining exploration sites, especially the equipment, products and typical wastes. This intervention was followed by interviews with key informants who were asked to indicate and to detail the abandoned sites they know on topographical maps with the scales of 1:50 000 and 1:250 000 from the Department of Energy, Mines and Resources Canada (DEMR). The recording of the observations of the equipment emphasises the enumeration (quantity, volume, surface area, distance), the nature (types of materials or products) and the condition of preservation. The descriptive categories that were used are: buildings (structure), dwelling (housing), drums, gas tanks and bottles, scrap (other than barrels: e.g. vehicles), solid waste and dry equipment, distance from sensitive areas (e.g. lakes, rivers, stream), and presence of contaminated soils. As it has been agreed with the informants at the beginning of the interviews, the delimitation of a given site includes all pieces of equipment which an adult can walk in under five minutes on this terrain; that is, all pieces of equipment located under 300 metres (1000 feet) from each other. Pieces of equipment located at a greater distance are considered to be part of a separate site.

Location of potential sites by the key informants

A warning from the key informants came regularly along with the plotting of the potential sites on maps: except for the sites surrounding the villages, they mentioned the regular presence of the snow cover when they made their observation, which restricts their ability to accurately specify the location of potential sites and what it contains. Many informants began the interviews by giving this warning. The usage of topographical maps of a scale of 1:50 000 was privileged although some informants preferred to use maps with a scale of 1:250 000 where they found more familiar landmarks. Locations were then transposed on 1:50 000 maps when available.

Location of potential sites through the MRN data

During the pilot project in 1999, the geographical co-ordinates of the sites corresponding to the mining deposits collected from the *Carte des gîtes minéraux du Québec – Région de la Fosse de l'Ungava* (Map of the mineral sites – Ungava Trough Region) with a scale of 1:250 000 were transposed on maps that were specifically created for that purpose and included in the research report (Duhaime and Comtois, 2000).

The success of the pilot project and the setting up of the inventory in 2000 furthered a greater involvement of the MRN that collaborated to define more adequately the data to be collected. It also contributed to introduce the researchers to the staff of the *Service de la géoinformation* (Geoinformation Service) who is in charge of the archives and documents associated with the Québec mining activities. The available data on the mining deposits discovered in Québec are nowadays integrated into a computerised geomining information system, called SIGÉOM, that integrates the quasi-totality of databases. Since the research emphasises on the period prior to 1976, the use of a former database has been necessary. This database is called COGÎTE. The data obtained from the *Service de la géoinformation* constitute a corpus regrouping all of the index cards on mining deposits that are codified in the *Catalogue des gîtes miniers du Québec* (Québec Mineral Sites Catalog), e.g. all types – showing, prospect and deposit – of documentary data. Geographic co-ordinates included in COGÎTE files are precise,

which eliminates margin of error due to inscription upon a reduced-scale map, as noticed for several sites appearing on the *Cartes des gîtes minéraux du Québec.*

Determining the potential sites

The year 1976 is a turning point in the history of mining exploration. Indeed, the exploration works that were launched after 1976 did not have the same scope as the works of the period between 1940 and 1976. In addition, since the sites opened after that period have been submitted to more severe regulations, they are considered separately from the ones from the 1940s until the 1960s. Given the *Mining Act* (QRSR Ch.M-13.1) current provisions on mining exploration, and the exploitation as well, the validation of a potential site indicated by an informant, or through the MRN data, can lead to one of the three following situations: (i) the cleaning of the place in accordance with a valid license, (ii) the cleaning of the place in accordance with a license delivered during the period prior to the adoption of the bill, which is retroactively enforceable back to 1960 if the liable company is still in operation and if the minister "enjoins" the company to do so, or (iii) the abandoned equipment do not have a liable owner, or are "orphan", and the political authorities have to take the required measures. Although this transition date restricted the efforts to collect data for a specific period, it did not prevent the informants to provide indications on the equipment abandoned after that date, no matter the liable industry. However, it appears that only a few cases can be attributed to the mining industry for the period after 1976.

The identification by an informant of an enterprise, a governmental agency, or an organisation associated with a site indicated is rare. However, the identification of the fields of activity of the enterprises that abandoned their equipment is completed and reliable, as some informants from the local populations had been working, at different levels and at different times, for the various industries present on the territory. This is why, in close collaboration with the local populations' will of clearing up equipment and dangerous products for the environment, it was important to offer them the possibility of locating the abandoned equipment by the other industries. Many informants grabbed the chance to do so, although all the sites of other companies or organisations had not systematically been pinpointed. Nonetheless, according to informants observations, those sites are plotted in maps available in the final report: e.g. Hydro-Québec, aboriginal outfitters, non-aboriginal outfitters, Canadian Departments, Québec Departments and unknown sources.

The description of the potential sites obtained from the key informants suggests typical functions of an exploration campaign such as: landing and take-off possibilities for air supply, beach, fuel depot, camps and dwelling, drilling site, equipment depot, maintenance area of vehicles, transportation infrastructures. However, even if some information can be gathered regarding the composition of an exploration site, it is impossible to identify the abandoned equipment and products on the sole assumption that there is an area devoted to this and to that. Reorganisation of exploration camps, and the moves on the territory in search of new drilling sites are likely to have spread the equipment and products all over and beyond a given surface area identified on maps.

