

CHAPTER 7

LEGISLATIVE ENVIRONMENTAL RESPONSES

7.1 Introduction

The environmental awareness, that had been growing primarily in the developed nations after World War II, increased at varying rates within the developed nations and the continents. The degree and rapidity of responsive enactments by their individual legislative bodies varied within a period of some twenty years. As stated in the introduction, the Anglo nations of the world, particularly the United Kingdom, the United States and Canada, and to a large degree in the northern European countries and the EC, were advanced in having established some measures of environmental controls for industry through legislation of laws and regulations to conserve and preserve natural resources, to minimize or eliminate pollution of water and air, and to protect mankind and the health, safety, and welfare of his environment.

Perhaps only of passing interest, and without the intention of individual accolades, it appears that of the Anglo nations, the United States took an earlier, and certainly more aggressive, lead in totally regulating and establishing controls for improvement of the environment. It was the first to establish an all-inclusive, nation-wide Environmental Protection Act (EPA) in 1969-70. EPA's in the Canadian provinces started appearing about 1970. England did not establish a comparable, all-inclusive EPA as such, until 1990. That is not to say that neither the U.K., nor Canada, had not established some sort of statutory controls for the environment before those dates, but that the ultimate, the most far-reaching, all-encompassing, and most effective national environmental controls did not materialize until after that of the U.S.

Ordinarily, in the courts of the U.K.'s off-spring nations, references to and citations of older English law cases are not uncommonly given in Anglo-American litigation to prove a precedential and established point of common law. This has been true in the past and an accepted practice in Anglo-law courts, whether in Canada, U.S., Australia, New Zealand, et al. However, with regard to the new area of law, known as environmental law, there has been a noticeable citing in Canadian environmental litigation of American environmental precedential decisions of U.S. cases and references to American environmental regulations. A prime case example is *Regina v. United Keno Hill Mines Ltd.* [1980], 10 CELR 43, Canada. The Court's arguments are replete with references to U.S. environmental case law and law review articles. This may be attributable to the fact that this new area of law has not been established long enough to have built a background of case law history. With the U.S. having been at least a decade ahead of other developed nations in being more extensively regulated in pervasive and mandatory environmental

law, it is logical that other Anglo nation's systems would look at one with longer and more experience, regardless of its degree of success.

Environmental control in the U.K. has not been the sole bailiwick of any single governmental state department or agency. The English legal system in the area of environmental regulation has relied more on the agencies of public health and planning control, e.g., the Public Health Acts, the Town and Country Planning Acts of various dates, as amended; and more recently, the Control of Pollution Act 1974. In the decades since World War II, these acts have played a vigorous part in environmental aspects and pollution control through land use control by restricted and conditioned permitting and licencing. Canada and the other British Commonwealth nations have mirrored the U.K.'s Town and Country Planning Act with their own enactments of the same name. Various other acts, periodically updated with environmentally-concerned features, have augmented planning acts in the British Commonwealth nations, e.g Public Health acts of different dates as amended. There has not been a sweeping environmental protection act in England until 1990 bringing major aspects of environmental control that compared with the all-inclusiveness of the U.S.'s EPA of 1969. Admittedly, as in England, the same pattern of various segmented environmental controls occurred in the U.S. over years preceding enactment of the U.S. EPA. It is only that the U.S. arrived at the point sooner giving rise to an earlier experience with all-encompassing national environmental regulation. Thus, it had established a short history of environmental regulation and enforcement experience by 1980 which its sister nations had not yet developed.

Another aspect in the development of effective Anglo-American environmental law and regulation is the differential psychology of applied law in general, and environmental law in particular, between the British viewpoint and that of the United States. British law has a more laissez-faire or discretionary aspect to it with less "command and control", i.e., British people enact laws, but are less reluctant to flex their statutory muscles when persuasion can be used instead. This British attitude is discussed later in Chapter 8 under weaknesses and strengths of legislative acts. The Canadian attitude is reflective of the British. Generally speaking, a minority of people in the U.S., seemingly, and somewhat conversely, react successfully to "friendly persuasion", with a larger number reacting only to court-administered orders, punishment, penalties and sanctions. Thus, the U.S. federal government, having gone through a reasonable period of hands-off policy prior to 1969, felt the necessity for taking control of the nation's environmental protection with federal action. It had allowed the states the self-autonomy measure of voluntary, state regulated controls to meet federally recommended pollution standards. State actions had failed to make a marked improvement on the environment. The federal government, recognising the need for strong, centralised environmental controls, found that the only way to deal with correction for a cleaner environment was to enact strict environmental federal laws and to create a schedule of fines for violations and penalties for failure to meet scheduled

standards. Initially, sanctions for environmental law violators were limited to payments of fines, frequently large and severe, unless death or physical injury was a direct result of the violation. It was later determined that even large fines were not enough to deter all environmental violations, particularly by large corporations where payment of large fines might be more economically expedient than to change the manufacturing process to conform with environmental requirements. Consequently, jail sentences for environmental “crimes” have been created in law and are increasingly being carried out for violations. (See *infra*, Ch. 8 § 9)

7.2 United Kingdom

After World War II, Prime Minister Clement Atlee’s government brought about certain principals included in the Town and Country Act 1947 which are still held as basic tenets in the present regulatory scheme for environmental planning control. These still valid principals may be summed up as : (1) all land is subject to the jurisdiction of planning authorities ; (2) land development generally may not take place without permission of a grant by planning authorities; and, (3) permission should not be granted unless the proposed development accords with a publicly prepared plan for the land in question. (Hughes, 1986, p. 17)

The British cabinet created several “super-departments” in the early 1970’s, each headed by a Secretary of State, with one of them being the Department of the Environment. However, by 1976, the re-organisation of departments had degraded to a degree that made the Department of Environment’s function partially illusory. This was attributed to considerable fragmentation of environmental responsibilities.

Nevertheless, the Department of the Environment had responsibilities for the areas concerned in this study for:

- (1) the winning and working of minerals, which came under planning control;
- (2) commercial and industrial wastes, which came under pollution control; and,
- (3) water and water borne pollution, which came under its own Water Directorate as a part of the department.

7.2.1 The European Community Environmental Law Effect on the UK

The UK, as a member of the European Community (EC), is effected by the subsequent regulations adopted by the EC.

At its conception in 1957, the Treaty of Rome set out the aims for a European economic community in its Article 2: “The Community shall have as its task, by establishing a common market and progressively approximating the economic policies of member states, to promote throughout the Community a harmonious development of economic activities, a continuous and balanced expansion, an increase in stability, an accelerated raising of the standard of living, and closer relations between the states

belonging to it.” The only inference that can be made which implied an environmental concern would be with regard to the phrase “ raising of the standard of living”.

An environmental policy for the EC was proposed at its Paris meeting in October 1972. In November 1973, the First Action Programme for the Environment was adopted which reflected the region’s awareness of developed nations’ need for urgent action to treat environmental degradation. The Commission stated, “ To remain balanced, economic growth must henceforth be guided and controlled to a greater degree by quality requirements. Conversely, the protection of the environment is both a guarantee of, and a prerequisite for, a harmonious development of economic activities.”

The first of three consecutive EC Action Programmes for the Environment, 1973, 1977 and 1983, developed aims for the environment, e.g. :

- 1) the prevention and reduction of pollution;
- 2) the maintenance of a satisfactory ecological balance;
- 3) the rational management of natural resources;
- 4) the recognition of the importance of environmental aspects of development and in planning decisions; and
- 5) participation in appropriate action at international level. (Hughes, 1986, p.100)

With a decade of Community experience behind it, the Commission published in March 1984 its statement, *Ten Years of Community Environment Policy* :

“ The prevention of environmental problems arising at all is now the crucial principle; and a vital key point for the further development of the rational environmental policy envisaged under the (third) programme. That this has major implications for industry, for agriculture, for energy production and for transport is clear. The Third Programme commits the Community to the progressive (and preventative) integration of environmental aspects into the planning execution of all actions within these and other economic sectors that can have a significant effect on the environment. “ (id. p.101).

The statement evidences a shift in policy from the former reduction and curative treatment of environmental degradation to a new commitment of preventative measures for a cleaner environment.

7.2.2 EC’s Environmental Administration

The Commission is the driving force of the EC’s three major bodies, viz., the Commission, the Council and the Parliament. In promulgating environmental regulation, the Commission drafts the proposals, but only after consultative meetings with civil servants of the member national groups and other interested entities in environmental controls and concerns. The draft measure is then published, first as a Commission memorandum, known as a COM document, and secondly , in the Information and Notices section of the Official Journal, known as the “C” volume. Opinions are then sought and taken on the proposal by a committee from representatives of trade unionists, industrialists, consumers, environmentalists and professionals.

Although this solicitation of opinions from various groups is discretionary by the committee, the Commission takes them under advisement and may amend the proposal accordingly. The opinion of the draft proposal by the EC Parliament, however, is mandatory and has been upheld by the EC Court. In *Roquetre Frers SA v. EC Council* [1980] ECR 3333, the Court held “that failure to obtain the Parliament’s opinion invalidated a regulation subsequently adopted by the Council.” (*id.*, p. 102).

Adoption is the final stage in the decision-making process. Under EC’s Articles 100 and 235, the Community is empowered to make directives, make laws, regulations and administer actions in member states. Article 235 provides that “if action by the Community should prove necessary to attain, in the course of the operation of the common market, one of the objectives of the Community, and this Treaty has not provided the necessary powers ***. “, then the Community may take the “appropriate action”.

Three types of legally binding measures are empowered by EC Article 189, viz., regulations, directives and decisions. Regulations become law in the members states without any necessary action of corroboration by the national parliaments. The UK’s European Communities Act 1972, §2(1) confirms the precedence of EC law over UK law. That such EC regulations must be given precedence and superiority over member state’s national law was upheld in the *Amministrazione delle Finanze dello Stato v. Simmenthal SpA* (No.2), [1978] ECR 629, 643. Further, in the notable European Court of Justice case, *Algemene Transport - en Expeditie Onderneming Van Gend en Loos v. Nederlandse Tarief Commissie* [1963] ECR 1, the Court held:

“ *** the Community constitutes a new legal order of international law the benefit of which states have limited their sovereign rights, albeit within limited fields , and the subjects of which comprise not only member states but also their nationals. Independently of the legislation of member states, Community law therefore not only imposes obligations on individuals but is also intended to confer upon them rights which become part of their legal heritage. “ (*id.*, p104)

Directives are binding “as to the result to be achieved. . . but shall leave to the national authorities the choice of form and methods”. Implementation of the EC directive is left to the national authorities, but must take place within the usual two-year period, unless otherwise specified. In the UK, the European Communities Act 1972, §2(3) provides for the implementation of Community law.

Directives were for a period prior to 1974, thought and/or argued to have no direct effect on the member state. It was argued that the effect of EC directives would be undermined if individuals were not allowed to rely upon them in national courts. That point was finally ruled upon and made clear in *Van Duyn* [1974] ECR 1337, 1348, in which the Court held “it would be incompatible with the binding effect attributed to a directive by Article 189 to exclude in principle the possibility that the obligation which it

imposes may be invoked by those concerned.” Member state compliance and recognition of EC directives as ‘law of the land’ , called ‘effet utile’, was thus established giving it the same weight in law and courts as other national laws of member states. The point was further secured in *Becker v. Finanzamt Muster-Innenstadt* [1982] ECR 53 when the Court pointed out that normally where a directive is correctly implemented “its effects extend to individuals throughout the medium of the implementing measures of the member states concerned.”

It has been established that an individual can rely on the EC-based law against the state, i.e., “vertical direct effect”. However, a remaining point that has yet to be decided is whether a law based on an EC directive in a member state can be applied by one individual against another (called ‘horizontal direct effect”).

EC decisions are binding on member states to which they are addressed. It has been established as a fundamental principle of community law in the case of *Costa v. ENEL* [1964] ECR 58 that any direct-effective Community provision prevails over conflicting national legislation.

7.2.3 UK Water Standards and Pollution under EC Directives

As Jaqueline Minor points out in writing Chapter 4 of Hughes’ work *Environmental Law*, water pollution control has been an object of major attention of the EC’s environmental actions since its earliest days because it plays such a wide part in the lives of individuals and industry. (Hughes, 1986)

Under the 1976 EC directive number 464 (OJ L129), certain toxic and hazardous substances were listed and became the subject of attack for reduction in the inland, territorial and coastal waters. Mercury, cadmium , and other carcinogenic-causing toxic chemicals that are persistent and bio-accumulatable were listed. Less toxic, but still hazardous, chemicals were also targeted for reduction, e.g., zinc, lead compounds, cyanide and ammonia. However, as Minor points out, powers in the UK already existed to control the disposal of waste generally under the Control of Pollution Act 1974, and conferred to water authorities under its §31, enacted 31 January 1985.

A separate EC directive in 1980, number 80/68 (OJ L 20), augmented the above directive 464 by focusing on and controlling the discharge of dangerous substances into groundwater sources. However, the UK’s Water Act 1945, §18, had previously empowered water authorities to prevent the pollution of groundwaters; the Water Resources Act 1963 §72 prohibited waste discharges into groundwater by wells and boreholes; and, the Town and County Planning Act 1971, §§ 264-265, dealt with waste produced from mines and quarries.

Additionally, under the UK’s Water Act 1973, §1, the Secretary of State is empowered to restore and maintain the “wholesomeness of rivers and other inland waters.” §2 of the Act imposes “a duty on regional water authorities to prepare plans for restoring and maintaining the wholesomeness of rivers and other inland and coastal waters in their

area. *** These plans can then be enforced so far as rivers are concerned by use of the power to control discharges under Part II of the Control of Pollution Act 1974 relating to streams, specified underground waters, coastal waters.” (id, pp. 108-111)

7.2.4 UK Waste Disposal Standards under EC Directives

The EC’s waste management programme has established three objectives:

- 1) to reduce the quantity of non-recoverable waste;
- 2) to recycle and re-use waste to the maximum extent; and
- 3) to dispose safely of any non-recoverable waste.

These objectives have been augmented with various EC directives, e.g., # 75/442 (OJ L194) which “ encourages the prevention, recycling and processing of waste and ensure that waste disposal takes place without endangering public health or harming the environment ***. The ‘polluter pays’ principle is to apply, i.e., the net cost of disposal (after recovery or reclamation) is to be met by the producer.”

