

# ABANDONED MINES IN CANADA

W. O. MACKASEY  
WOM GEOLOGICAL ASSOCIATES INC.

## INTRODUCTION

Several years ago I was driving through Michigan. It was during the height of the Viet Nam war. I was tuned to a radio station from a little town in the middle of nowhere. The disc jockey came on with a public service announcement: “ We are looking for abandoned airports in the United States. If you come across one please phone Zenith ‘such and such’ and tell us where it can be found.” I thought to myself, “how could the United States of America ever lose track of it’s airports.” Yet it was a reality. What is really amazing to me is that, some 30 years later, I am here in Winnipeg speaking about mines we appear to have lost track of.

Canada is in its fifth century of mining. As a country we are considered leaders in mining exploration, mining technology, and mining legislation. It’s a fact, Canadian’s are called upon as advisors, instructors and project managers around the world for mining.

I became enthralled with mining as a kid growing up in Toronto. A couple of my uncle’s had stayed at our home for a while and left me their mining gear. I was the envy of all the other kids in the neighbourhood when I wore my uncle’s mining boots. I could go in the deepest mudpuddles found in the east end of Toronto. After finishing my studies in geology at university, I worked in exploration and mining geology. I gained great satisfaction from uncovering the secrets of rocks and discovering mineralization. It was the same type of satisfaction I witnessed in my grandfather when he reaped a good harvest on his farm. During my career I have seen the country and it’s peoples from coast to coast. I have been able to get know and learn from Canadians in a way none of my childhood buddies were able to do. Mining has been good to me.

Having said that, I must focus on why we are meeting here in Winnipeg. I must focus on why non-mining people are here, why First Nations peoples are here, why environmentalists and policy makers are here. Collectively we are facing the challenge of abandoned mines - a common interest, albeit for different reasons.

Right off the top I will state that a factor on our need to meet here is because of a gap in the Canadian Constitution. The concept of environment was not considered at the time of Confederation. The Constitution clearly spells out the roles and responsibilities of the provinces in managing natural resources, including minerals. But what it doesn’t spell out is the jurisdiction for environmental matters. This appears to have forced both the federal and provincial environmental agencies to jump into the same pot. It has resulted in a number of overlaps and gaps in environmental management regulations for mining in Canada.

## THE IMPACT OF MINING

I will use the Ontario Mining Act definition of a mine: “any opening or excavation in, or working of, the ground for the purpose of winning any mineral or mineral bearing substance, ....” The definition goes on to include buildings, machinery, mills, smelters, wasterock and tailings. It includes everything from a small test pit in the bush to a large open pit mine. It even includes the kitchen sink in the staff house.

In Canada, over the last twenty years, a number of changes have been made in legislation affecting the closure of mines. The most significant changes have come within the last 10 years. When I started my career with the Ontario mines department, the only requirements for mine closure under the Mining Act were to: 1) place bulkheads in the openings to surface and, 2) “vegetate tailings to the satisfaction of the district mining engineer.” I have known a lot of mining engineers, but haven’t met too many who knew much about vegetating tailings.

Today it is different. In most parts of Canada before starting a mine, a company must now produce a closure plan using a number of specialists, and provide the government with financial assurance. This way, if a company goes broke or disappears there would be money and a plan available to clean up the site. This is not the reason we are meeting in Winnipeg. We are here to discuss the legacy of the messes left behind before the new rules were brought in. To discuss the mines that closed before I started my career. Before my uncles bought their boots. It is called the legacy of abandoned mines.

I have dealt with a multitude of abandoned mine issues in my time. I have had to calm down a foundations engineer when he discovered that the hospital he was building, sat on top of old mine workings. He was contemplating the number and severity of law suits if his foundation shifted. All the medical testing equipment would be thrown out of alignment and produce erroneous tests for patients. I have dealt with dust storms from tailings that caused accidents on highways, cave ins that blocked highways, teenagers lost in old mine workings, tailings dam failures that threatened drinking water supplies. I have even assisted the RCMP in their search for mafioso guns stored in abandoned mines.

The greatest threats from abandoned mines stem from physical and/or chemical stability problems. Threat from potential collapse of old mine workings that could kill people or cause serious damage to the local industries. Threat to people’s health or to the environment due to the chemical instability of abandoned mine waste materials. I am always amazed, however, that the most common complaint from the public is not about health and safety issues, but rather aesthetic concerns. “The abandoned mine in our community does not look nice, please do something to get it cleaned up.” I have seen schools, senior citizens buildings, housing subdivisions, railways, highways all built where they should not be. Once I had a senior official tell me there were no hazards on his ground because he “did not have the budget to fix any.”