The inventory also takes into account two categories used in the *Catalogue des gîtes miniers du Québec*: the *prospect* gave rise to works allowing to evaluate some dimensional parameters, without an evaluation of the tonnage; the *deposit* has been the object of works that permitted an evaluation of the tonnage. The *Catalogue des gîtes miniers du Québec* uses another category: the *showing*, which has never been the object of any kind of work.

The presence of dangerous materials (oil products, gas, chemical products) and the variety of equipment would probably constitute indicators of the extent of the works conducted on the sites. For example, gas tanks and chemical products were observed in 1999 in sites where camps were established for a long lasting period of exploration, e.g. deposit and prospect. However, the informants warned the future users about the data provided by them; the equipment was often observed during the winter, with the presence of a layer of snow. Therefore, the enumeration and the scattering of this equipment have to be validated during the summer season.

The retained classification for the potential sites observed by the informants emphasises (i) the nature of equipment, defined in terms of items and products, as well as (ii) the variety observed on the sites. Seven categories were set up for describing the potential sites. In Category 1, there is a group of sites characterised by the presence of a *unique item of product* (e.g. sites with only oil barrels). Sites characterised by the presence of a *combination of items or products* were classified in the Categories 2 to 7, with 2 to 7 pinpointed items. In addition, according to the data of the pilot project of 1999, the higher is the combination of items in a given

site, the more important is the scattering area observed at this site.

The presentation of the results in the following pages gives priority to the items and products, whether their presence is unique or combined with other elements (item or product) in accordance to their degree of potential impact on the environment and human beings. The following elements are characterised by a high degree of potential impact: chemical products, gas products, and oil products. Since the extension of the duration of the works increases the probability of finding those items and products at the site, this also involved that other equipment used for a lengthy duration will be found as well: buildings (shed, workshop, drilling cabin) and dwellings. Finally, a bloc of information is classified under the headings scrap (pieces of metal, tractors, vehicles) and solid waste (non-metallic debris, wood, plastic).

RESULTS

The results come from the compilation and the analysis of the data obtained through the interviews with the informants and from the corpus on the mining deposit index cards drawn from the MRN's COGÎTE database. A listing was made to facilitate the work of the users of the inventory: (i) Key informants: numbered classification of the identified sites by the informants in accordance to the municipality, and classification in accordance to the observed types of equipment; (ii) Mining deposits (MRN): Classification of the National Topographic System Numbering of Canada. Initially designed to assess the surroundings of the northern villages of Nunavik, the project was extended to the Naskapi village of Kawawachikamach as well, regarding the abandoned exploration sites of the Labrador Trough and the George River region (Map 1).

In Nunavik, all in all, a total of 661 potential sites were identified, among which 66 sites contain abandoned equipment not related to mining exploration, such as camp sites or fuel depot, outfitting establishment, mobile camp for sport hunting (Table 2). There are 595 mining exploration sites that contain equipment, dwellings, vehicles, or other abandoned items that have been left during the mining exploration works conducted before 1976. Two thirds of these sites are located in the Labrador Trough and George River regions, while one third are located in the Ungava Trough and the Hudson Bay regions. The Inuit and the Naskapi informants identified a total of 445 potential sites. They pointed a total of 379 sites associated directly with mining exploration conducted before 1976. The sites identified by the informants reveal a more or less large quantity and complexity of equipment and materials. As a matter of fact, more than half of the sites identified by the informants count only one item (Table 3). The general results can be quoted as following: according to the informants, there are few sites with dangerous products while there are many sites presumed with no or not much dangerous products; and there are few sites with a large variety of equipment (combination of items or products) while there are numerous sites with few equipment items left behind.

The following findings are based on the data displayed by category and by region in detailing it according to the villages. Three general findings emerge from the compilation presented in Table 3: (1) more than half (52%) of the potential sites indicated by informants are characterised by the presence of a unique product or item or equipment, that is to say 196 sites out of 379 potential abandoned sites in both Ungava Trough and Labrador Trough regions. (2) The presence of standard drums (45 gallons) for the transportation of oil products has been pointed out in 80% of the potential sites indicated by the informants. (3) The cleanup works undertaken by the municipal corporations did affect only a minimal number, that is to say less than 10% of the potential sites in Nunavik[2].

Potential sites per category

Category 1: Sites with a unique observed equipment

It appears that a total of 196 sites are characterised by the presence of one item of a same type of equipment in Nunavik. However, the number of units of equipment from one site to another is still impossible to determine. Those 196 sites with abandoned equipment are attributed to the mining exploration as identified by the informants. From this total, there are 126 sites that contain uniquely standard drums for the transportation of oil products, whereas 12 sites have estimated residues which quantity has to be validated on the spot.

There are 8 sites containing chemical products, among which 5 were identified in the Ungava Trough. The most important of those sites covers a part of the upper course of the Puvirnituq River, where sediments constituting its bed are considered as potentially toxic on a distance of several kilometres. The community points out the presence of the former underground exploration site called Raglan around the source of the

[2] A detailed accounts of the sites can be found in the Research Report (Duhaime and Comtois, 2002).

Puvirnituq River. Informants also pointed out the presence of drums containing or having contained brine of calcium chloride in four sites. Like the informants from Ivujivik, they also indicated the presence of a site with some batteries.

The large majority of the potential sites contain drums used for the transportation of oil products. From all of the sites of Category 1 with oil products in Nunavik, the informants have pinpointed only 12 as having estimated quantities of residues, most of them (10) located in the Ungava Trough region. It is then possible that other sites contain residues, but the quantities are unknown.