Various other directives have been issued, e.g., 78/319, OJ L84 (Toxic and Dangerous Waste); 76/403, OJ L108 (Disposal of polychlorinated biphenyls, etc.); 75/439, OJ L194 (Waste Oils). (id., pp. 122-123).

7.2.5 U.K. Environmental Impact Assessment

As noted, supra, §7.2.1, the EC’s Environmental Action Programmes emphasised the control, reduction and prevention of pollution, giving particular attention to its prevention in the planning, utilisation and management of natural resources. The planning stage would necessitate the ecological consideration for all major developments by preparation of an environmental impact assessment (EIA) To accomplish this goal, EC directives promulgated the use of an EIA in 1980, OJ C169 and by amendment in 1982, OJ C110. (id., p.125)

The purposes and goals for the EIA are the same as for those described in the EIA and EIS as directed by NEPA of the U.S. (see Ch.5 § 4.1 , supra). Major developments, as mining and waste disposal sites, would require an EIA upon development application in compliance with the EC directives. An EC directive instituting the use of an EIA for development was initiated in March 1985. It should be noted that whether the need is mandatory or significant for an EIA for new development is determined under the directives of Annex I and II.

The EC’s EIA must include: (1) the developer’s individually prepared EIA, wherein any adverse environmental effects are stated, steps for mitigation or reduction thereof, reasonable alternative sites, and reasons for their rejection; (2) a consultation with interested and concerned public agencies; and (3) the decision must be reasoned and may contain conditions for approval.

7.2.6 UK's Environmental Protection Act 1990 (UKEPA)

In November 1990, the British Parliament enacted an EPA which attempted to consolidate, amend and strengthen many of its other in-place environmentally protective acts. Its preamble, *res ipsa loquitur*, speaks for itself.

“An Act to make provision for the improved control of pollution arising from certain industrial and other processes; to re-enact the provisions of the Control of Pollution Act 1974 relating to waste on land with modifications as respects the functions of the regulatory and other authorities concerned in the collection and disposal of waste and to make further provision in relation to such waste; to restate the law defining statutory nuisances and improve the summary procedures for dealing with them, to provide for the termination of the existing controls over offensive trades or businesses and to provide for the extension of the Clean Air Acts to prescribed gases; to amend the law relating to litter and make further provision imposing or conferring powers to impose duties to keep public places clear of litter and clean; to make provision conferring powers in relation to trolleys abandoned on land in the open air; to amend the Radioactive Substances Act 1960; to make provision for the control of genetically modified organisms; to make provision for the abolition of the Nature Conservancy Council and for the creation of councils to replace it and discharge the functions of that Council and, as respects Wales, of the Countryside Commission; to make further provision for the control of the importation, exportation, use, supply or storage of prescribed substances and articles and the importation or exportation of prescribed descriptions of waste; to confer powers to obtain information about potentially hazardous substances; to amend the law relating to the control of hazardous substances on, over, or under land; to amend section 107(6) of the Water Act 1989 and sections 31(7)(a), 31A(2)(c)(i) and 32(7)(a) of the Control of Pollution Act 1974; to amend the provisions of the Food and Environment Protection Act 1985 as regards the dumping of waste at sea; to make further provision as respects the prevention of oil pollution from ships; to make provision for and in connection with the identification and control of dogs; to confer powers to control the burning of crop residues; to make provision in relation to financial or other assistance for purposes connected with the environment; to make provision as respects superannuation of employees of the Groundwork Foundation and for remunerating the chairman of the Inland Waterways Amenity Advisory Council; and for purposes connected with those purposes.”

7.2.7 U.K.'s Environmental Planning Concerns for Surface Mining

As recited in Ch.3 § 5, Conclusions, *supra*, surveys of the public in the U.K. have indicated a general accord that the main complaints from neighbouring residents near surface mines are for noise, dust, blasting vibration, and traffic. In one Mineral Planning Authority (MPA) survey in an area with predominantly sand and gravel pits, only 4% of the people considered “themselves or their homes to be affected”. Traffic and noise were the main sources for complaint. Of the 4%, lesser concern for water, landscaping and ecology/habitats was expressed. (Environmental Effects of Surface Mineral Workings, 1992, p.6).

An innovation of the U. K.'s TCPA 1990 is found in its §106, as substituted by the Planning and Compensation Act 1991. This section provides for a developer, e.g., mine

operator/landfill operator, to make unilateral undertakings, that is, to privately enter into an obligation to do certain things related to the development of the land in question by agreement, or otherwise, where the objective cannot satisfactorily be accomplished by a planning condition.

As an example, it has been stated that planning authorities may consider during the formulation of environmental criteria for planning conditions for an open cast mine site applicant, there may be instances “where the operator considers it economically unreasonable to carry out further amelioration at ‘source’ but where the effect on neighbours is still unacceptable. In such cases, if planning permission is to be obtained, the operator will need to consider other methods of reducing nuisance.” Such voluntary compensatory measures are acceptable to the planning authorities, and simultaneously assist the applicant to lessen or eliminate resistance to permission approval by irate prospective neighbours at public hearings. As an example, the Commission suggests that “providing compensatory measures off-site, such as sound-proofing of houses, or compensation by house purchase, payment or some other compensatory action can be useful ways of meeting performance criteria.” (op.cit., p.13).

7.2.8 U. K. Wildlife and Countryside Protection

Although rural land regulation may not play a large part in presenting obstacles to the proposed siting of an excavating operation, there are three environmentally protected special interests that cannot be overlooked. Agricultural land in the U.K. has historically had few environmental controls with the force of law. Typically British, the voluntary approach has been favoured by both farmers and the central government. A few, limited changes have been made in policy by the central government as control of stubble burning and implementation of water pollution in the Water Resources Act 1991. Even there, the legislation favours the voluntary approach. The Countryside Act of 1968, amended in 1981, and augmented by the Wildlife and Countryside Act 1981 (WC) imposes certain limited duties on ministers when considering diversification of enterprises of benefit to the rural economy. Part II of the WC Act is concerned with the conservation of nature and protection of the countryside. §28, as amended in 1985, lays down new provisions for the protection of sites of special scientific interest (SSSI). SSSIs are those containing any outstanding flora, fauna, geological or physiographical features. Notification of the location of any of the SSSIs must be given by the Nature Conservancy Councils for England and Scotland and the Countryside Council for Wales to the landowners, the Secretary of State and the local planning authorities so that damage to the sites by any planned operations may be avoided. By 1990, there were some 5,435 SSSIs listed comprising 1,713,840 ha of land.

In a second area, the prospector searching for a deposit of rock for aggregate mining, typically for a site with little or no overburden to remove, should be aware of a related area of natural resources protection, the Limestone Pavement Orders, which come

under §34 of the 1981 WC Act. Where a large area of exposed, or outcropping limestone, lying wholly (or partly) on the surface, usually as an extensive flat exposure, it is referred to as “pavement limestone”. A protective order may be obtained by filing with the local planning authority if it can be shown that it is an area of special interest by virtue of its flora, geological or physiographical features.

Where a Limestone Pavement Order has been filed and granted, the rock exposure is protected and removal or disturbance of the limestone is prohibited and deemed an offence. However, an Order may be revoked for a “reasonable” excuse.

A third area protected by environmental regulation is the coastline which may be included in the National Parks, AONBs or designated as “Heritage Coasts”. By 1990, there were 1,455 km of designated coastline to be protected. The National Trust has protected over 450 miles (724 km) of coastline in its “Operation Neptune”. Mineral development plans along unprotected shorelines would be highly scrutinized by the authorities. (Hughes, 1992, pp. 178-179).

7.2.9 Derelict Lands and Reclamation Regulation

The Survey of Derelict Land in England 1988 found some 40,500 ha. (100, 075 acres) classified as derelict, with 78% requiring reclamation. It was found that 29% of the waste land contained spoil heaps or piles from mining operations, mainly from coal mining. Though legislation dealing with derelict lands has been on the statutory books for many years, viz., in the National Parks and Access to the Countryside Act 1949, the Local Authorities (Land) Act 1963, the Local Government Act 1966, the Local Employment Act 1972 and the Local Government, Planning and Land Act 1980, they have been supplanted by the Derelict Land Act 1982. Restoration powers are supplemented by the Mineral Workings Act 1985, §§ 7 and 8. Local authorities are given the power to enter derelict lands, to search, bore, and where found to be hazardous to the public, to proceed with reclamation work without consent of those interested in the land. Notice of intent must be given to those with land interests. A new policy of financial aid may be found in the Derelict Land Grant Policy issued by the DOE in May 1991. (Hughes, 1992, pp. 191-193).

Hughes’ conclusions on derelict land are noteworthy: “The laws regulating land use in rural areas continue to be a microcosm of the confused state of environmental law and policy. They illustrate the fragmented nature of environmental control, with responsibility being divided, unnecessarily in many cases, between central government, local authorities and a range of statutory *ad hoc* agencies. The number of involved bodies could be reduced; the answerability of those remaining could be increased.” (Hughes, 1992, op.cit.)

7.3 United States

Miscellaneous Environmental Statutes Affecting Surface Mining are:

(i) Coastal Zone Management Act; (ii) National Historical Preservation Act; (iii) Wildlife And Endangered Species Acts; (iv) Criminal Penalties For Environmental Violations
(i) The Coastal Zone Management Act (CZMA) [(16 U.S.C. 1451-1464 (1988))] requires all coastal states to develop a management plan. There are approximately 30 states under the Act, viz., states bordering both Pacific and Atlantic oceans; states bordering the Great Lakes; Nevada and California bordering Lake Tahoe have also joined.

A state CZMA plan, approved by the US Secretary of Commerce, gives a state great power over activities , including permitting. A federal agency cannot issue a permit if the proposed mining activity is inconsistent with the state's plan. However, the states must operate under regulations of the U.S. Department of Commerce (15 CFR 930). Those regulations require a public-interest review process The applicant for mining must certify to the state that the project is consistent with the state's CZM plan. [See, supra *Florida Dept. of Environmental Regulation v. Goldring* in re. limestone quarry development. Under Florida CZMA guidelines, mining operations are presumed to be development of regional impact. For another CZMA case, read *California Coastal Commission v. Granite Rock Co.*, 107 S.Ct. 1419 (1987)].

As part of the Omnibus Budget Reconciliation Act of 1990, Congress enacted provisions which re-authorize and fund the CZMA until 1995.

(ii) The Endangered Species Act (ESA) (16 U.S.C. 1531): Federal permitting agencies are required to ensure that any proposed mining action will not jeopardize the existence of listed species, or adversely affect their habitat. Permits will be denied for mining projects that will harm any species or habitat. The applicant must provide project data and information for a "jeopardy opinion" from the U.S. Fish & Wildlife Service (USFWS).

For example, in April 1990, the USFWS designated the desert tortoise a *threatened* species. Mining activities on public lands in the southwest desert areas of California, Nevada, Arizona and Utah are subject to the consultation requirements of Section 7 of the ESA.

Other wildlife acts that could affect a mining project are: The Fish & Wildlife Coordination Acts; the Migratory Birds Treaty Act; The Bald Eagle Protection Act; the Wild Free-Roaming Horses and Burros Act; the Marine Mammal Protection Act; the Fisheries Conservation & Management Act, et al.

(iii) Historic and Archeological Sites:

Amongst the recent environmental land use controls are those protecting and conserving buildings and places of historical interest. Under the Archeological and Historic Preservation Act of 1979 (16 U.S.C.§469a-1) and the National Historic Preservation Act Amendments of 1980 (16 U.S.C. §470), the permitting agency is required to give the Advisory Council on Historic Preservation an opportunity to comment on any proposal that may affect properties listed, or eligible for listing, in the National Register of

Historic Places. It should be noted here that the forerunner of similar laws were enacted in the U.K. with the Ancient Monument Acts of 1913 and 1931.

Even more pertinent and affecting public mineral lands is The Native American Grave Protection and Repatriation Act [(Pub. L. No. 1011-106, 104 Stat. 3048 (1990))]: A provision of this new act concerns any development activity on public lands, that any person who discovers, or has reason to know, Native American cultural items in the course of activities such as mining, construction, et al, must stop all activity in the area of discovery and make a reasonable effort to protect the items, and notify the Secretary of the agency with primary management authority over the land. Mining and construction activities may resume following notification and after a reasonable period of time.

National Indian Youth Council v. Andrus, 501 F.Supp. 649 (D.N.M. 1980), aff'd. 664 F.2d 220 (10th Cir. 1981), is a leading minerals case to date in this area of environmental protection. In *National Indian Youth*, a federal mining lease was involved in an area of New Mexico where the Indian Council felt that native American archeological and paleontological culture was in jeopardy from mining. The Indians argued that studies and surveys should be completed before a lease was given. The court determined that the award of a mining lease did not constitute approval of a mining plan. The court further noted that to complete a cultural study on a 40,000-acre (16,187.8 ha) tract before mine planning for a mere 8-acre (3.24 ha) tract bordered on the "absurd".

(iv) Criminal Penalties For Environmental Violations: This subject is discussed supra at Ch. 8 § 9.3, U.S. Environmental Crime Punishment

7.3.1 Regulated Protection for Water Quality from Mining Effects

As preservation of water quality is an important and integral part of this work where surface mining occurs, and particularly for the subsequent recycling of open pits as solid waste landfills, a few examples of litigated cases resulting from environmental regulations concerning mining effluents and water purity controls are included.

In an exemplary regulatory response to mining, the USEPA tightened water pollution controls for mining's stream discharges. Illustrative cases follow:

7.3.1.1 Navigable Waters Pollution- Mining Discharge Violation

In *Rybachek v. U.S. EPA*, 904 F.2d 1276 (9th Cir. 1990), an Alaskan mine operator and the Alaska Miner's Association challenged EPA's regulations which dealt with treatment required for discharges of untreated dredged soil and rock directly into navigable streams. The EPA interprets dredged soil and rock as pollutants and requires settling pond treatment before discharge.