## WHY KEEP TRACK OF ABANDONED MINES?

I have to wear many hats to discuss this point. First I will wear a miners hat. It’s important to

know the location of abandoned mines because they are sometimes the best places to look for new mines. At some abandoned mines the geology of the area may have become better known, or new exploration techniques or theories developed. The price of the commodity in the abandoned mine may have increased making it economically feasible to reopen. If we have lost track of an old mine, we may be missing an opportunity for economic development.

My next hat is a safety hat. We must make ourselves aware of risks to public health and safety. We must be aware of potential risks to the environment. Mine openings, especially near towns, are tempting for children. Old mine workings, especially crown pillars, can eventually collapse. A former mayor of Timmins was the last person to drive over the Pamor mine crown pillar before its catastrophic collapse. Highway 101 had been built squarely on top of the crown pillar. Officials had notified the highway department of the potential danger several years earlier. But their warning apparently fell on deaf ears.

Another hat is the mayor's hat. The mayor must be sure that the planning department has factored in the presence of any abandoned mines when giving approval for new developments. This is one of our biggest challenges. I was sharing a drink with an architect friend a number years ago. I naively asked him "What does a developer have to do to get a permit to construct a building in a community?" His answer was that the developer had go to city hall and apply for the permit. A soils test may be required. "What about testing the bedrock for underground mine workings?", I continued. "No" was the reply. "They only have to drill down until the soils are found to be competent, or they hit bedrock." "What if the bedrock is only a few inches thick?" "Not a requirement.", was the answer. "Well, surely there is a file at city hall, red flagging the presence of mine workings within the municipality?", I insisted. "Sorry Bill, nothing like that exists." Well that story goes back some twenty years. Since then the Ontario Planning Act has been amended, the Mining Act rewritten, and most mining municipalities have been provided maps and reports of old mine workings in their jurisdiction. My fingerprints can be found on all of these.

My final hat is the emergency response hat. It is prudent to be prepared for the unforeseen. One of the first things that happened after the terrorist bombing of the World Trade center in New York was an emergency inspection of the main support columns. Had they been severely damaged the entire building could tumble. The emergency response team had immediate access to the construction plans for the buildings and were able to quickly assess the situation. I don't know where or how they got the drawings, but it was obviously part of a well thought out emergency response plan. In contrast, let me tell about one of the most risky abandoned mines I've ever seen. It occurs in southern Ontario. It had a little bit of everything for a student of abandoned mines: open shafts, unstable mine workings, radioactive materials and a large exposed toxic wastepile. My first concern was that a flash flood could devastate the watershed area. I inquired if a floodplain study had been prepared for this river system. It would help me assess my concern that a flash flood could wash all the toxic waste downstream. They reported back to me several days later that, "Yes, a floodplain study had been done for the river, but, however, the study had not gone north of highway seven because there was nothing up there but an old abandoned mine." That bureaucratic decision, made several years ago, could have resulted in a terrible environmental disaster if a flood hit the area. A lot of reclamation work has since been done on this site. Again my fingerprints can be found on some of the reports.

## A SNAPSHOT OF ABANDONED MINES IN CANADA

I have attempted to lay out a bit of a background on abandoned mines. A background that motivated the questionnaire I prepared and sent out to government agencies across Canada last year. The questionnaire was the foundation for a report on abandoned mines for my client MiningWatch Canada. I will run through the results of the questionnaire and try to point out gaps in our knowledge and policy for abandoned mines.

### 1a) WHAT INVENTORIES OF ABANDONED MINES HAVE BEEN COMPLETED IN YOUR PROVINCE/TERRITORY?

Only five provinces had what I would call systematic abandoned mines inventories. The remainder had lists or files in varying stages of completion and organization. The inventory for the Territories included only sites with no legally responsible party in operation. The Ontario inventory was based on the Ontario Geological Survey Mineral Deposit Inventory and appears to be the most complete. There is no consistency in the type of agency in charge of the inventory - it varies from Natural Resources, Mines, Environment, Energy and Utilities, to Indian and Northern Affairs.

### 1b) HOW MANY ABANDONED MINE SITES HAVE BEEN IDENTIFIED AND ARE ON FILE?

Approximately 10,000 sites are on record in Canada. In my opinion, however, until systematic surveys are completed we will never know the exact number. We must look at the records of old mining exploration programs, not just past producers. We are talking here about the possibility of thousands, not tens of thousands more. It is essential that all sites, irrespective of ownership, be included.

### 1c) OF THE ABANDONED MINE SITES IDENTIFIED, WHAT PERCENTAGE HAVE BEEN VERIFIED BY FIELD INSPECTIONS?

The answer to this question really depends on what's included in the original survey. If the files show ten sites and all of them have been inspected, then the answer is 100%. However, did anyone look through the Mineral Deposit Inventory files? Is there a Mineral Deposit Inventory file? There are no standards across Canada on what should be included. I suspect that less than 30% of what really needs to be field inspected has been done.