As for the buildings and dwellings, the sites that contain these types of items rank second among the sites of Category 1, especially in the Labrador Trough region with 21 sites. Nearly two thirds of these sites (13) include dwellings, cabins, or camp cabins. In the Ungava Trough region, those sites are numerically less important, representing 8% of the potential sites of this region. Most of these sites are dwellings (cabins or camp cabins).

Category 2: Sites with two types of observed equipment

One fourth of the potential abandoned sites contain at least two types of equipment that have been recorded in Nunavik. These sites present various combinations of equipment indicated by the informants. Among this category, 95 sites out of a total of 96 contain at least the standard drum for the transportation of oil products. The most common combination is oil drums with scrap items, as well as with the waste associated with the dwelling for the workers. However it is important to note that the absence of snow cover during the observation made by the informants could have involved the transfer of many of the sites of this category in the categories of combinations with a greater variety of equipment.

In the Ungava Trough region, one site indicated by the informants presents the combination of chemical products and gas tanks. The chemical products are characterised by the presence of drums containing, or having contained, brine of calcium chloride. In the same region, four sites were identified as containing standard drums and gas tanks, and 10 of these sites were reported in the Labrador Trough region. A more common observed site is the combination of buildings and dwelling with standard drums in the Labrador Trough region with 56 sites presenting a combination of at least two types of equipment and items.

The most common combination involves the presence of standard drums and scrap. Indeed, there were 73% of the potential sites of Category 2 in the Ungava Trough region (29 out of 40), and 45% of those located in the Labrador Trough region (25 out of 56), which means 56% of all potential sites. One third of the sites contains waste associated with dwelling for workers. Moreover, some debris and pieces associated with drilling activities compose the essential of the sites with other combinations.

Category 3: Sites with three types of observed equipment

There are 29 potential sites in Nunavik associated with a combination of three types of equipment. All these sites contain buildings whether associated with the exploration work itself or with dwellings for workers, and the quasi-totality (28), identified in the Labrador Trough (17) and in the Ungava Trough (11), is characterised by the presence of standard drums; among them, five sites contain undetermined quantities.

There are four sites that present the combination of standard drums, gas tanks and buildings or dwellings. There is one site that shows the presence of gas tanks, dwelling and solid waste, while there are 21 potential sites that are characterised by the combination of standard drums, dwellings and scrap, most of the time observed in the form of solid waste. In the Labrador Trough region, the most often observed abandoned sites containing at least standard drums and dwellings also contain scrap in the form of vehicle pieces, canoes, camps, drilling pieces and debris. The solid waste is characterised by the predominance of wood and plywood.

Category 4: Sites with four types of observed equipment

There are 21 sites related to the observation of four types of different equipment and items in Nunavik. The totality of these sites contains buildings and dwellings, as well as at least one drum for the transportation of oil products, while 20 sites out of 21 contain scrap, among which six sites with vehicles and tractors. Moreover, more than half of the sites (11) is characterised by the presence of gas tanks.

There are four sites characterised by the presence of standard drums, gas tanks, buildings or dwelling and scrap. Most of the combinations of these types of elements are located in the Labrador Trough region.

One site presents the characteristic of containing standard drums, gas tanks, dwellings and solid waste, situated in the Ungava Trough region. The solid waste is made of samples of drilling lying in many stacks. There are five sites that contain standard drums, buildings, dwellings, and scrap. The scrap takes the various forms of oil furnaces, debris, tractor, bucket and antenna. Two other sites were identified containing a similar combination of items and products, except for more permanent dwellings like cabin and mobile homes. Finally, two sites contain drums, cabins as dwelling, scrap and solid waste associated with dwelling, while another one presents the same characteristic except for the shed as a building and that the waste are associated with exploration drilling works.

Category 5: Sites with five types of observed equipment

Three sites were recorded under this category, constituting less than 1% of all potential sites in Nunavik. All these sites were identified in the Labrador Trough region. The three sites contain gas tanks, standard drums, buildings (shed), and scrap. According to an informant from Kuujjuaq, one site would contain dynamite – classified as a chemical product.

One of these sites, located in the vicinity of Tasiujaq, presents the combination chemical products (dynamite), gas tanks, standard drums, building (shed), and scrap (drilling waste, tractor). Beside the drums, which represent a large quantity, and the tanks, some scrap made of drilling waste was reported. The Kativik Regional Government was informed as soon as the existence of this site was known. There are two sites that reveal the presence of standard drums, gas tanks, building, dwelling and scrap.

Category 6: Sites with six types of observed equipment

Three potential sites are characterised by the presence of six different types of equipment. The three sites have in common the presence of chemical products, gas tanks, standard drums and buildings (shed). More precisely, there is one site that has dwelling of the type of cabins while the scrap takes the form of one tractor and drilling pieces. Another potential site contains solid waste in the form of plywood, while a third one has scrap associated with drilling equipment as well as plywood.

Sites with cleanup under way

All categories (1 to 7) put together, there are presently 31 sites that are, or have been cleaned up by competent authorities. There are eight villages that would have participated in the cleaning works of mining exploration sites launched around the mid-1990s in Nunavik. In the year 2000, the informants from four villages provided an assessment of their works, constituting, when they are put all together, the achievement of 69% of the total cleaning efforts. The cleaning works are to a great extent associated with sites of categories 1 to 5, which represent the large majority of all sites. Finally, the presence of standard 45-gallon drums was reported in 28 of the 31 sites under cleaning up.