The Court found that EPA's classification of settleable soils as a non-conventional pollutant and subject to best available technology (BAT) standards was both a reasonable and permissible construction of the CWA. Congress had not designated settleable solids as either a conventional or toxic pollutant. As to its determination of economic achievability of technology, EPA must consider the cost of meeting BAT limitations, but need not

compare such costs with benefits of effluent reduction in promulgating regulations under the CWA. EPA was held to have considerable discretion in weighing technology's costs which are less important factors than in setting best practical technology (BPT) limitations.

From *Rybachek* of 1990, tightening of water controls for mining have increased from existing operations to those anticipated mining operations where even designated mining lands have been prohibited by being found "unsuitable" in preserving aquifers.

In *Village of Pleasant City v. Div. of Reclamation, Ohio, Dept. of Natural Resources*, 617 N.E.2d 1103 (Ohio 1993), the Ohio Supreme Court held that surface mine permitting required consideration of the long-range impact of mining on aquifers and the aquifer recharging area.

In *Pleasant City*, in September 1987, the U.S. EPA had designated 1,000-acres (404.69 ha) as a sole-source aquifer for Pleasant City. Following mine permitting of a company to surface mine 100 acres (40.47 ha) located in the City's designated aquifer-source area, over the opposition of Pleasant City, four monitoring wells were installed to determine whether the mining operations were affecting the village's drinking source wells. The mining company owned mining rights on additional acreage in the designated aquifer-source area.

In September 1988, Pleasant City filed a "Lands Unsuitable Petition" with the Ohio Division of Reclamation requesting that 833-acres (337.1 ha) of land surrounding the village be designated as unsuitable for mining. By October 1989, the Division issued a decision precluding mining in about 275-acres (111.29 ha) of the aquifer source area. That area approximated the present area of the cone of depression from which the town drew its water from the aquifer. On appeal, the Board of Review enlarged the area precluding mining, reasoning that future surface mining could negatively affect the town's cone of depression in the aquifer. Moreover, replacement of removed aquifer material with mine spoil could interrupt or alter the aquifer's recharge zone. Pleasant City appealed the Board's decision.

The appeals court found that the Board's order was contrary to law because it "merely protected the area of present usage of the aquifer and recharge areas." The court granted Pleasant City's request that all 833-acres (337.1 ha) be designated unsuitable for mining.

Appeal to the Ohio Supreme Court followed in which it held that "consideration must given to the impact of mining and reclamation could have on the long-range productivity of an aquifer and the recharge zone, not solely the impact on their current use as a water supply." However, the Supreme Court disagreed with the lower court's ruling that all the designated aquifer area may be unsuitable for mining. It stated that deference should be given to the Division's expertise in determining what additional area may be unsuitable for mining. The case was remanded to reconsider the necessary area.

7.3.2 National Pollutant Discharge Elimination System (NPDES)

In August 1990, the USEPA developed new rules for discharges into streams for industrial (mine and landfill) waste waters under §402, the National Pollutant Discharge Elimination System (NPDES) (40 C.F.R., Part 122) , more commonly known as “stormwater runoff”. NPDES permits are required for all mining and landfilling operations which may discharge waters into streams or onto the surface.

§402 regulates the pertinent category of discharges from industrial activities. The administrative burden of application preparation for an NPDES permit has been reduced considerably by general permits for certain classes of industrial dischargers. Permits are either individual, i.e., for one site, or general, for an entire group of similarly situated but separately located facilities. Aggregate operations owned by one company in a geographic area can usually qualify for the general permit because of (1) similar operations; (2) discharging the same type of waste waters; (3) have the same effluent limitations and operating conditions; (4) require the same or similar monitoring; and (5) are more appropriately controlled under a general rather than an individual permit. (Evans, 1994, p.59)

Stormwater Discharges Associated with Industrial Activity: The term “discharges associated with industrial activity” has been defined by EPA to mean “ a discharge from any conveyance that is used for collecting and conveying stormwater, and that is directly related to manufacturing, processing, or raw material storage areas at an industrial plant in any of the following eleven industrial categories: ***

3. Facilities in SIC (Standard Industrial Classification) codes 10 through 14 (mineral industry) including active or inactive mining operations *** that discharge stormwater contaminated through contact with overburden, raw materials, finished products, *** on the site of such operations; ***

5. Landfills, land application sites, and open dumps that receive or have received any industrial wastes, including facilities subject to RCRA (Resource Conservation and Recovery Act) Subtitle D;

6. Recycling facilities, including metal scrap yards, battery reclaimers, salvage yards, and automobile junkyards, including SIC codes 5015 and 5093;

7. Steam electric power generating facilities, including coal handling sites; ***

10. Construction activity including clearing, grading and excavation activities ; ***

As an example of a general NPDES permit, on May 31, 1994, the EPA issued a general NPDES permit for discharges from placer mining facilities in Alaska. The permit included effluent limitations and other conditions. [59 Fed. Register 28,079 (1994)]

As an example of a violation of discharging without a required NPDES permit, the east Bay Municipal Utility District and members of the California Regional Quality Control Board, as joint owners and operators of the Penn Mine were found liable for unpermitted discharges from a facility designed to capture, contain and evaporate contaminated mine

runoff. In *Commission to Save the Mokelumne River v. East Bay Municipal Utility District*, Env't.Rep. Cas.(BNA) 1159 (E.D. Calif. 1993), reaching its decision, the court found no immunity from liability and deferred to an EPA determination that a leachate collection and treatment area which impounded water prior to discharge constituted a "point source" requiring a permit. (For further information on the (New) Penn Mine, see supra, Ch. 3 § 4.2 (iii) Negligence - the case of *People (of California) v. New Penn Mines, Inc.*, which was an action for abatement of an alleged public nuisance caused by drainage of toxic mine and mill wastes into a river, resulting in damage to fish life.)

As a related example for permitting of discharges under the CWA, though not an NPDES permit required by §402, the following case was brought under §405 regarding sludge disposal in landfills. In *Sierra Club v. EPA*, 992 F.2d 337 (D.C. Cir. 1993), the environmental groups petitioned for review of EPA's regulation controlling the disposal of toxic substances and solid wastes at landfills. The Court of Appeals held that the EPA had acted reasonably and adequately explained its decision to dispense with numeric limits for toxic substances co-disposed with sewage sludge in municipal solid waste landfills. The court found that the EPA could not measure effects of chemical interactions between pollutants and sludge or between pollutants and solid waste, and that the EPA had insufficient data about the chemical composition of debris in typical municipal landfills and, thus, could not establish scientifically defensible numeric limits. (Id. at 340) (Garrett, 1994, p.256)

7.3.3 Acid Mine Drainage

The subject of acid mine drainage (AMD) is thought to be of little, relative import to the primary subject use and recommendation of non-metallic surface mines as landfills. Drainage from aggregate quarry spoil piles is essentially inert and thought to be ineffectual on groundwaters. Common rock (granites and limestones), as used in aggregates, contain ineffective and negligible amounts of sulphides and metals to cause acid rock drainage (ARD). The abundant locations of aggregate pits near population centres of volume waste generation make them more suitable as MSW sites. Metallic surface mines are fewer in number, generally more distant and less well-located with regard to population centres, thus making them of lesser import for solving the urgent need of MSW landfilling sites. However, the hauling distance to MSW landfilling sites has become of less economic import. As full restoration of all types of non-fuel surface mines is advocated herein by possible landfilling with waste, treatment of all surface mines' problems of AMD is touched upon. Furthermore, since unreclaimed surface coal pits have been mentioned herein as successful examples of MSW landfilling to full surface restoration (see Appendix A-1 §7.6 - Using Abandoned Surface Coal Mines for Landfills), even the problematic AMD from coal mines appears to be surmountable, at least for landfilling purposes.

AMD study and research programmes have been underway in recent years in attempting to neutralise acid drainage from metallic and coal mine and mill waste dumps.

One such programme, Mine Environment Neutral Drainage (MEND), with joint industry / government aid in British Columbia, has been active in the study. Studies at “the University of Saskatchewan have also been underway to monitor and model the moisture profile in soil covers over waste rock dumps. High moisture contents, if maintained, will significantly reduce the rate of oxygen transfer and thereby the rate of acid production. Optimum materials for covers can be selected. In addition, the use of water cover on tailings (subaqueous disposal) has been studied over the past six years as several sites in Canada as part of a MEND project. Work has successfully demonstrated that this method prevents sulphide oxidation and subsequent ARD problems in tailings.” (Robertson, 1995).

Other hopeful areas for treatment of and removal of contaminants from landfill leachates, and metals from mine and mill dumps and their water drainage are by bio-remediation methods. For discussion of treatment of leachates, see Appendix A-2 § 2.3.2, Peat -The New Waste Treatment “Wonder” Material.

Another prominent and highly hopeful vegetative method is phytoremediation which utilises plants that have affinities for metals and natural attributes for collecting them in their systems and removing them from polluted soils and waters. Of particular interest in this area are plants, shrubs and trees with high absorptive qualities (“metal up-take”) exhibiting the process, hyper-accumulation. Hyper-accumulator plants are those species that have the ability to accumulate excessively high concentrations of metals, e.g., cadmium, lead, zinc, cobalt, nickel, copper, chromium, manganese, selenium. Such plants can tolerate 10 to 100 times higher metal content than normal crops. These contained metal elements exist in ranges higher than trace elements, with concentrations exceeding 10^3 mg/kg (1%) in the plant dry matter, or 10 to 20% in the ash. Phytoremediation-agriculture offers a distinctive and possible solution for decontamination and removal of high metallic content of soils. (MEM, 1995 a,).

Farming or cropping of hyper-accumulator plants also offers a new, speculative possibility of economic metal recovery. The U.S. Bureau of Mines recently completed a preliminary study on farming hyper-accumulating plants as an environmentally-friendly method of extracting nickel from contaminated soils at mine dumps and wastes from industrial operations.

Research on the potential farming of metal hyperaccumulators gives indications that they could remove enough metal to decontaminate soil, making hay from the biomass, recycling the metals, and repeating the process over a period of years. Researchers in this area are suggesting that “phytomining” might be a viable, economic process with the plant ash becoming an ore that would at least offset the costs of decontaminating the soil. It is also noted that phytoremediation is purported to be a lowest cost method to decontaminate soils, being not only lower than engineering alternatives, but by far, more bio-friendly. (MEM, 1995 b).

Wetland treatment and use of microbial mats are other new methods being currently investigated. Authors of an article on wetland treatment of discharge waters from the abandoned Wheal Jane tin mine at Cornwall, U.K., have noted that "Some of the processes occurring in natural wetlands, such as the uptake of metals by plants, are relatively insignificant as mechanisms for metal removal."

However, they further note that "There are, in principle, a wide range of physical, chemical and biological processes operating within a wetland environment which can promote the removal of metals from acidic metal-rich mine drainage. These include the oxidation of dissolved metal ions and subsequent precipitation of metal hydroxides, bacterial reduction of sulphate and the subsequent precipitation of metal sulphides, the co-precipitation of metals with iron hydroxides, the adsorption of metals onto organic substrates, and metal uptake by growing plants. *** The conditions required for some processes are incompatible with the conditions required by others., e.g., conditions for precipitation of most metal hydroxides are incompatible with conditions for sulphate reduction, *** and the pH in most wetland environments rarely rises to the 7.5 pH level necessary for the precipitation of zinc hydroxide."

At Wheal Jane, the simulated shallow wetlands comprised a pre-treatment of lime dosing and anoxic limestone drain pre-treatment. A series of aerobic cells and anaerobic cells followed. The authors concluded that "Passive treatment using wetlands can have a significant advantage over conventional water treatment processes." (MEM/Dodds-Smith, Sept. c, 1995, pp.22-24).

In "Biotreatment of Mine Drainage", the authors note that "Microbial mats are being used to promote metal removal for mine drainage in Alabama and Colorado, U.S. These mats are a microbial consortium of blue-green algae and bacteria which are highly tolerant of toxic metals and harsh environmental conditions." (MEM/ Bender, Sept. 1995d, p. 25).

In a practical application for treating mine drainage, the West Glamorgan County Council and the National Rivers Authority co-sponsored a joint project to develop four wetland treatment systems for AMD from four abandoned coal mine sites in West Glamorgan, Wales. Iron-rich discharges are being made into the River Pelenna. Reportedly, each wetland has an artificial or clay liner, peat-free compost and reeds. The more acid discharges are channelled through anoxic limestone drains. Iron reduction is reportedly about 90-95%. (MEM, 1995 e, p.28).

7.4. Canada - Environmental Impact Assessments

As the Canadian provincial and federal governments have been confronted by jurisdictional overlapping of environmental problems, they have begun to realise that some

environmental issues, controls and laws for ecosystems cannot be confined within geographic boundaries. As noted by Canadian researcher Kennett at the Canadian Institute of Natural Resources Law, “Two events in the first half of 1992 added impetus to interjurisdictional concerns. First, the Supreme Court of Canada’s decision in *Friends of Oldman River Society v. Canada* (Minister of Transport) [1992] 2 W.W. R 193 (S.C.C.) (hereafter *Oldman River*) confirmed that environmentally significant projects will significantly trigger both federal and provincial EIA jurisdiction. Second, the enactment of the Canadian Environmental Assessment Act moved intergovernmental cooperation towards the top of the EIA agenda. According to the Canadian Council of Ministers for the Environment (CCME), ‘the focus should now be on negotiating bilateral federal-provincial agreements as soon as possible to ensure effective joint environmental assessment procedures.’ “ (Kennett, 1992, p.2).

Consequently, Canadian provinces in 1995 were still undergoing revisions of their environmental impact assessment (EIA) processes. “Treatment of interjurisdictional arrangements for EIA in provincial legislation presently varies considerably. Manitoba’s Environment Act sets out a general “equivalency” standard and specific requirements for joint assessment processes. More commonly, provincial legislation contains little or no explicit mention of interjurisdictional agreements and joint assessments. The Saskatchewan legislation merely gives the Minister authority to enter intergovernmental agreements. Conversely, in New Brunswick, there is no statutory reference to interjurisdictional cooperation on EIA. The reaction by the Minister of Environment for Quebec was that the act was ‘totalitarian’. *** British Columbia’s legislation recommends that the EIA process ‘should enable the province to work cooperatively with the federal government, neighbouring jurisdictions and local government.’ “(Kennett, 1992, pp.1-3).