### 1d) WHAT PERCENTAGE HAVE BEEN TESTED FOR PHYSICAL AND/OR CHEMICAL STABILITY?

A judgement call for testing would have to be made during the field inspection. In my opinion, the majority of the sites in Canada do not require this step. The survey revealed that a lot of test work has been done. However, there are no standards across Canada to automatically trigger testing.

### 1e) HOW MANY SITES WERE FOUND TO HAVE PHYSICAL OR CHEMICAL STABILITY PROBLEMS? WHAT PERCENTAGE HAVE UNDERGONE REMEDIAL WORK?

The answer to this question is not good. Although 10's of millions of dollars (my estimate) have been spent on reclamation - there is no consistency across Canada in either record keeping, or amount of work done. Some provinces/territories have made an effort, others appear to have done nothing.

1f) DO YOU HAVE A PRIORITY RATING SYSTEM FOR THE ALLOCATION OF REMEDIAL WORK FUNDS?

Only two agencies appear to have used a systematic priority rating system. From my own experience, without a rating system, it's the squeaky wheel, not the most hazardous site that gets the funding. There is a need for the creation of a Canadian system for setting priorities. Funding is much too precious to be spent rehabilitating low priority sites. There is no need for each province/territory to create its own rating system.

1g) ARE "ARCHIVAL STANDARD" FACILITIES USED (OR BEING PLANNED) FOR STORAGE OF ABANDONED MINE AND MINE RECLAMATION DATA?

In Canada, we have millions of dollars of data stored in file cabinets, cardboard boxes, under drafting tables, and piled somewhere in storage rooms. This is information on underground workings, tailings dams, trenches, etc. It would cost millions of dollars to replace. A few years ago, a water leak at Queen's Park, Toronto, wiped out information on a number of mines in Ontario. Think of my example on the World Trade Center and emergency response. It appears that only a couple of Canadian agencies have taken steps to safeguard their data. In answering the questionnaire, one agency wanted to know what an "Archival Standard" storage facility was. We need to look at a Canadian standard for storage of abandoned mines data.

2) WHAT WORK HAS BEEN DONE BY OTHER AGENCIES (INCLUDING FEDERAL AGENCIES) IN YOUR JURISDICTION ON THE TOPIC OF ABANDONED MINES? THIS WOULD INCLUDE INVENTORY, TESTING, MONITORING AND REMEDIAL WORK.

The results from this question showed there is some collaboration among agencies. This is a good sign. However no consistency exists.

3) WHAT POLICY AND LEGISLATION IS CURRENTLY IN PLACE REGARDING ABANDONED MINES AND MINE RECLAMATION?

There appears to be some form of legislation in place in all jurisdictions. Some very good ideas have been developed and should be shared.

4) WHAT POLICY AND LEGISLATION IS CURRENTLY IN PLACE REGARDING MINE CLOSURE AND FINANCIAL ASSURANCE TO COVER THE COST OF MINE RECLAMATION?

It would appear that some form of financial assurance legislation occurs in all jurisdictions. There does not appear to be any uniformity in regulation or application of financial assurance across the country? It certainly would be more efficient and effective for both the mining industry and government agencies if some form of national standards existed.

5) WHAT POLICY AND LEGISLATION ON THE ISSUE OF ABANDONED MINES AND

MINE RECLAMATION IS CURRENTLY UNDER REVIEW (OR AWAITING PASSAGE, PROMULGATION, ETC.)?

There is continuous change throughout the country.

6) ARE THERE ANY TECHNICAL STANDARDS IN PLACE FOR MINE RECLAMATION OR REMEDIAL WORK?

Yes, but there is a need for national standards.

7) DO ANY MINING OR EXPLORATION ORGANIZATIONS HAVE A MINING CODE OF PRACTICE?

Many companies and associations have policy statements and guidelines. Ontario has added a Rehabilitation Code of Practice to the Mining Act. Other provinces/territories should look closely at the Ontario Code. It places rehabilitation standards under the law.

8) DO ANY OTHER AGENCIES HAVE RESPONSIBILITY/JURISDICTION FOR ABANDONED MINES?

Nearly every jurisdiction had more than one agency dealing with abandoned mines: Environment, Labour, Natural Resources, Mines, Fisheries, etc.

9) WHAT NEW ACTIVITIES (ACTION, PROJECTS, ETC.) COULD HELP IN THE MANAGEMENT OF ABANDONED MINES?