There is one site of Category 7, which represents 3% of the sites in the process of being cleanup. The informants from the Ungava Bay region knew this site for a long time, especially those from Kangiqsujuaq where the cleaning efforts have been until now co-ordinated. At the end of the pilot project in 1999, even after a visit of the place, it remained impossible to measure the exact surface area. Indeed, this site was in the heart of a vast exploration program that brought in dozens of workers during the 1960s until the end of the 1970s in order to establish the tonnage of a deposit. The cleanup works achieved by the workers from Kangiqsujuaq had already greatly contributed to tone down the sight before the visitors at that place five years ago. In 1999, there were still a hundred of litres of chemical products made up of a significant part of very dangerous concentrated acids, in addition to calcium chloride, a number of gas tanks, more than one thousand of standard drums for oil products, a number of dwellings (cabin), buildings (shed, laboratory), scrap (oil reservoir, drilling pieces, tracked vehicles “Muskeg”) and solid waste (hose, stacks of rock samples). In July 2000, the MRN conducted an intervention to move the concentrated acids toward a secure depot, at the facilities of the Falconbridge Company situated at 10 km northwards.

Potential sites documented with the COGÎTE database

There are 216 sites prior to 1976 that were documented with the COGÎTE database. This number represents a proportion of 36% of all potential sites in Nunavik. Among those sites, 81 are of the “deposit” type, that is to say that were the object of works allowing an evaluation of the tonnage. A total of 135 sites have been the place of works to determine some dimensional parameters, but without an evaluation of the tonnage. Those sites were retained on the basis of the results

from the pilot project in 1999. Their cross-checking with the sites indicated by the informants allowed to expect that some abandoned equipment are present in the vicinity of the position provided by the information included in the mining deposit index cards. Regarding the Labrador Trough region, it is expected that the complementarity of these sites with the ones reported by the informants will give a more accurate portrait of the abandoned equipment: the territory of that geological formation is vast and some sectors are solely documented by the data available in the index cards after the decease of informants who would have been able to provide the required information.

In order to test the possibilities of locating the abandoned equipment, which result from the content of the mining deposits index cards contained in COGÎTE, the archives of ten sites distributed in the Ungava Trough and in the Labrador Trough regions were examined. Special attention was paid to the sites located close to the potential sites which details classified them among the most important sites in terms of abandoned equipment. Three types of documentation were examined:

(i) The annual report of activities of the company holding a license of exploration, which consist in a brief description of the results of the conducted works. The analysis of the samples takes on a predominant place. These reports rarely include a description of the equipment used for the exploration works.
(ii) The cards integrated or delivered with the annual report of activities could have provided some key elements. Unfortunately, the comments about the sites susceptible of containing some abandoned equipment are rare, if existing at all. The emphasis is put on the location of drillings on maps which scale seems to depend on the good will of the company – most of the time large scale.
(iii) Finally, reports by geologists from the Department about the inspection of the site, or within the adjoining region, are different as they account for the ongoing works in the region, and are followed by a geological analysis. The description of the surrounding area and the logistic element required for conducting these works get a particular attention, especially in the region covered by the project. It includes natural areas that raise a challenge on a daily basis for the setting up and the pursuit of the projects. Unfortunately, these reports are rarely accompanied of maps and, if this happens, they are based on large scale.

In short, besides the location of the geographical co-ordinates provided by the index cards and their validation during the pilot project of 1999, the potential of the corpus on mining deposits is limited in regard to the delivering of information about the most susceptible sites that might contain abandoned exploration equipment. However, a characterisation may allow to find indications that would help to retrace the works history.

CONCLUSION

Methods, efficiency and limitations

The main challenge of the inventory project was the current location of the abandoned sites and equipment by the mining industry at the time of their exploration works during the period prior to 1976. The use of various techniques helps to validate the results (by comparing them) obtained from each of these techniques. When tested, remote sensing was a technique not yet completely developed to locate the exploration sites in the hinterland; however, changes in that field occur fast, and the usefulness of remote sensing could be different in a near future. The aerial survey was determinant at that step: the collection of both geographical co-ordinates and photographs of sites with equipment provided the field evidences that allowed the evaluation of other corpuses of data, including the data on mineral deposits that became accessible at the end of the pilot project. For instance, all of the sites where the key informants mentioned the presence of chemical products and barrels of petroleum in plenty have also been retraced by the aerial survey – including the sites where the presence of cabins or shelters has been pointed out.

Interviews with key informants and data collection of the mineral deposits were combined to make the inventory of potential sites in the whole Nunavik territory. With the documentary data on the mineral deposits of “prospect” and “deposit” types, we were able to use complementary techniques to carry out a large-scale inventory at a reasonable cost. The integration of the data by using the proximity rule of 300 meters gave an overview of the results according to one’s choice of a particular method. It appears, at first, that nearly all of the sites with multiple records have been identified by the key informants and the aerial survey – adding up three of the six mineral deposits where exploration works have occurred (“prospect” and

"deposit" types). Then, a comparison of the results according to the category sites with a unique record, reveals that the results from the aerial survey show that 10 of the 13 sites are compounded of a small quantity of equipment – and among the three remaining sites, there is one site with 50 barrels of petroleum that has not been identified by the key informants. Moreover, among the 16 sites with a unique record identified by the key informants, the potential content remains important: camps, helicopter, tracked vehicle, gas tanks – all of them escaped aerial survey.