The following discussions concern the current Canadian attempts to revise their environmental acts.

7.4.1 Ontario: The current law is the Environmental Assessment Act , R.S.O. 1980, particularly §5(3) which sets out the statutory requirements of an environmental assessment document, pursuant to sub§ 1, to be submitted to the Minister and shall consist of:

- “(a) a description of the purpose of the undertaking;
- (b) a description of and statement of the rationale for:
 - (i) the undertaking
 - (ii) the alternative methods of carrying out the undertaking, and
 - (iii) the alternatives to the undertaking
- (c) a description of;
 - (i) the environment that will be affected or that might reasonably be expected to be affected, directly or indirectly ,
 - (ii) the effects that will be caused or that might reasonably be expected to be caused to the environment, and
 - (iii) the actions necessary or that may reasonably be expected to be necessary to prevent, change, mitigate or remedy the effects upon or the effects that might be reasonably be expected upon the environment, by the undertaking, the alternative methods of

- carrying out the undertaking and the alternatives to the undertaking; and
- (d) an evaluation of the advantages and disadvantages to the environment of the undertaking of alternative methods of carrying out the undertaking and the alternatives to the undertaking. “

7.4.2 Alberta: The *Oldman River* case, as noted, supra, in § 7.4, was an especially contentious one in which feelings ran high between proponents of a dam being constructed in the late 1980's on the Oldman River in southern Alberta by the provincial government, and an environmentalist group opposing its construction.

The purpose of the dam was to impound water for storage and as a management facility for relief of an adjacent region subject to drought. Opponents contended that the provincial government had not obtained the proper federal permit for construction, and had not adhered to the environmental screening process required by the Environmental Assessment and Review Process Guideline Order. Whether the Order had the force of law, was a question at issue. Opponents were concerned over flooding destruction of fish habitats. The controversy is reminiscent of the U.S. *Snail Darter* case, except that no species was endangered. Another distinction was that dam construction was not held up for years by the on-going litigation and appeals by opponents. Construction of the dam was continued by Alberta throughout the litigation, although enjoinder of construction was sought and denied.

Oldman River was heard by the Supreme Court of Canada. Its decision affirmed the construction of the dam even though handed down in the year after the construction was completed. The Court did find that a section of the Navigable Waters Protection Act and of the Fisheries Act were sufficient to trigger the requirements under the Guidelines Order. The court justified the decision-makers' discretion to consider socio-economic effects of such a project, e.g., relieving a drought, as well as the biophysical environmental effects on navigable river waters, for without such consideration no dam would ever be approved.

Alberta's current environmental assessment (EA) programme for non-energy projects followed in the same year of the *Oldman River* decision. The Environmental Protection and Enhancement Act (EPEA) 1992, S.A.c. E-13.3, is a multi-stage process and provides for an initial review, a screening report, and a more comprehensive environmental impact assessment report (EIA). When the Natural Resources Conservation Board Act (NRCB), 1990, S.A., c. N-5-5., applies to a project, public hearings *may* also be held (i.e., discretionary). The procedure for determining how far a given project should progress through this process is central to the operation of EA.

The following pertinent information, central to the thesis herein, concerning the EPEA and NRCB process was given by Ms. Susan Blackman, an attorney-researcher for the Canadian Institute of Natural Resources Law at the University of Calgary in Alberta :

“ When the question is utilisation of ‘old quarries as municipal landfills, the municipal landfill would normally be approved by the local government, with appeals of that decision going to a public hearing before the very busy Development Appeal Board. The provincial environment department and the provincial public health department might render advice on the proposal to the local government and might appear at the hearing. The Natural Resources Conservation Board (NRCB) and the full brunt of the Environmental and Enhancement Act (EPEA) would not normally be brought to bear on the project unless the project was large, involved more than one government, involved hazardous wastes, or, perhaps generated a serious public outcry. So I think that most landfills would be exempt from environmental assessment under the EPEA, but would usually be subject to a Development Board Appeal public hearing. Arguably, the EPEA process is redundant and the issue is more properly considered by the local authorities rather than the provincial authorities..

“The following appear to be the most relevant parts of the regulations and the NRCB Act:

Alberta Reg. 111/93 (under the EPEA) includes under Schedule 1 for mandatory assessment: (b) a quarry producing more than 45,000 tonnes per year; ... (g) a surface coal mine producing more than 45,000 tonnes per year; ... (i) an oil sands mine... (aa) a landfill that accepts hazardous waste from an off-site source.

“Schedule 2 for exempted activities includes: ‘ (a) construction, operation or reclamation of ... (vii) a sand, gravel, clay or marl pit that is less than two hectares (5 acres) in size.’

“The Natural Resources Conservation Board Act (S.A. 1990, c.N-5-5) states: 4. The following are subject to a review with this Act and the regulations: ... (c) metallic or quarryable mineral projects; ... (e) any other type of project prescribed in the regulations; (f) specific projects described by the Lieutenant Governor in Council.” (There are no regulations yet.) Also, “6 In conducting a review under this Act the Board may (a) make inquiries and investigations and prepare studies and reports; (b) hold hearings or other proceedings; and (c) do anything that it considers necessary to carry out the purpose of this Act.’

“The following section is also important : ‘ 2. The purpose of this Act is to provide for an impartial process to review projects that will or may affect the natural resources of Alberta in order to determine whether, in the Board’s opinion, the projects are in the public interest, having regard to the social and economic effects of the projects on the environment.’

“If landfilling a quarry is considered ‘reclamation’, then a small quarry would be exempt from environmental assessment. And, this exemption may exist partly with the municipal landfill in mind (see Development Appeal Board above). “ (Blackman, 1996.)

The EIA report is the most detailed stage of review under EPEA. An EIA report is mandatory for certain classes of activities specified by regulation. For non-mandatory activities, statutory decision-makers have considerable discretion to determine whether this level of EA scrutiny is required. The extent to which legal constraints guide the exercise of this discretion is therefore an important issue for the EA regime.

An order to prepare an EIA report has two significant consequences: (1) it results in a detailed project review which must address the issues listed in §47 of EPEA, unless otherwise excepted by the Director. These issues include potential environmental impacts, including cumulative, regional, temporal and spatial considerations; the significance of

these impacts; and planned mitigation measures; (2) for several classes of projects, it triggers application of the NRCB Act.

The decision not to order an EIA report therefore precludes a public review. The Director is entitled to terminate the EA process if public comments are frivolous and vexatious. (Kennett, 1995, op. cit.)

7.4.3 British Columbia :

In recent years, British Columbia has had numerous, bitter environmental disputes over the utilisation of its well-endowed natural resources for commercial purposes versus disturbing its grand scenic topography and diverse ecological systems. The disputes have centered around the logging and mining industries, e.g., logging of old-growth forests at Meares Island, Lyell Island, the South Moresby archipelago, et al ; and for mining, expropriation of mining claims in Strathcona Park (see Ch.5 §5.1, Mineral Land Takings By Environmental Regulation and Expropriation cases of *Casamiro Resource Corp.* and *Cream Silver Mines Ltd.*), and more recently, the environmental planning taking of a planned world-class copper-gold deposit in a proposed provincial park in the Tatshenshini-Alsek region, northwest of Skagway, Alaska. (See Ch.10 § 4.1 -British Columbia).

Canadian Institute of Natural Resources researcher, Steve Kennett, has posed the question, “ Is British Columbia leading the way in natural resources management ?” by virtue of its greater experience and resolution of such disputes. As part of the environmental resolution, British Columbia has established the Commission on Resources and Environment (CORE). CORE has the “overall responsibility for developing a provincial land use strategy and reforming the processes for resources and environmental decision-making in British Columbia. ***

“ CORE was established in 1992 *** and established a new approach to land use planning and decision-making, ‘ one that will put an end to valley-to-valley conflicts’. *** ‘CORE’s role is not to resolve directly a multitude of local resource disputes, but rather to ‘design new processes for the future.’ “

The commission began its work by declaring an 18 month moratorium on logging on Vancouver Island which had become a top priority for CORE. The moratorium allowed the Commission time to study and formulate a regional land use plan. Subsequently , it used the same procedure to study the Windy Craggy mineral claims in the Tatshenshini-Alsek region.

CORE is a giant step in the right direction for land use planning. However, the undertaking of land use planning for an expanse of territory as large as British Columbia is staggering. British Columbia has an area of 366,255 square miles (948,600 sq.km.). Compared with the United Kingdom’s area of 94,226 square miles (2244,045 sq.km.), British Columbia is 3.89 times larger than the U.K. The population densities are equally startling: 9 per square mile for British Columbia, compared to 660 for the U.K.

Nevertheless, as argued in Ch.5 §4.7, Mineral Land Planning, supra, forethought or foresight is virtually unheard of with regard to mining and minerals in land use planning, that is, to set aside and reserve known land areas that contain certain valuable and unmined minerals. Forethought to reserving land areas for mining should be given to avoid future conflicts with other types of land uses, particularly recreational, park lands and scenic areas. Mineral deposits must be mined where they are found, but the ecology of mined areas can be restored.

7.4.4 Yukon Territory

Since the Yukon is not a province, its powers are limited to those granted by federal legislation. The Yukon Environment Act (YEA), Yukon Stats., 1991, c.5, was assented to May 29, 1991, but will not be fully in force until all parts are proclaimed in 1996. YEA is comprehensive covering many new areas, e.g., solid waste management, reduction and cycling, release of contaminants and spills. It also provides for integrated resource planning and management; development assessment process for close integration with the permit stage, to be applied under a forthcoming Yukon statute, the Development Assessment Process Act; and, finally, it provides for citizens suits to be brought against any person "likely to impair the natural environment" or the government of the Yukon "for failing to meet its responsibilities as trustee of the public trust to conserve the natural environment." The Act is generously armed with provisions, giving it "teeth", to pursue alleged violations, e.g., offering protection for employees against retaliation for "turning in" their employer, and for monetary rewards in keeping levied fines upon violators after bringing successful private prosecutions.

7.5 A Negative Legislative Response - Withdrawal of Potential Mineral Lands

The Shrinking Mineral World: As a result of the strong tide of conservationism and the governmental responsive legislative actions, one of the major problems that currently threatens activities of the mining industry, especially in the developed nations, is the governments' withdrawals of huge land areas and acreages from mineral prospecting. These massive areas of potentially mineralized lands withdrawn from exploration, or placed under highly restrictive regulations severely limiting access for exploration and mineral development, are on lands set aside for national, state and provincial forests and parks, wildlife habitats, fish and game preserves, world heritage areas, native lands, seashores, coastal management zones, recreational and primitive areas, et al. The volume of "environmentally sensitive" lands steadily mounts at the public clamour for cultural preservation and conservation without regard to the severe reductions being placed on the area of mineral-base lands from which future mineral production for society might come. As said before, minerals must be mined where they are located. When the world's base-

area is greatly reduced by massive land withdrawals from mineral prospecting, the future potential for mineral production is similarly greatly reduced; or said another way, as the untouchable lands grow in number and area, the world's potential mineable mineral deposits correspondingly shrinks.

This argument is supported by a document published by The Australian Mining Industry Council entitled "Shrinking Australia" which treated the problem of access to land, and announced that "29% of the area of the State (of South Australia) is either closed or severely restricted to mineral and petroleum exploration". In 1988, the Council predicted that "about half of Australia's land area will be severely restricted or prohibited to exploration and mining unless the current growth in conservation areas, particularly protected wilderness and aboriginal lands, is reduced sharply, or existing restrictions applied on these lands are relaxed." It has been noted that cultural affluency of the developed countries has passed the point where untouchable lands have far greater consideration and priority than does the economy and mineral development within their

borders. [(Aston, 1993a) - In an article, "Enviromining Law" referring to an article "Environmental Policies Towards Mining in Developing Countries" by Professor Thomas Walde, Editor of the International Bar Association's *Journal of Energy and Natural Resources Law*, Professor Walde points out that in the developed countries of the North, "*** mining is no longer automatically assigned precedence over other land-uses, and environmentally (socially or culturally) important land is no longer available for mining."]

Governmental withdrawal of public lands from mineral prospecting and mining activities has been prevalent in Canada and the U.S. Of consequence to this work is the concern that surface mining as a part of mining will be reduced, not only severely reducing the supply for minerals, but thereby reducing potential voids for landfill sites during their reclamation process. This concern is predicated on the hypothesis that substantially all open pit mines could and should be fully reclaimed by infill of wastes before restoring the surface to its original contours and surface. If the natural state of the worked-out mining pit is found to be suspect of having natural leaks into the groundwater, the thesis herein is predicated on modern technology's ability to repair it; that it can be made leak-proof and safe by proper lining methods to hold solid wastes. Further contention is that it can be made safer than any landfill placed in soil or overburden. Treatment of this mining-landfill process in preserved land areas is made in Appendix A-1, *infra*.

7.6 Conclusions and Comments

The two major approaches of the application of environmental law to effect the desired environmental improvements of this thesis are: (1) that of the British, visually, a discretionary and persuasive manner of obtaining compliance for established law and new regulatory developments, and (2) the U.S. approach of a "command and control" system for established law and new regulatory developments.

The Canadian approach in the past has been understandably more like that of Britain, employing government discretion and persuasion, than of the U.S. There is a notable change, however, in recent years, in which environmental regulation appears to be patterned increasingly after U.S. environmental regulations which allow the public to have a larger input and influence through public hearings. However, as part and parcel of emulating the American way, increased contention and litigation over environmental issues have also accompanied the increased Canadian public participation. In support of this changing Canadian attitude toward environmental law are the following statements .