Some of the suggestions included: Database development, rating system, code of practice, inventory of abandoned mines on private land, funding for more inventory and rehabilitation work, regular funding, development of standards for risk assessment and documentation standards for abandoned sites.

10) WHAT POLICY OR LEGISLATION IS CURRENTLY IN PLACE FOR THE LONG TERM MANAGEMENT OF "CLOSED OUT" MINES, (THAT IS, MINES THAT HAVE BEEN CLOSED AND MEET ALL THE REQUIREMENTS OF AN ACCEPTED CLOSURE PLAN)?

It would appear only one province has not addressed long term management. The remainder have some form of policy and/or legislation dealing with the long term care of abandoned mines.

11) IS YOUR ORGANIZATION REPRESENTED ON ANY COMMITTEES THAT EXCHANGE INFORMATION ON ABANDONED MINES? (THIS COULD INCLUDE COMMITTEES TO EXCHANGE INFORMATION WITH MUNICIPALITIES, ENVIRONMENTAL AGENCIES, ETC.)

A number of committees, for information exchange on abandoned mines, exist at various locations in Canada such as: Standing committee of Mining and the Environment, Joint tailings committee, Joint Regulatory Review group, Contaminated Sites Working Group, Waste Management Committee and MEND. Most of these committees appear to include active mines and/or non mining sites. There is need in Canada for a central clearing house on information exchange concerning abandoned mines.

## 12) WHAT MECHANISMS ARE IN PLACE (OR UNDER REVIEW) THAT ALLOW ABANDONED MINE INVENTORY DATA TO BE SHARED WITH OTHER AGENCIES, CIVIL OFFICIALS, ETC.?

Information on abandoned mines is available in a great variety of ways across the country: Public access system at government library, Internet, Open File Maps, AMIS database, Public Archives, Microfiche files, Atlas, proposed MINFILE system, DIAND database, and the Federal contaminated sites database. There is the need for a national directory of abandoned mine databases in Canada.

### SOME COMMENTS ON DEFINITIONS

A number of terms have been used to describe abandoned mines. We should not confuse legal terms used by government agencies to fit various programs, regulations or policies. The important point is that we should be consistent in the use of terminology if we are to “red flag” abandoned mines for future mining exploration, public health and safety, land use, and emergency response. This is a long term issue for the benefit of our “children’s children.”

A) Unattended Mine, Inactive Mine: These terms can wrongfully convey the message that someone may return someday to look after the site.

B) Toxic Site, Waste Site, Contaminated Site: These terms have a narrow focus. Abandoned mines with no apparent toxic materials may not be included in a toxic/waste/contaminated site inventory.

C) Orphaned Mine: The term “orphan” is applied to a person when “one or both parents are dead.” It may incorrectly conjure up feelings of unfortunate circumstances, tragedy or sympathy when used to describe the status of a mine. This term may also serve to confuse the American principle of private ownership of minerals with the Canadian principle of mineral and forest reservation. We should not ignore our history and the principle established in the 1700's that the “bounty of nature” belongs to the public. In Canada all sites may eventually revert to the Crown. If good stewardship of the land is not practiced, we the taxpayers, will eventually have to pay the price.

D) Abandoned Mine: This definition is the most commonly used throughout the world. It conveys the thought that the site has been neglected or forgotten. There is no suggestion of ownership. The site could be forgotten or neglected equally well by mining companies, governments, the public and civic officials. This definition however, as with the others, may not include sites that have been rehabilitated to current standards.

E) For the future: In an ideal world all mineral deposits would be assigned a registration number when they reached the advanced exploration stage. This number would be maintained in perpetuity irrespective of any future activity such as underground exploration or mining development, abandonment or rehabilitation. The registration number would be used to track information on the site in a database available to all users of the land.

## SELECTED REFERENCES

Bolger, P.M., Z. Duszak, W.W. Koczkaj & W.O. Mackasey, 1995. Big Problems/Little Problems? - Applying "First Things First" Principle Towards Establishing a Management System (AMHAZ) For Prioritizing Abandoned Mine Hazards. Proc. Sudbury 95, Conference on Mining and The Environment. pp. 339-348: Sudbury

Mackasey, W. O., 2000. Abandoned Mines in Canada. WOM Geological Associates Inc., Sudbury, Ontario, 11 p. (Also available on the Internet at [http://miningwatch.ca/publications/Mackasey\\_abandoned\\_mines.html](http://miningwatch.ca/publications/Mackasey_abandoned_mines.html) )

Mitchell, A. & W.O. Mackasey, 1997. A systematic inventory of abandoned mines - A powerful tool for risk management. International Journal of Surface Mining, Reclamation and Environment, Vol. 11, pp. 83-90

Nelles, H.V., 1974. The Politics of Development, Macmillan of Canada, 514p.