The technique of interviews was fruitful, allowing to locate 379 sites where mining exploration equipment had been observed. The period chosen to conduct the inventory – beginning of the summer – does not seem to have had some negative effects on the results of the collect. However, since it was the season of travelling towards the summer camps, especially in the Hudson Bay region, we were not able to meet with some informants who could have influenced the results.

The unanimity of the informants from the northern villages regarding the conditions of observation at the time of the visits of most potential sites – with the presence of snow cover – had an impact on the identification of equipment on the site, their enumeration, and the establishment of their scattering. In short, they warned the researchers to be cautious in their evaluation. Therefore, the processing of data took it into consideration; the nature of the equipment and their combinations have been prioritised in order to identify the sites that should be the object of a special attention from the regional and national authorities.

Finally, the number of signalled potential sites associated with other industries (66) remains a fragmentary data: they have been indicated, quite often, because their size was more impressive than the size of the surrounding mining exploration sites, or because of their rarity. The research upon which this paper is based increased the knowledge about the sites whose presence did not escape to the population, but whose number is still unknown. Once the phase of characterisation is over, the extent of this number, just as the quantity of debris that were abandoned on territory, should encourage the competent authorities to take on the suitable measures.

Needs for further actions

The number of mining exploration sites of the "deposit" type found in the Labrador Trough and the high number of standard oil drums pinpointed in many potential sites by the informants, especially from Tasiujuaq, Kuujjuaq, and Kawawachikamach, constitute some indications of a significant potential presence of other dangerous products such as gas and chemical products. For the moment in Nunavik, the number of potential sites containing chemical products is low – less than 10. On the contrary, the large number of potential sites with oil drums is worrying insofar as very few data is available regarding the exact number of drums per site, the presence of residue and their volume.

The overall number of sites and the available information about the material they contain are a matter of concerns for Nunavik residents, and for the government authorities of all levels. With the inventory, it is now possible to work with a better idea of the scale of the problem of abandoned mining exploration sites. Clearly, with hundreds of sites, this question can no longer be taken as a side problem. However, in order to get a comprehensive portrait of the situation, some necessary parameters are still missing. A new research phase is underway to get a case by case description of sampled sites. With such information, it will be possible to give a better diagnosis about the environmental threat these sites do represent. It will also be possible to prioritise future public intervention based on foundations of stone.

The project of characterising a sample of sites was an unexpected result of the inventory project. When the inventory started, all doors were closed to financially support the project at the superior levels of governments. But while working on the pilot or the inventory phase, awareness and interests raised in such a way that we obtained the full cooperation of the Ministry of Natural Resources. Today, the characterisation phase is supervised by regional stakeholders, namely the Kativik Regional Government and the Makivik Corporation, and funding comes from the Northern Ecosystem Initiative (NEI) of Environment Canada and the Ministry of Natural Resources of Québec. Moreover, during the inventory phase, the research team informed the regional authorities about the presence of chemical compounds and other potentially harmful materials, which later lead to the removing of some of these by the appropriate government agencies.

Finally, the scope of the problem is so vast, as it is now understood, that a government intervention is clearly needed in the near future. Reclaiming programs exist at the federal level. Some of them are at a very large-scale, since they were designed to face the situation of abandoned or orphan mines that had previously operated and then shut down without proper reclaiming

work, such as the Northern Contaminated Sites Program (INAC, 2002b). However, they are generally not applicable in the Arctic Québec for constitutional reasons. Nunavik, its land and resources, are all part of the Province of Québec; therefore, the federal government could not intervene in this provincial jurisdiction. Moreover, such programs are not designed for mining exploration sites, but for closed mines. As a matter of fact, it is worth raising the question of what do we know about abandoned mining exploration sites in the rest of the country? Under the impulse of the regional stakeholders and leaders, the different levels of government are discussing the necessity for an on-going program to safely clean up the sites and to try reclaiming the Nunavik environment. In connection with these discussions, the question of the situation in the rest of Canada could legitimately be raised.