In an article entitled, “ Environmental Law and the Greening of Government: A Cynical Guide”, a book reviewer states “One conclusion *** is that the constant in the development of environmental law in Canada has been the dogged retention of discretion by government. As environmental laws have been dramatically altered and the public increasingly included, the influence of the regulated community has been diluted for there is by no means a real sharing of power over decisions.” (Wood, 1995)

Another, similar article entitled “Environmental Groups and the Courts: 1970-1992” is one in which the author complains about the lack of input by the public. In it, the author traces the number and type of public interest environmental law suits brought in Canada since 1970. The reviewer commenting on the author’s article states, “There has been a relatively low level of such litigation, as compared to the United States, although it has been increasing since the end of the 1980’s. Even though most of this activity has focused on the actions of governments rather than those of business, *** many in business in Canada feel the rate of public interest litigation is ‘already out of hand in Canada and any further growth is unacceptable’ and are working ‘to impede the ability of citizens to bring [such] suits .’ Examples of such strategy include the efforts *** to revoke public funding for Elgie’s group, the Sierra Legal Defence Fund, and the avoidance of litigation written into the new Ontario Environmental Bill of Rights.” (op.cit., p. 469).

While both authors of the preceding articles complain there is a lack of environmental litigation in Canada, and that the public has only illusory input into the environmental “say-so” of their country, the statement in Ch. 3 §3.3 by a Canadian natural resources attorney explains the scarcity of Canadian litigation by commenting that “Canadians are far less litigious than Americans, and where there are such contentious matters, Canadians tend to resolve them without court involvement.” Though other conclusions may undoubtedly be drawn, a suggested one is that the British and Canadians place more confidence in their elected leaders’ direction, “discretion” and judgement, and are more willing to follow them without litigating. Americans, on the other hand, are more dissenting, litigious and prone to squabble. Environmental litigation in the U.S. is so prolific that environmental progress is actually impeded. In keeping with arguments here, it proposed that “command and control” regulation apply to permission, permitting, and environmental regulation for surface mining and landfilling. The statement of the

University of Senior (Environmental Law) lecturer Hughes' (see Ch. 8 § 3.1) that British "Planning law has not historically been generally over-concerned with giving third parties rights at the development control stage. " would seem to coalesce with command and control environmental regulation.

The determination of which is the better system is questionable and arguable. Each has its merits and its drawbacks. Arguably, to allow too much public input in the approval process leads to prolonged public hearings, results in increased contention and conflicts, impedes environmental progress, and is generally not conducive to serving the general public's welfare. Useful and beneficial projects to the public may be thwarted or easily defeated by a vocal and militant minority. The argument is here injected that the public hearing process for approval should be minimal, and not required in all cases of public and private development. Public reliance should be placed on the technically-trained environmental agencies that have been emplaced by the government to protect the environment, public welfare and health, not in placing reliance on the non-technically educated lay public that is often subject to unfounded fears, misinformation and hysteria, as in the NIMBY syndrome.

SECTION III

TRANSITION FROM PRESENT TO FUTURE

CHAPTER 8

TODAY'S ENVIRONMENTAL REGULATORY STRENGTHS AND WEAKNESSES FOR TOMORROW'S NEEDS

8.1 Introduction

Two of the principal problematic regulatory areas affecting the irreputed "bad neighbour" industries of concern here are : (1) the planning approval, public inquiry process (PIP) and licencing permission ; and, (2) mineral lands withdrawal reducing the mineral base.

8.2 The Public Inquiry Process (PIP)

The PIP is principally encountered after the land use, or zoning, has been approved, for general industrial use. A host of publicly sensitive areas precede, or occur during, the applicant's licencing process, as aesthetics (visual intrusion), road traffic, noise, dust, injury to natural beauty and scenic areas, and to minor degrees, historical, aboriginal and cultural areas. These problems are the most difficult to deal with in persuading and assuaging the lay public that their fears are exaggerated or unfounded and can be dealt with in a satisfactory, environmentally-safe manner. Although the engineering profession knows that environmentally sensitive problems affecting groundwater, drinking and surface water sources, air contamination, landscaping, road traffic, et al, introduced during the public hearing process, can be treated successfully by modern technology, the general public remains skeptical. Apparently little trust is placed by the public in governmental environmental regulation and engineering feats for industrial sites. Their fears frequently succumb to the NIMBY syndrome. The problem for the so-called "bad neighbours" is that the NIMBY syndrome is becoming universal. As Justice Dooley of the Vermont Supreme Court so aptly stated concerning the NIMBY syndrome, "We are in serious danger of expanding 'not in my backyard" into 'not anywhere' ". (See *In Re Meaker*, 588 A.2d 1362 (Vt. 1991), *infra*).

Once an area's land use planning, or zoning, is resolved with intelligent foresight and the public accepts the fact that excavations for minerals and waste disposal are essentials for mankind's welfare and for the public's good, health and well-being, the remaining problems for keeping the environment safe can be overcome and dealt with

through modern technology and enforced by properly trained governmental agency technicians and personnel.

The weaknesses of the land use and permitting procedure, prior to actual permission, permitting or licencing of a mining or landfill project, are the frequently incurred and prolonged delays by public hearing appeals, excessive or unnecessary administrative and litigation costs. This often results in defeat for a much-needed site for the general public's benefit, which, in turn, means that the expensive public process has to be repeated for each new proposed site.

It is therefore, strongly advocated that the general public's participation should largely terminate, or be greatly reduced, with the land use permitting process. Once the public has participated, aided and approved in determining that certain land areas must necessarily be reserved for certain uses, including permissible areas for excavations for minerals and the depositing of MSW, the deployment and monitoring of such excavations in the permissibly approved areas should be left to the determinations and supervision of scientists, engineers and technologists skilled in environmental protection. Further involvement by the lay public and placing reliance on the unscientific whims as generated by unbased or misinformed fears of environmental damage and the NIMBY syndrome only serves to vexatiously delay essential excavation projects. They incur added and unnecessary public inquiry process, superfluous environmental protection costs, and generally compound the problems and conflicts. In the case of urgently needed landfill space, the delay by prolonged public hearing process only serves to exacerbate the urgency.

Ultra-expensive, ultra-extensive and intricate scientifically-based environmental programmes have been emplaced in the Anglo-nations for the public's protection. For the greater part, the environmental protection programmes are administered by well-informed governmental agencies placing reliance on scientists and technology for environmentally-safe procedures. Agencies are in a far-superior position to the lay public's to determine, assure and resolve environmental protection for the public. Hence, reliance by the public should be placed in them and on their decisions without further public involvement, agitation and prolonged conflict.

8.2.1 A Prime Example of Disruptive Public Hearing

A prime example of disruptive public interference based on unfounded information, continuing long after extensive natural resource planning by the central government for the public welfare, is illustrated by the U.S. Tellico River Dam site and construction controversy about 1971 in Tennessee. Environmental fears fanned by environmental groups through the media swept the U.S. incurred extremely high costs to the public for years of litigation up to the highest court of the land, finally requiring resolution by the U.S. Congress. The end result was that dam was finally extricated from the environmental controversy by the government over-ruling the environmentalists'

objections, put into service, and the environmental fears evaporated upon discovery that they were unfounded.

The environmental controversy arose when a federally approved and financed dam was being constructed in a rural, mountainous area of East Tennessee at the confluence of the Little Tennessee and Big Tennessee Rivers. The area was one of great natural beauty and minor historical importance. The area to be flooded contained several ancient sites of Indian villages, whose archeology had not been explored, and Ft. Loudon, established in 1756 as England's southwestern outpost in the French and Indian War. An area of 16,500 acres (6,677.46 ha), some of which was valuable and productive farmland, was to be inundated by damming of the rivers to form a reservoir 30 miles (48.28 km) long.

Between 1967, when Congress first appropriated money for the project and every year until 1972, the dam, although virtually completed, never operated due to a tangle of lawsuits and administrative hearings brought by environmental groups attempting to stop the dam. An injunction was finally granted in 1972 to halt the dam, and remained in effect until 1973 when a federal court of appeals lifted the injunction on finding that the EIS for the sit was in compliance with NEPA. [*Environmental Defense Fund v. Tennessee Valley Authority* (TVA), 371 F.Supp.1004 (E.D. Tenn, 1973); aff'd.492 466 (6th Cir.1974)]. Unfortunately, that was not the end of the controversy for the Tellico dam and the conflict continued for nearly six years more.

Just prior to dissolving the injunction, a University of Tennessee ichthyologist while exploring the Tennessee River waters discovered a previously unknown species of perch, the snail darter, a 3-inch (7.62 cm) long fish whose numbers were estimated to be in the range of 10,000 to 15,000, and one of some 130 known species of darters. Four months after the snail darter's discovery, Congress passed the Endangered Species Act (ESA) of 1973. The ESA authorized listing of species of life that are either classified as "endangered" or "threatened", and to protect their habitats from destruction. In January 1975, the anti-dam environmentalists resumed their opposition to the dam's completion by requesting a rating of "endangered" under the ESA for the snail darter. Having been listed as an "endangered" species with its habitat described as critical, the Secretary of Interior found that "The snail darter occurs only in the swifter portions of shoals over clean gravel substrata in cool, low turbidity water. Food of the snail darter is almost exclusively snails which require a clean gravel substrata for their survival. The proposed impoundment of water behind the proposed Tellico Dam would result in total destruction of the snail darter's habitat." Thus, the small fish became a *cause celebre* for the opponents to the dam. The dam's relief was short-lived with the lifting of the injunction, only to be impeded a year later by further litigation. In 1976, a permanent injunction against dam completion was issued [*Hill v.TVA*, 549 F.2d 1064 (6 Cir. 1976)] "halting all activities incident to the Tellico Project which may destroy or modify the critical habitat of the snail darter." *id.* at 1075. The Court of Appeals "directed that the injunction remain in effect until Congress,

by appropriate legislation, exempts Tellico from compliance with the Act, or the snail darter has been removed from the list of endangered species, or its critical habitat re-defined." Ibid. A final appeal was made to the U.S. Supreme Court, 437 U.S. 153 (1978), which affirmed the Court of Appeals' decision that the ESA as written by the Congress, made no allowance for exceptions and the Courts had no alternative than to halt the federal dam project. The Supreme Court said, " It is clear that TVA's proposed operation of the dam will *** have the effect of eradication of an endangered species. Concededly, this view of the Act will produce results requiring the sacrifice of the anticipated benefits of the project and of many millions of dollars in public funds." (Actually, \$100 million had been expended in dam construction costs up to the injunction, not inclusive of litigation costs in defending the federal project's continuance.)

"As a result of the *Snail Darter* case, Congress *** in 1979, legislated an exemption for Tellico Dam and the project was " completed. (Schoenbaum, 1985, p. 399).

Ironically, the near-decade of delay in completing the dam and the millions of dollars spent on litigation was, in the end, found unnecessary and based on erroneous environmental fears and false reports. The snail darter's occurrence and habitat at the dam site was not the only one in existence. Since the initial discovery of the snail darter, several other populations and locations away from the proposed dam site were found. The fact is that the snail darter was never an "endangered" species. The U.S. Fish and Wildlife Service announced that it was removing the snail darter from the "endangered" species list. Professor Schoenbaum poses the question, "Was the environmentalists' primary purpose in the *Snail Darter* case to save the fish or to stop the dam ? "

The *Snail Darter* conflict is exemplary of costly problems created by leaving determinations to hearings with the lay public; so-called environmental problems that frequently have already been investigated and determinations made by environmental and scientific professionals.

8.2.2 Other Examples of Public Protest Interference

A December 1995 editorial in *Mining Environmental Management*, London, treats the subject in more detail:

PUBLIC MISUSE OF THE MINERAL REGULATORY SYSTEM

" There have been a number of events, recently, which indicate a trend whereby project permitting no longer follows the path laid down by the legislation of that country. An extreme example of this happened earlier this year when Shell U.K. tried to implement a plan to dispose of the derelict Brent Spar storage buoy in deep water off northwest Britain. Activists, led by Greenpeace, mounted an extremely vocal opposition to the proposal, insisting that Brent Spar be disposed of on land. It had taken over three years of research and negotiations with the government to finalise the details of the plan. All along, Shell insisted that its proposal was by far the safest. Media exposure reached fever pitch until Shell capitulated and said it would rethink the options. Greenpeace has since apologised publicly, admitting that it had miscalculated the quantity of potential pollutants.



Illustration removed for copyright restrictions

8.3 Land Use Planning - In General

Land use planning in the U.K. under its Town and County Planning Acts is possibly the most advanced of any nation in the world, and certainly so amongst the three Anglo-nations herein studied. Its provisions and considerations are without doubt most far-reaching extending to most all human activities. Although land use planning is not mainly environmental in nature, but managerial, its designs perhaps make environmental regulation and control more systematic, and consequently more efficient and manageable.

The U.K. appears to be well-advanced over the U.S. and Canada in environmentally regulating regional areas as evidenced by its Town and Country Planning Act, and as amended. Perhaps its advanced regional land use planning may be attributed to the much smaller size of the nation, in that closeness of population forced stricter control and planning of land uses in an attempt to making living in close-quarters more comfortable and compatible and with less friction. With the comparative sizes of the U.S. and Canada being about 38 times larger than the U.K., “closeness” or crowding has not yet been an overall compelling consideration for detailed land use planning in the two larger countries. However, crowded conditions or more dense populations in the eastern, Atlantic and Maritime coastal areas of both the U.S. and Canada, and more recently in the growing Pacific coastal areas of both nations, are seeing the need for megalopolis and regional land use controls. However, as noted in Chapter 7, at §4.3, British Columbia, with an area 3.89 times larger than the U.K, has undertaken a staggering land use plan through its Commission on Resources and Environment (CORE).

Especially in the U.S. and Canada, several areas of environmental regulation are in much need of overhauling with respect to need of larger area authorities, as opposed to state and provincial control, particularly in the areas of land use planning, navigable rivers, surface and groundwaters, solid and hazardous waste landfills and surface mining pits as disposal sites.

8.3.1 Land Use Planning - U.K.

Planning of land use in the U.K. has been controlled by the Town and Country Planning Act (TCPA) since 1932 and its various updated amended acts over the decades with the latest act in force being that of 1990. The Act’s very title word “planning” implies that plans are not irrevocable, but serve more as a methodical guideline for intended best land use and its development. In fact, reviews must be periodic and constant. There is a general limit of between 10 and 15 years on approved plans, which must then be re-appraised or re-planned.