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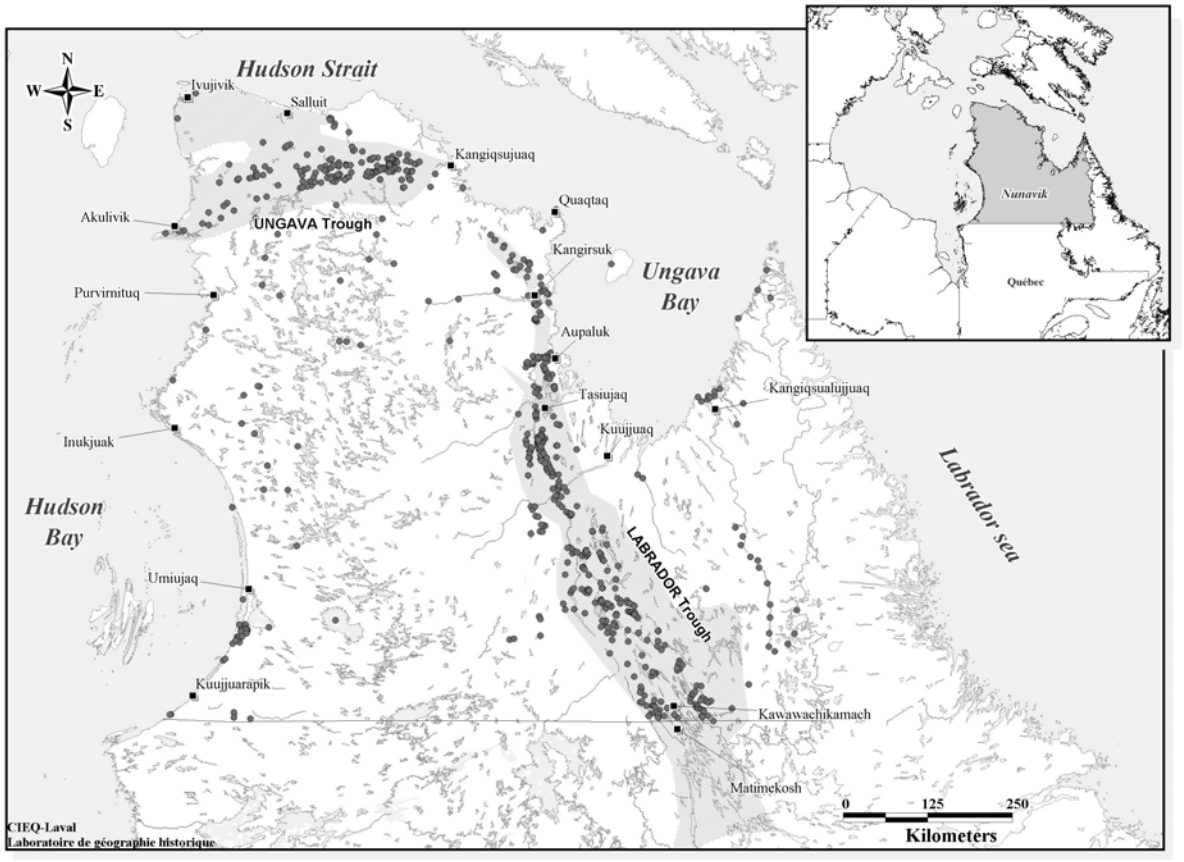
MAP 1
Location of potential abandoned mining exploration sites in Nunavik region



N.B.: Each grey spot indicates one site.

TABLE 1
Items and products observed on potential sites by key informants

Chemicals	Concentrated acids, spray (aerosol, solvent), drums (bryne of calcium chloride), battery (acid), calcium chloride, dynamite, heavy metals.
Gas	Tanks, propane
Oil products	Oil can, diesel, gasoline, oil, kerosene, furnace oil, standard 45-gallon drums.
Building	Shack, dome (metal), drilling (cabin), garage, laboratory, mobile workshop, shed radio station, tripod
Dwelling	Cabin, mobile camp cabin, tent pad.
Scrap	Antenna, fastener (nut, bolt, string), domestic appliances, tracked workshop, airplane, boat, can (food, milk), crusher, bulldozer, cables, truck, pick-up, camp (equipment, canoe, car body (parts), wagon, loader (tractor), container, kitchen appliances, debris, derrick, shelves (drilling post), furnace, generator, crane, helicopter, bed, heavy equipment, airplane and outboard motors, skidoo, tools, water pump, drums recycled as bridge, tracked vehicles (Bombardier, Muskeg).
Solid waste	Tent pad (collapsed), wood, boxes for rock samples, bottle, hose, canvas, structure and equipment for camp, rubber, plywood, domestic waste, dump site, stud, mattress, building equipment, food, seaplane wharf, Styrofoam, tent, cloth (plastic-coated), sleigh (akutik).

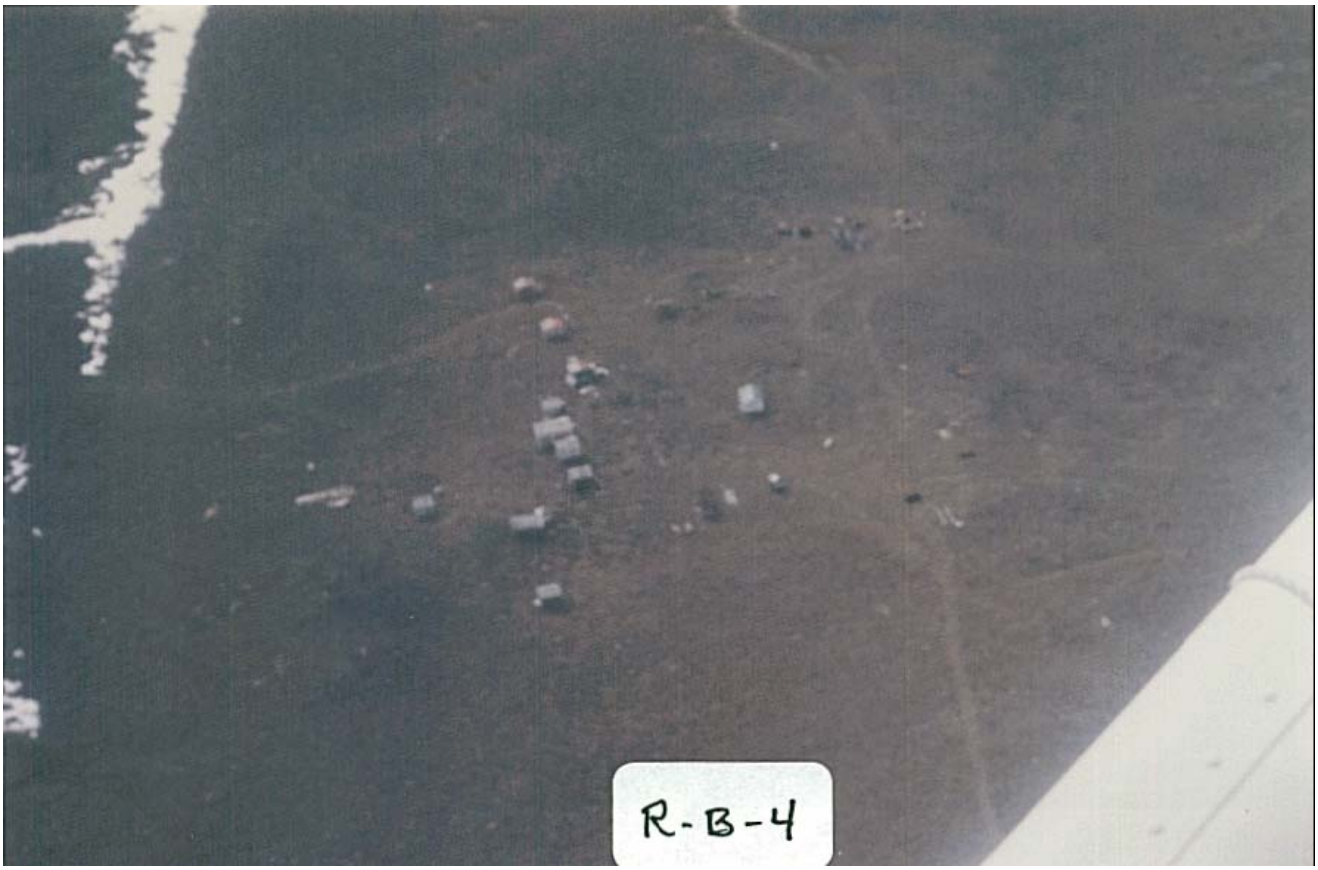
TABLE 2
Potential abandoned sites in Nunavik per field of activity and region (N)

FIELD OF ACTIVITY AND SOURCE OF INFORMATION	UNGAVA TROUGH AND HUDSON BAY	LABRADOR TROUGH AND GEORGE RIVER	TOTAL
Potential abandoned mining exploration sites			
Determined by key informants	176	203	379
Determined by the data from MRN	28	188	216
SUBTOTAL	**204**	**391**	**595**
Potential abandoned sites from other industries			
Determined by key informants	22	44	66
TOTAL	**226**	**435**	**661**

TABLE 3
Potential abandoned mining exploration sites per category and region (N)

CATEGORY	UNGAVA TROUGH AND HUDSON BAY	LABRADOR TROUGH AND GEORGE RIVER	TOTAL
Potential sites according to key informants			
Category 1 – Sites with a unique observed equipment	97	99	196
Category 2 – Sites with two types of observed equipment	40	56	96
Category 3 – Sites with three types of observed equipment	12	17	29
Category 4 – Sites with four types of observed equipment	7	14	21
Category 5 – Sites with five types of observed equipment	0	3	3
Category 6 – Sites with six types of observed equipment	2	1	3
Category 7 – Sites with seven types of observed equipment	0	0	0
Sites under cleaning (All categories – 1 to 7)	18	13	31
SUBTOTAL	**176**	**203**	**379**
Potential abandoned sites according to MRN data			
Categories unspecified	28	188	216
TOTAL	**204**	**391**	**595**

PHOTO 1
Aerial view of an abandoned mining exploration site



Source: Duhaime and Comtois (2000)

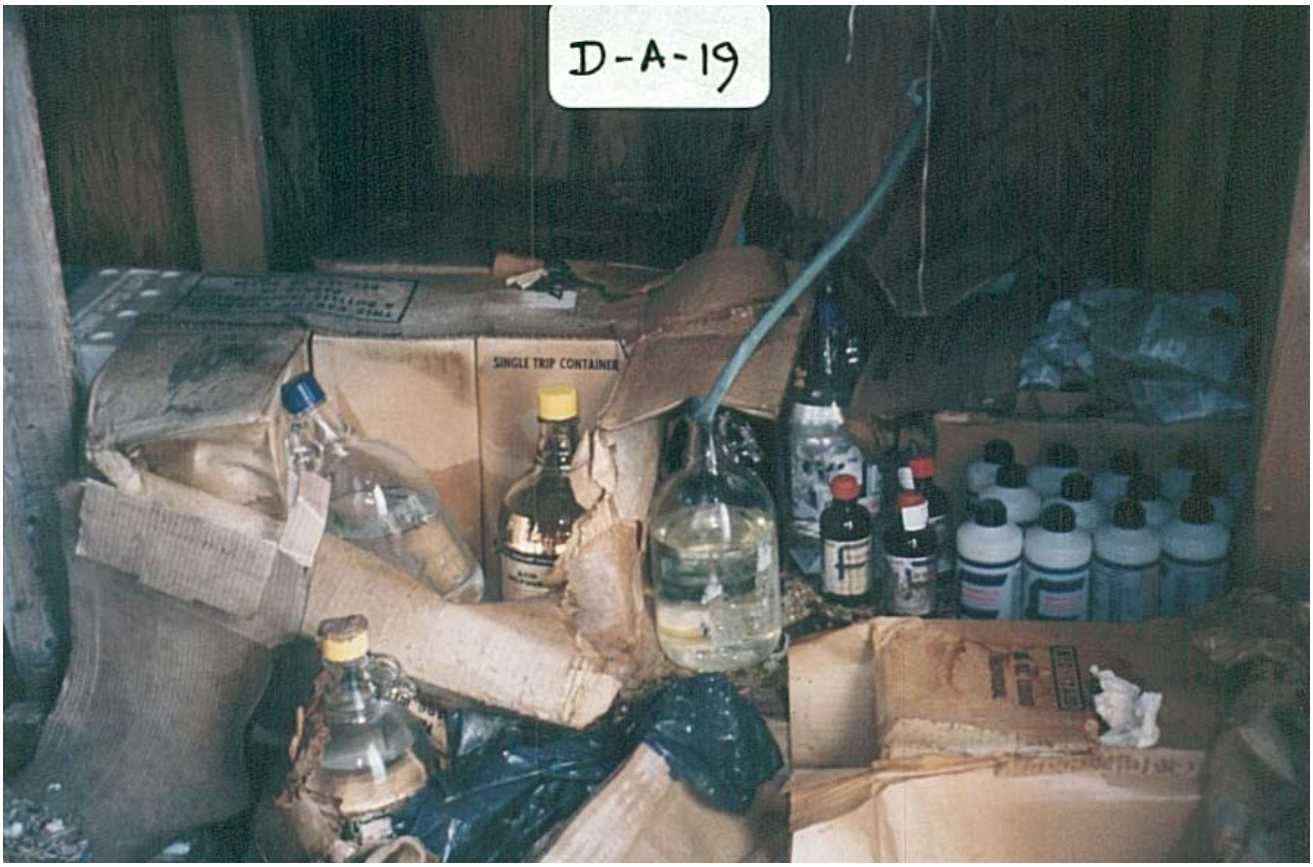
PHOTO 2
Sample of material found on abandoned mining exploration site, including a Muskeg vehicle, poles, drums, cabins