Under TCPA, three development plans are statutory in nature: (1) unitary development plans, which apply to metropolitan areas; (2) structural plans, which apply to ‘shire’ counties and districts; and (3) local plans, which also apply to ‘shire’ counties and districts. In addition, non-statutory plans exist to fill temporary needs, but only until a statutory plan is passed. It should be noted that “local plans must not contain policies on winning and working minerals or mineral waste deposition, save for those plans relating to National Parks, nor similarly, any policies on waste or refuse deposition.” (Hughes, 1992, p.113). Under Chapter 8, §37 of the TCPA 1990, mineral planning authorities are required to prepare any Minerals Local Plan (MLP) (other than within National Parks) containing the formulated and detailed policies of winning and working minerals or the deposition of mineral wastes. §38, similarly, deals with the making of Waste Local Plans (WLP) with respect to refuse and waste deposition. These plans, filed with the Secretary of State, must

reflect central government guidance in the form of planning policy guidance (PPG), mineral planning guidance (MPG) and regional planning guidance (RPG) (RPG's generally extend over a 15-year period).

Public participation for commenting during the proposal-making process is provided for by sections of the TCPA and objections are considered by the Secretary of State, who has very wide discretion. The Secretary may hold an examination in public on any specified matter. As noted by Hughes, "The examination is not a public inquiry in the full sense*** for no person has a right to be heard***." Hughes also observes that, "Planning law has not historically been generally over-concerned with giving third parties rights at the development control stage. *** Nevertheless, there are publicity and notification requirements in the 1990 Act." (Hughes, 1992, p. 112, 126.)

A noted difference between the nature of British and U.S. concern for meeting environmental problems is in the setting of pollution standards for planning consents. As stated by the U.K.'s Undersecretary of State for the Environment in March 1992, "The adverse effects of a working can be significant even though the operations conform with a standard, are within the terms of the planning consent, or conform with a code of practice. A standard is a compromise between the costs of control and the benefits to be gained; a standard rarely seeks to avoid any adverse impact. Planning consents are likely to take account of local conditions and sensitivities." (op.cit., p. 5)

From a U.S. viewpoint of environmental protection, that statement evidences a difference in attitude for environmental standard-setting and compliance to obtain improvement of quality for the environment. In the U.S., pollution standards under its EPA are rigid and applied uniformly nation-wide. Ultimate, obtainable standard goals were set to obtain zero pollution. Where they could not be reached at the time of setting of the standard because of lack of technology or for extremely different conditions from the national norm, intermediate standards and time limits were set, but only to be considered as a time-limited step to the ultimate zero-pollution goal. For example, under the USEPA air pollution standards, nation-wide standards were applied, but temporary exceptions were only made where approved progressive time schedules were approved in certain metropolis areas affected by intense smog conditions, as in Los Angeles, et al, not being the national norm.

To state that "*** a standard rarely seeks to avoid any adverse impact " is arguable under the USEPA. An adverse impact, large or small, by a proposed project subject to an EIS in the U.S. is likely to meet with defeat. Such statement is evidenced by the Tennessee Valley Authority's nearly completed dam at Tellico, Tennessee, in 1972, which came very close to being a multi-million dollar monument to a falsely reported endangered species of fish. Moreover, it is highly debatable whether the snail darter was of sufficient socio-economic consequence compared to those benefits of the dam, particularly when it is

considered that the snail darter was only one of 130 unendangered species of the darter. (See the review of the TVA “*Snail Darter*” case, supra at § 8.2.1.)

Under the TCPA 1990 §53, “development” is described “as the carrying out of building, engineering, mining or other operations in, on, over or under land, or making any material change in the use of land***”. There are two divisions of development, viz., operational development, and, making material changes of use.

As defined by the courts, operational development generally requires physical alteration of the land with some degree of permanence. (See *Parkes v. Sec. of State for the Environment* [1979] 1 All ER 211.)

“Material change” development is much more elusive and difficult to define. The courts have had difficulties in deciding whether there has been a ‘material change’ in a land use. It may involve an intensification of the present use as illustrated in the case of *Brooks and Burton Ltd v. Secretary of State for the Environment* [1978] 1 All ER 733, where the annual production of concrete blocks quadrupled from 300,000 to 1,200,000. In other cases, constant but small progressive intensification of a use is difficult to detect when it reaches a point of change of character.

Under §55(2)(f) of the TCPA 1990, Use Class Order 1987 SI 1987/764, six broad categories with subdivisions of land uses are given. Change within a use class will not be considered an act of development. However, a change across classes may be considered development, if it is ‘material’. No categories are specified for excavations, either mining or landfilling, but certain ancillary mineral processes are, as, mineral crushing, cement production, brick or lime burning, and smelting works.

A reading of British cases litigating whether there has been a ‘material change’ constituting development frequently results in a feeling of “much ado about nothing” or that there is much nit-picking and a wasting of time over seeming irrelevant aspects of land already in use. Nevertheless, the statutory approaches of British land-use commendably include collaborative planning with trained, mining and waste-knowledgeable personnel for consideration of future area mineral and waste excavation requirements.

8.3.2 Planning: Voluntary vs. Mandatory Compensatory Measures

The Planning and Compensation Act 1991 provides for developers as mine and landfill operators to make unilateral undertakings. By way of further example, if allegations are made by neighbours at a public hearing for an applicant’s new site, or for extension of an existing site, to loss of water in their wells, the developer might well offer to provide piped-in water, or alternatively to drill a new, deeper well, if such a water loss occurred. Such conditional guarantees by the applicant developer of correcting a nuisance or a wrong before the event occurs are less onerous for both parties than the alternative of “going to court” over an actual incident, and at the same time alleviates the friction at the hearing between the developer and the public.

As noted by the U.K. Commission in its 1992 Research Report on Environmental Effects of Surface Mineral Workings “Compensatory measures are seen by some operators as a valuable approach but, whilst there seems to be some willingness to compensate communities as a whole, there is a reluctance to compensate householders directly, e.g., by money, sound-proofing (a home), an offer to buy. It is recognised that operators inevitably make a contribution to the local economy in the form of rates and the provision of employment. In some cases their workings remove existing dereliction. *** Guarantees, e.g., to provide piped water if wells dry up, are more conventional. These conditional offers are likely to be less onerous for an operator than providing facilities before the event. They have the drawback that problems have to occur first, but can ensure that a remedy is provided without too much argument and delay.” (id. pp.114-115).

As an illustration of the difference between the British voluntary style of pre-mining negotiations between operators and community residents are the following two U.S. case occurrences. A distinguishing difference between the two acts, i.e., Planning and Compensation Act 1991 and the U.S.’s SMCRA is that the British act encourages voluntary interaction, while the U.S. act is mandatory adjustment.

In the following case, voluntary compensatory amelioration would have been preferable to the ensuing and costly litigation.



in the event that an operator's company should dissolve, change ownership or enter bankruptcy. " (Aston,1995 b)

In a second illustration under the U.S. SMCRA, duplicated by the West Virginia state version, the Surface Coal Mining and Reclamation Act (SCMRA), a similar claim of loss of a private water supply was litigated in *Russell v. Island Creek Coal Co.*, 389 S.E.2d 194 (W.Va.1990).

Russell had conveyed the surface rights for coal mining on a 60-acre tract adjacent to his homesite. During 1983, the 60-acre tract was mined and Russell alleged contamination of his spring supplying his home with water. For several years, Island Creek voluntarily attempted to rectify the problem for Russell by drilling a new well and by installing a purification system, both of which failed to correct the contamination. In *Russell*, the West Virginia Supreme Court of Appeals held that the provisions of the WVASCMRA require a coal operator to replace the water supply of an owner of interest on real property whose water supply has been affected by contamination, diminution, or interruption approximately caused by a surface mining operation.

As an aside in *Russell*, it should be noted, however, that the court denied liability of Island Creek for the contamination of the spring since Russell had signed a waiver of surface damages to Island Creek, and, additionally, Russell had been found culpable in causing the pollution of his own spring since he had previously mined coal on his own land even closer to the spring before conveying the mining rights of Island Creek Coal Company. His actions thereby mitigated liability by Island Creek in causing the water damages.

It should be noted that in the *Carlson* case, the compensatory act of replacement was not voluntary by the mine operator, but required by environmental regulation and involved expensive litigation cost and time. Certainly the voluntary act by the operator would have been a less expensive alternative. In the latter *Russell* case, voluntary correction was attempted by Island Creek Coal, but the damage had already been done to the water source by the owner himself.

8.3.3 Planning : Consideration of Private Property Rights

Are private property ownership rights being lost to over-regulation ?

It has been noted earlier in the Introduction of Chapter 5, that the environmental regulations, particularly in the US, are of a "command and control" nature which encroach on previously held areas of private ownership and self-control of individual property rights. For example, an owner of mineral-bearing property, whether an individual or a mining company, could previously mine any place on its property, or as many acres as it wished. After planning, zoning, permitting and licencing controls were in place, a land owner could not freely excavate or move about on his own property without the approval and licencing of authorities. At times, even public notice hearings were involved before

approval could be given for exercising excavation of the property owner's minerals on his own land. Clearly, the property rights of the owner have been severely encroached upon, limited, restricted, and even taken away from him. This is a result of the "command and control" type of environmental regulation. However, to obtain the desired results for the good of the public, the new "command and control" system proscribed environmentally "harmful" acts and effects requiring specific control measures to produce the governmentally and environmentally-desired benefits for the general welfare.

8.3.4 U.K. - TCPA Environmental Assessments

EC's Directive 86/337 EC, effective July 1988, caused the Environmental Assessment (EA) to be incorporated into British planning law. The EA ensures that the probable effects on the environment of any planned development will be taken into consideration. Planning authorities are no longer limited to just land use considerations, but must now also consider issues of pollution control with development. In certain, specified cases, an EA is mandatory, while in others an EA will take place if the project is anticipated to have "significant effects on the environment." Under Sch 2 of SI 1988/1199, relevant planning projects listed under the category "Extraction" and requiring EA's are: extracting peat, deep drilling, mineral extraction of sand, gravel, shale, etc., coal, petroleum and natural gas, extracting ores, open cast extraction, ancillary surface installations, coke ovens, cement manufacture.

An interesting statement by the Infrastructure Policy Group of Institution of Civil Engineers published in a 1985 paper on "Pollution and Its Containment" pointed out a weakness in the provisions of the Control of Pollution Act - "though site licences have enabled stricter controls to be imposed and, together with stringent planning conditions, they go far in reducing the environmental impact of waste disposal on landfill sites. However, this is, to some degree, treating the symptoms rather than the disease. The disease must be treated as well as the symptoms."

8.3.5 Land Use Planning - U.S. - Narrow Jurisdictional versus Regional Needs

A recurring U.S. problem in both land use planning and environmental regulation is the oft-occurring conflict and interference of local, narrow jurisdictional controls and planning with larger, regional controllers and interests.

Hopefully, local planning at the county level is becoming obsolescent to some degree as it, either increasingly interferes with planning goals for the larger concerns in regional planning, or it may not conform with regional needs, and occasionally even conflicts with the larger, regional areas for environmental controls, e.g., clean water for larger rivers and their tributary drainage systems under area water authorities, waste disposal and landfill requirements for region-wide areas that are unhampered by narrow jurisdictional lines, etc.

Local planners are properly concerned with strictly local environmental matters. However, as the adage states, they cannot "see the forest for the trees". The regional

“forest” is of greater concern, which is the perspective taken by state agencies and regional authorities. Regional authorities are better situated and informed as to the needs of greater areas and larger populations enabling them to coordinate efforts more effectively than the unconcerted individual local efforts.

As others have observed, geological provinces do not conform to political subdivisions and boundaries. It is the geological formations that control physical and topographical features of the earth’s surface which include rivers and drainage patterns and a host of other features affecting the environment on the earth’s surface. The larger English county or shire, the Canadian province, and the U.S. state political division boundaries do not conform to the geological provinces. Administrative environmental controls within these larger political subdivisions may not suffice for efficient and best control of the environment, e.g., river and water control, clean air control.

Land use controls in the U.S. has always been considered the sacred domain of the states and their subdivisions. Consequently any encroachment on this sensitive area reserved to the states has been jealously guarded and considered inappropriate for the federal government to attempt to administer or become involved in to even a slight degree. However, the federal government has made some successful efforts through its grants-in-aid powers to cultivate areal planning that is unconstrained by narrow political boundaries. The grants are exercised under the federal spending power as an inducement to the states to employ state-wide planning and regional approaches requiring mandatory controls in intergovernmental efforts, e.g., in solid waste disposal, interstate highway planning, interstate air-pollution control regions, and region-wide waste effluents under the federal Water Pollution Control Act (§ 208), and in the largest of all regional acts, under the Coastal Zone Management Act of 1972.

The Coastal Zone Management Act (CZMA) was an early federal law passed for national land use planning. There are no direct federal enforcement powers involved, except for the greatest indirect power, being the power of monetary funding which will be withdrawn for lack of state compliance with the federal guidelines. Congress’s purpose in the CZMA is basically for “more effective protection and use of the land and water resources of the coastal zone to encourage and assist the states to exercise effectively their responsibilities in the coastal zone through the development and implementation of management programs to achieve wise use of the land and water resources of the coastal zone giving full consideration to the ecological, cultural, historic and esthetic values as well as to needs for economic development.”

Penetrations into local planning domains are gradually being made under developing regional authorities for environmental and pollution control of rivers, water and air, and on a lesser scale for regional waste disposal sites.