Source: Duhaime and Comtois (2000)

PHOTO 3
Drums are the most common single item found on abandoned mining exploration sites

Source: Duhaime and Comtois (2000)

PHOTO 4
Chemical compounds found in one site, including toxic concentrated acids.
The cabin in which that was contained had no padlock or any other safety devices.



Source: Duhaime and Comtois (2000)

Situation of clean-up efforts

Photo 1. Aerial photo of historical abandoned camp near Lac Dumas, Nunavik, before commencement of clean-up efforts. Note large cache of fuel drums at left, tent floors and tent frames in center of photo. View looking north, July 7th, 2005.

Photo 2. Aluminum tent frames and old fuel drums at the abandoned camp near Lac Dumas, Nunavik, before commencement of clean-up efforts. View looking east, July 7th, 2005.

Photo 3. Pile of old fuel drums at the abandoned camp near Lac Dumas, Nunavik, before commencement of AAEC's clean-up effort. A total of 30 drums of fuel were transferred to new drums (6 gas, 24 diesel) and 75 empty drums were brought to Belanger camp in 2005. View looking west, July 7th, 2005.

Photo 4. Paul Tayara, Salluit resident and Goldbrook project employee, prepares to transfer fuel to a new drum – abandoned camp, near Lac Dumas, Nunavik, September 5th, 2005.

Photo 5. Kevin Girard transfer fuel to new 45 gallon drum– abandoned camp, near Lac Dumas, Nunavik, September 5th, 2005.

Photo 6. 206L (LongRanger) slinging empty fuel drums from old camp near Lac Dumas to Belanger camp, September 5th, 2005

Photo 7. Aerial photo of abandoned camp near Lac Dumas, Nunavik, after AAEC's clean-up effort. Note all old fuel drums have been removed from site, and all tent frames have been taken down. A total of 30 drums of fuel were transferred to new drums (6 gas, 24 diesel) and 75 empty drums were brought to Belanger camp in 2005. View looking south, September 5th, 2005.

Thanks to the Contributors of the Fonds Restor-Action Nunavik

The Fonds Restor-Action Nunavik (FRAN) was created to rehabilitate mineral exploration sites in Northern Quebec that have been abandoned for several decades.

The FRAN is a partnership between the Quebec Government, the mining industry and the Inuit community. The fund will allow, starting this year, the cleanup and rehabilitation of abandoned sites. According to previous studies, nearly 600 sites have been identified, of which 18 are considered a priority. Work has already started on 4 of these 18 sites.

Following the creation of FRAN in March 2007, more than 30 companies from the mining sector confirmed their financial participation for a total of more than $1.5 million. Here is a list of the participating companies:

Abitibi Geophysique inc.
AEMQ
AMQ
Agnico Eagle
Alexandria Minerals Corporation
Alexis Minerals Corporation
Breakwater Resources Ltd.
Canadian Royalties
Dios Exploration
Ditem Exploration Inc.
Donner Metals Ltd.
Eastmain Resources
Exploration Azimut inc.
Exploration Osisko
Exploration Puma
Everton Resources
Genivar
Goldcorp Inc.
Helicopteres Canadiens
IamGold inc.
Knight Resources Ltd.
Mines Aurizon inc.
Mines Virginia inc.
PDAC
Ressources Majescor inc.
Roche Ltd, Consulting Group
Ressources Appalaches
Ressources Metco
Ressources Sirios inc.
Ressources Strateco
S.E.M. Vior
Uranium Star
Stornoway Diamond Corporation
Xstrata

Thanks again to all the contributors.

The Board of Directors

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