An example of the narrow controls of local zoning boards was recognised by a judge in an Ohio case where a sand and gravel operator had been issued a conditional use

permit by the local zoning board. The Board later, upon the operator's application for renewal, subverted their former decision by claims of possible contamination of their water supply. In *Barrett Paving*, supra, at Ch.5 §4.7 (ii), the Ohio Court of Appeals stated that "the purposes of local zoning and environmental regulations are inherently different *** are complementary but wholly independent of one another. The EPA is solely concerned with the environmental protection and protection of human health from pollution and improper waste disposal. A local zoning board *** is primarily interested in land usage *** affecting the development of the community. "

The point of the argument is to limit approval for mine permitting to a state agency. Once local authorities have reached their decision to approve mining activity by zoning, the control over mining that may affect the environment, health and safety of the community should be left to the state EPA and mining agencies which are professionally trained in such matters. The purpose of state agencies for natural resources and environmental protection is to administer environmentally protective regulations. (See *Nimby Syndrome Continues for Ohio S & G Operator*, supra at Chapter 5 §4.5.1)

If local communities find they are not being adequately protected environmentally from quarry operations, they may bring suit against the state agency for failure to perform their duties. [See also, the case of "Concerned Citizens Question Vulcan Quarry Permit", supra at Ch.5§4.9.3)]

8.3.6 Land Use Planning - Canada

Planning regulation in overall Canada is of far less concern than in the more populated lands of her cousins, the U.K. and the U.S. However, mineral exploitation and other natural resources on Crown lands is one of the federal Canadian government's areas of land planning. In all jurisdictions, the common law rules dealing with surface rights are put aside for activities under mining legislation "These statutes provide for the conditions under which a miner can enter private land in pursuit of Crown minerals and the manner in which the miner is to pay compensation to the surface owner and occupier. The Ontario and British Columbia statutes allow the miner to enter private land without seeking permission, while those of the older provinces and territories require the miner to obtain the permission of the owner or an order from the tribunal or officer that the statute designates." (Barton, 1993, p.192). Where both surface and mineral rights are both privately owned, the mining legislation, above, does not apply.

As noted in Ch.7 §4.3, supra, British Columbia is leading the way in natural resources management . As part of its environmental resolution, in 1992 the provincial government established the Commission on Resources and Environment. CORE has the overall responsibility for developing a provincial land use strategy and reforming the processes for resources and environmental planning and decision-making in British Columbia. CORE's role is not to resolve directly a multitude of local resource disputes, but rather to design new processes for the future.

8.4 United Kingdom - General Environmental Protection

Prior to passage of the Britain's Environmental Protection Act 1990, there was no over-all, well-defined national environmental policy within the U.K. No central body existed, having entire responsibility for development, oversight and operational implementation for the loose assemblage of environmental regulations in force. Various governmental bodies, authorities and agencies shared the duties and supervision of implementing environmental directives and regulations authorised under an assortment of Acts. The lack of a central environmental organization frequently led to duplication of supervision and control, which in turn led to confusion, less effective environmental control, and certainly greater administrative costs.

The British system of enacting regulations and carrying them out seems to be, both historically and presently, (1) lacking in centralisation; (2) lacking in strict mandate for their application and enforcement, being permissive and voluntary; and (3) lacking in simplicity, being complexly intertwined with other acts, regulatory bodies and agencies. Offered in corroboration of those weaknesses are quoted statements by the eminent British environmental lawyer, David Hughes, Senior Lecturer in the Faculty of Law, University of Leicester and Honorary Consultant to the National Housing and Town Planning Council, in his 1986 book *Environmental Law* which follow:

“ Between 1848 and 1872 a multiplicity of enactments covering issues such as nuisances, sewage and sanitation, ... general public health... were put on the statute book. The essential basics of modern public health law were created in this period, but, sadly, in a confused and tangled manner which was beyond the comprehension of even trained minds. ... The division of responsibility made the law unnecessarily unwieldy and difficult to know and interpret. Added to this complexity was the fact that most of the law was permissive and not mandatory. These basic defects made the law unworkable. ... the twentieth century has also signally failed to create either a comprehensive system of environmental law or machinery to enforce it. The legacy of past divisions of responsibility lies heavy on us. (p.5)

“*** the Public Health Act 1936, Part III, (which) deals with nuisances and offensive trades... was generally applied to London by the London Government Act 1963, § 40(1), but the law is made irritatingly complex because ... boroughs, London and the Temples retain an inherited independence with regard to certain public health issues. (p. 6)(emphasis added).

“ Environmentally, the most important matters are noisome or unhealthy accumulations and deposits of trace or manufacturing dust or effluvia... . These provisions are enforced by centrally appointed inspectors ... Much more reliance is placed on informal liaison between local environmental health officers and the various central pollution inspectorates who ...prefer to use persuasion rather than the powers of enforcement in their functions. (p.8)

“ A further restriction on the powers of local authorities to take action in respect of certain nuisances arising from coal or shale mining, is contained in the Clean Air Act 1956 § 18(2), whereunder §92 of the 1936 Act does not apply to ... the combustion of refuse deposited from such mines and quarries *** . (p.8)

“ It is apparent from what has been said above that the public health legislation is hedged about with technicalities which limit its usefulness. A further limitation is to be found in §109 of the 1936 Act which states: ‘Nothing in this Part of this Act shall be construed as extending to a mine of any description so as to interfere with, or obstruct the efficient working of, the mine, or extending to the smelting of ores, and minerals, to the calcining, puddling, and rolling of iron and other metals, to the conversion of pig iron into wrought iron, ... , so as to interfere with or obstruct any of these processes’. “ (p.14)

Hughes (op. cit) in quoting Charles Webster in *Environmental Health Law* (1981) page 17, who writes: “... it is suggested that a new look at the rather archaic provisions relating to offensive trades might be appropriate. Control by means of the development control system under the town and country planning legislation is likely to be more efficient than control under the public health legislation. **In any case, a single unified form of control is less likely to produce confusion and injustice.**” (emphasis added)

In discussing the use of planning law to effect environmental control over developments, Hughes states:

“ It is this large measure of discretion which principally makes planning law so imperfect an agent of environmental control. Planning law, however, has other defects such as the lengthy and cumbersome nature of its procedures, the principal that an authorized development or activity can only be halted following the payment of compensation, slow moving and somewhat ineffective enforcement systems, and a failure to rationalise the legislative overlap between planning law and other *ad hoc* industrial safety, environmental and public health measures that have grown up around it in recent years. The last named defect is readily visible in the division of responsibility for environmental issues between a wide variety of central and local agencies. Frequently there is no legal obligation on these agencies to consult and cooperate with one another, though informal collaboration has become rather more common of late. *** the present author believes that the current system of planning law is too much subject to the manipulations of central government, and as such, is not a truly effective system of environmental control.” (op. cit., p.25)

In Hughes' writing, he makes a plea that planning law, in its present form (1986), is not “as effective a system of environmental control as it might be. *** ‘So far as new development is concerned, the broad powers of planning authorities ... are a significant means of preventing development which may have an adverse environmental impact. *** But there is a strong case for arguing that a more formalised procedure ought to be built into development control to encourage special weight in decision-making to be attached to environmental damage.’ “ (op.cit., p.23).

In support of the point, Hughes writes, “Such a system of ‘environmental impact statements’ is well established in the U.S.A. , and the Commission of European Communities has been working on a similar system for its member states for some time.

The introduction of environmental impact assessments would undoubtedly give much more weight to environmental considerations in the planning process as against technological, social, and nowadays the pre-eminent, economic considerations. **On the otherhand, it is hard to see how such a system could be made to easily fit into the British system of planning which is so very much based on fluid discretion.**" (Hughes, 1986, p.23, emphasis added.)

Hughes argues support for this position by stating: "As we said in '10 years in Europe: Success - and setbacks - in cleaning up the environment' (Supplement to *Europe* '82 No. 12, December 1982):

"One characteristic of British legislation, at least in the environmental field, is that it is normal to place a duty on an authority (perhaps a local authority or a central government agency) to achieve certain ends, to give that authority powers to carry out the duty, but then to leave to it a great measure of discretion as to how that desired end is to be achieved. British legislation also has a tendency to caution with only small steps being taken at a time, and with care being taken that demands are not made that cannot be realised. *** For the system to work well there has to be a consensus between the government and the governed and close collaboration between them : this has always been the essence of the British democratic tradition. **In other countries It is more common for legislation to be used to force the pace, sometimes making demands that cannot be achieved, but with timetables for doing so.**" (emphasis added)

The emphasised words in the preceding statement accurately describe the environmental programme of the U.S. In fact , the American legislative environmental programme has been described as oppressive with long-standing individual rights succumbing to the regulations. Agreeably, the point of Hughes' argument is that for environmental regulation to be successful, it must be forceful; its administration and enforcement powers should not be distributed, or in Hughes' word "fragmented", amongst several departments, each doing their uncoordinated, independent bit. The efforts of all must be concerted under the direction of one environmentally responsible department. To this point, it is notable here there is no legal obligation of the various agencies to consult and cooperate with one another over environmental matters and regulations.

Hughes points out that in planning for mineral extraction, "plans may not be over rigid."(p.244; p.250/92 book). § 29 of the 1971 Act (§70 of the 1990 Act-p.254) imposes conditions on mining for the hours and manner of working, screening operations, hours of permitted maintenance works, phasing extraction and restoration on a progressive basis. In view of the infinite amount of specified planning controls for mining, the statement is ironic. Policies that also regulate hours of work, production output, control stockpiling and erection of ancillary plant and machinery are no better than government owned and operated mining operations which leave little management to private owners and certainly less incentive to entrepreneurs. Past lessons in private enterprise versus government owned and operated mining operations, as in the British coal industry, and in mining investments

for third world countries requiring 50% or better ownership-control should demonstrate that detailed government controls over the inner workings of a mine should be very limited, not too "rigid", and left to free enterprise management. Certain specified controls for ecological protection have been accepted by the mining industry as necessary, but interference with the actual operation of mining in government planning will be a deterrent to successful environmental management mining.

The following short item from *The Mining Journal, London*, April 7, 1995 purports to corroborate the cost-effect on U.S. mining of over-control by government.

U.S. MINING REFORM COSTS JOBS

" More than 60% of the \$US 3, 640 million invested by U.S. mining companies over the past two years was spent outside the U.S.

The study by the Mining Resources Alliance said that more than 16,000 U.S. jobs in mining and mining-related industries have been lost as a result. The study by two professors at the U. of Nevada-Reno said, " It is no coincidence that the decline in expenditures began when draconian mining law reform proposals were introduced that would discourage domestic mineral development." The Gold Institute president, John Lutley, said in a statement that the results of the study were a call for Congress to enact mining law reform to reverse the trend." (The Mining Journal, 1995 d).

8.4.1 The European Community

The 15-member nation European Union/ Community occupies only 3.5% of the world's land area, but contains approximately 10% of the earth's population. It furnishes one-third of the world's gross domestic product and captures about 50% of the world exports. A credible part in previous decades has been its large degree of self-sufficiency in mineral production. After many centuries of mineral products ranging from ferrous and non-ferrous ores, coal, industrial minerals, and construction minerals, mineral production has decreased rapidly since the 1970's, and in some cases has virtually stopped. Metal mining has decreased greatly, with none at present in France and Germany. Iron ore mining in 1994 has been reduced to one third of its production in 1974. Zinc production has dropped 50%, lead 40%, and all copper mining has ceased except for two remaining mines in western Europe. In total, the E.C. is more than 80% dependent on imports for most of its metal needs. However, it continues to be a leading producer of potash, magnesite, kaolin, fluorspar, and construction minerals.

Total expenditures by European-based companies for mineral exploration invested in Europe during recent years has been about \$40 million out of a total \$450 million, or less than 10%. Dr.-Ing. R.K.F. Nemitz, president of the German Mining Association, in a paper presented at Leeds on January 25, 1995, attributes the European decline mainly to richer mineral deposits abroad which are easier and cheaper to exploit, but also because planning and environmental requirements are less onerous due to fewer environmental constraints imposed by governments of the developing nations.

8.5. United States - Weaknesses of surface mine permitting procedures

Until quarry and surface mine permitting is placed solely under the control of state mining agencies and removed from local control, surface mining operations will continue to suffer irrational and illogical local mining regulations by nonprofessional, layman local authorities. Several formerly reviewed cases, as well as a 1992 New Jersey Supreme Court decision, illustrate the point.

In the State of Washington, the court supported state regulation of quarries stating that "Such (*mining*) regulation is vested exclusively in the State's Department of Natural Resources (DNR)." In *Fjetland v. Pierce County*, Wash. App. No. 12448-3-II, Div. Two, (unpublished) (1990), a Washington court supported the state's DNR agency as being exclusively in control by denying county limitations on mined area and annual tonnage because DNR had issued the permit. In spite of that ruling, Washington county governments still exercise limited authority over quarrying that severely controls or hampers mining. For example, inconsistent with the earlier *Fjetland* decision was the later case of *Meridian Minerals v. King County*, 810 P.2d 31 (Wash.App.1991), where the local authority's denial of quarry enlargement and increased production was upheld by the court because the quarry was operating under a locally-issued nonconforming use permit. Even worse and more illogical was the decision in *Valentine v. Kittitas County*, 753 P.2d 988 (1988), where the court ruled that DNR had the exclusive right to regulate mining under the State's Mining Act, but site processing was not state-regulated and, thus, left to local control. As a result, Valentine was allowed to quarry stone, but could not crush it on the quarry site because local regulations prohibited stone crushing. Such a ruling is not only inconsistent, but idiotic and virtually leaves mining control still in the county despite rulings that DNP is in control. Legislators should be able to visualise that roads cannot be paved with large quarry-blasted size rock, but need crushing. Mine-permitting and regulation over mining **and** mineral processing needs to be solely controlled by one, professionally-staffed, state-wide mining agency. Split or joint governmental control over the mining process only leads to chaos, expensive and numerous litigation, delays and frustration of the mining economy.

In the 1991 Vermont case, *In Re Meaker*, 588 A.2d 1362 (Vt. 1991), local controls were upheld in preventing a mining permit to a sand and gravel operation because the already locally deteriorated roads could not accommodate the extra trucking anticipated. (An aggregate operation could have cured the local bad road conditions.) A dissenting justice of the Vermont Supreme Court aptly stated that under such a decision, "**We are in serious danger of expanding 'not in my backyard' into 'not anywhere' "**. (emphasis added.)

In the New York case, *Hunt Bros. v. Glennon*, Park Dir., 585 N.Y.S. 2d 228 (1992), [when local state park authorities tried to regulate mining activities and interfere with a state-approved mining permit, the court properly found that the local agency had no control over mining within the park and that regulation was vested in the State. For further supportive arguments to eliminate local controls over mining operations see *Bernardsville Quarry v. Bernardsville Borough*, supra at Ch. 5 § 4.6 (vi).

In the New Hampshire *Wolfeboro* case, supra at Ch. 5 §4.9.1-Grandfather Act, the three-pronged test designed by its Supreme Court as to whether there was intent to quarry all of the land from its inception of acquisition, illustrates the lack of understanding of the judiciary of mine planning and operation. An article in *Pit & Quarry* that responded to the *Wolfeboro* decision and its three-pronged test is re-produced following and entered into evidence of the weakness of the *Wolfeboro* decision and for any states that would adopt *Wolfeboro* as case law.

Wolfeboro decision sets a dangerous test for
allowing quarry expansion in New Hampshire

A QUARRYMAN'S REPLY TO WOLFEBORO
(*Pit & Quarry*, March 1990)

by R. Lee Aston, J.D., LL.M., Legal Editor

“ The *Wolfeboro* decision by the Supreme Court of New Hampshire may prevent quarry owners who should have the right to expand their operations from doing so.

The decision set a three-pronged criterion test for allowing quarry expansion under the grandfather clause of the state's 1979 surface mining law. The test is ill-conceived, ill-devised and grossly unfair. In defence of mining operations across the nation, the Court is urged to revise this test before other states mistakenly adopt it as good case precedent.

The Case: Smith began operating a sand and gravel pit on a 35-acre tract of land in Wolfeboro, N.H., in 1950. Twenty-nine years later, the state legislature passed a law granting “municipalities the authority to cope with the recognised safety hazards that open excavations create” through zoning and permitting. The law was designed to regulate mining operations that started production after its effective date of August 24, 1979.

As with most licencing laws, the act contained a grandfather clause, which allows prior mine operators to continue their operations. In Wolfeboro, the local zoning board took the untenable position that only the land currently in use on the law's effective date was exempt under the grandfather clause. This meant operators could not expand their operations or even change pits on the same property without a permit, once the law took effect.

The Answer: The Supreme Court rejected that argument saying many operators would find they could not continue mining much longer, if at all, under the zoning board's reasoning. The Supreme Court said the question was whether lateral expansion constitutes a permitted continuation under the grandfather clause.

In answering its own question, the Court said it was not aware of any other jurisdiction that ruled continuing an excavation included only vertical - and not horizontal - expansion.

Up to that point the Court's reasoning was supportive of mines that had operated before permitting laws were passed. But from that point, the

Page removed for copyright restrictions.



Illustration removed for copyright restrictions

However, contra to the 1989 decision in *Wolfeboro*, in New York's 1992 *Fletcher* decision, and in California's 1995 *Hanson Brothers* decision, both courts took the minority zoning position in supporting expansions for quarries under the grandfathering acts.

8.6 The Detrimental Cost-Effect of Currently Prevalent Zoning Denials

The current, prevalent, uncoordinated actions in the U.S. for planning of land use without included consideration for mining of construction materials, or other essential minerals, can only have the unnecessary effect of causing higher costs.

Through personal communication in 1995 with the Northmont Sand & Gravel Company, supra, 5.4.6, the continued denial of several successive zoning hearings over five years since closure of their worked-out pit, to allow the operator to open a new tract of land for sand and gravel mining, has adversely affected the supply of materials for concrete and road construction and maintenance in the local area. Builders and contractors are having to pay higher costs to bring the materials in sufficient quantities from further away.

This increased cost-effect of the NIMBY syndrome is dramatically borne out by a current and similar example in the Denver, Colorado, area: "along the booming eastern flank of the Rockies in Colorado -where sand, gravel and stone demand is approaching 12 tons/a. per person (*the average American uses 9 tons of aggregate per year - the equivalent of a 50 lb. bag every day*), no new aggregate mine has been permitted in the past twenty years. In the suburban areas surrounding Denver, one of the nation's fastest growing cities, vocal citizens have killed three proposed quarries in three years.

"Meanwhile, the Denver area is already coming up short of aggregate. Rubble for the new Denver-International Airport had to be brought by rail from Wyoming. People, who don't want pits in their neighborhood, say the rubble should be brought in from elsewhere. But experts say the cost doubles every 30 miles that is transported by truck. Consequently, in urban areas that are running out of gravel, costs are skyrocketing, and the high prices are drawing sea-faring shipments from Mexico and Canada. While in smaller cities gravel costs as little as \$6/ton, the Philadelphia street department, for example, is paying \$11.70 a ton to have gravel delivered." (Wall Street Journal, March 1, 1995)

As Justice Dooley of the Vermont Supreme Court has said, "To allow the general public to prevail with the NIMBY syndrome will be to place the nation in serious danger, of expanding 'not-in-my-backyard' into 'not anywhere' ". The point is further supported by a comment from the National Stone Association Digest of 3 March 1995, on Martin Marietta Corporation's Chairman Augustine's article, "On Permitting Delays" which appeared in the Wall Street Journal, March 1, 1995: The article on Norman Augustine "does an excellent job of identifying why aggregate prices are climbing, due to a reluctance of local government authorities to expedite approval of permits for new aggregate operations, because of complaints usually generated by overly zealous environmental activists."

The "rule of thumb" frequently stated by executives in the aggregate (crushed stone) business for obtaining permitting of a new surface mine is minimally one year, and more commonly two years, provided there are no environmental obstacles and opponent

reactions and prolonged public hearings by citizen's groups. However, a current example of obtaining permission for re-opening a former gold mining operation in California now stands at two years without receiving approval for a county Use Permit. Emperor Gold Corporation, after two years' work to overcome environmental obstacles to reopen its former mine near Grass Valley, California, received the county's approval in November 1995 of the company's final EIS. Approval of the EIS is an important preliminary hurdle prior to receiving a Use Permit. Even then, the purpose of the Use Permit is only to allow the company to do drilling and further exploration of the old mine, not to mine.

8.7 Canada

An aspect of Canadian environmental law lies in that there is lack of strong federal, or central control, i.e., laws are not uniform as each province is responsible for its own jurisdiction. The federal government allows far more local autonomy for its provinces than the U.S. does for its states, thus following the governing pattern of the U.K. Environmental regulatory matters are largely left to the provincial legislative bodies, with legal interpretations and decisions left to the provincial courts. The main environmental concerns of the Canadian federal system are for regulation of Crown lands owned by the central government, for coastlines and international agreements.

Canada's constitutional division of powers is generally non-prescriptive in policy terms, enumerating and allocating powers without requiring that they be exercised in a particular way. The currently proposed Environmental Management Framework Agreement (EMFA), now in its second draft submitted in May 1995, is "quasi-constitutional in the sense that it specifies functional areas of responsibility, but leaves substantive policies to be determined by the provincial government, or in some cases, through an inter-governmental process. *** Although the EMFA addresses the environmental management responsibilities of both levels of government, it is the resultant federal role that will generate the most controversy. The objective is to clearly redefine federal priorities, focusing on areas where the federal government has exclusive authority or which require a national perspective, while ceding responsibilities in other areas to the provinces.. *** The EMFA's comprehensive approach to environmental regulation is also seen as a step forward from the current pattern of largely uncoordinated bilateral agreements and informal arrangements among governments. The goal of reallocating responsibilities between the two levels of government is to be accomplished through administrative agreement, thereby avoiding the quagmire of constitutional reform." (Kennett, 1995, pp.1-3). Kennett notes that the first draft of the EMFA in 1994 "was criticised by environmentalists as a wholesale federal abandonment of substantial areas of environmental regulation."

The EMFA “adopts a functional approach to the detailed allocation of government roles. Environmental management functions are divided amongst the schedules, eleven of which are specified in the Framework Agreement. These functions are: monitoring; environmental assessment; compliance; international agreements; guidelines; objectives and standards; policy and legislation; environmental education and communications; environmental emergency response; research and development; state of the environment reporting; and pollution prevention.” Ibid.

Under the heading of “Accountability”, Kennett writes that an argument of the environmentalists in the first draft of EMFA, that “it is argued that the negotiation and implementation of federal-provincial agreements and the role of intergovernmental bodies [in this case the Canadian Council of Ministers of the Environment (CCME)], can remove important decision-making from public scrutiny and political accountability.”

This is counter-argued herein (see 8.0- 8.1) as a progressive step forward to the reduction of: conflicts in public hearing and litigation over environmental matters; excessive and unnecessary costs of promulgation of rules and regulations and ensuing litigation. As previously argued, for the greater part, the environmental protection programmes are administered by well-informed governmental agencies placing reliance on scientists and technology for environmentally-safe procedures. Agencies are in a far-superior position to the lay public’s to determine, assure and resolve environmental protection for the public. Hence, reliance by the public should be placed in them and on their decisions without further public involvement, agitation and prolonged conflict. Anticipatory fears in environmental regulatory matters frequently turn out to be uncalled for as evidenced in the U.S. *Snail Darter* case, and the U.K. Brent Spar occurrence, supra.

8.8 Legislative Weakness of Land Withdrawal from Mining Activities

The inevitable conflict between conservationists / environmentalists and the mining industry for use of public lands for park development is noted by Professor Barry Barton, “Mineral exploration and mining are regarded as precisely the kinds of activity against which protection is needed, no matter how little land is taken up with actual mining. *** No satisfactory process is in place for reconciling or arbitrating these different needs for mining and parks decisions, be they to create new parks, to open parks to mining or reduce levels of protection for parks, or to adjust park boundaries. Decisions are made by an exercise of governmental discretion without any settled procedure or opportunity for input from the affected parties.” (For discussion and argument concerning the decision-discretion of elected officials, see Ch.7 §6., Conclusions and Comments, supra; and, Ch. 11 §4, Deciding the Procedure for Permission of Projects, infra.)

The concern in this work is for excessive land withdrawal for numerous parks, forests, wildlife preserves and habitats, and other preservation projects, in its limiting of

the potential land-area mineral base necessary for future mineral prospecting and production. In turn, the number of potential future surface mines, or pits, are similarly reduced, thus affecting the potential of future sites for landfills in the full restoration and reclamation process.

The inevitable conflict between the conservationists and the mining industry is that mining disturbs the natural ecology during the mineral removal and until the operation is worked out, leaving a scar on the natural beauty of the area. Mineral removal should be viewed as only a temporary period of minimised interruption of the ecology that is necessary to provide the minerals for mankind's way of life. As so often said, minerals must be mined where they are found. Parks and forests can be located elsewhere, but not mineral bodies. Further, with proper planning of land use, particularly by governments for large areas of the public domain or Crown lands to be set aside for parks, habitats and recreation, those lands should be first be reviewed and evaluated for potential mineral contents. Where bodies of minerals are suspect in the areas to be preserved, an opportunity should be provided for the mineral industry to explore and evaluate the mineral bodies, even exploiting them if economically called for and reclaiming the surface before the land is set aside and classified as "untouchable".

The thesis herein calls for a compromise that allows mineral production from environmentally sensitive lands during a relatively short period of years for the mineral removal, accomplished with modern mining consciousness for the environment that minimises injury to the ecology. On depletion of the mineral body by surface mining, land reclamation would immediately follow with full restoration of the surface to its original state. This can be done by placing solid waste infill back to replace the volume of the ore body removed. An additional, but necessary, disruptive feature required for mineral removal and infill for restoration in such areas is the road and power lines infrastructure. Such roadways are frequently in place in national forests as requisite for timber cutting and mining where permitted. Construction and maintenance of these roadways are already strictly supervised by the Forest Service. In regard to national forest mining, roads must be viewed as temporary features until the surface mine is fully restored, whereon, the road access to the restored mine and landfill may also be removed and reclaimed to its natural state. This position is given more attention in the Chapter 10, under future trends.

8.9 The Future Development And Enforceability of Environmental Law

Moderation or temperance, i.e., utilising environmental management, is herein the suggested path for future development of environmental law in contrast to extremism. As Hughes points out concerning stewardship of the earth and the polarity of the various environmental stewards, those "Dark Greens" who espouse "*** the need for considerable

restraint on activities (both procreative and economic), while “Lighter Greens” are prepared to adopt a less strict approach. *** seen in legal systems between those which stress environmental protection and those who favour environmental management.

“It is not always easy to know what the environmental consequences may, at some unknown future date, flow from the particular uses of the environment and its resources, or from particular industrial, or agricultural processes, nor the ways in which they may happen. The law could require:

- (a) cautious progress until a process is judged ‘innocent’ ;
- (b) ordinary progress until findings of ‘guilt’ are made; or
- (c) no progress until intensive research has been conducted into a proposed process.

“It is (c) which most fully represents a ‘precautionary principle’ in law corresponding to the economic notion of ‘anticipatory action’. It is (b), however, which represents the general British response to the problem. “ (Hughes, 1992, p.13, 17.)

The EC’s “polluter pays” principle has been debated as to whether it is adequate. A recognised problem is that many industrial polluters may absorb the cost of fines for environmental violations, or costs of remediation, as overhead or operating costs, then pass the costs on to the customers as increased production costs. There are also those industrial polluters that may have an inability to pay high fines as a deterrent to polluting. More effective alternatives to sanctions against corporate and industrial polluters have been considered, e.g., corporate dissolution, disqualification to take government contracts, stock dilution to pay fines, etc. Whether imprisonment for environmental violations, or “crimes”, is morally acceptable is still debatable.

8.9.1 Criminal Penalties for Environmental Violations

Until about 1990, the U.S. was the leading proponent of punishment by imprisonment for higher magnitude “criminal “ violations of environmental laws. Canada had revised and implemented its federal EPA in 1985 by adding imprisonment as an alternative to fines. U.S. terms for imprisonment were between 6 months and a maximum of five years. The Canadian Provinces followed suit about 1989 to 1990 by increasing the amounts of fines and/or imprisonment. (R.S.Ontario and R.S.Saskatchewan.) The U.K. joined the U.S. and Canada in April 1992 by amending its Environmental Protection Act 1990 with the addition of imprisonment sentences to supplement fines for criminal violations. Nevertheless, the U.K. and Canada have remained far less aggressive in applying and meting out imprisonment terms as sanctions for environmental violations, generally employing only fines. According to a natural resources attorney in Canada, “To the best of my knowledge, nobody has ever actually been imprisoned under the sections, at least no body connected with any oil, gas or mining facility.” (Blackman, 1996).

8.9.2 U.K. Environmental Crime Punishment

For example, in the applicable sections of the UK’s EP Act concerning legal obligations for waste disposal, Section 34 imposed a “duty of care” and went into force in

April 1992. Section 33, the Prohibition on Unauthorised or Harmful Deposit, Treatment or Disposal of Waste, went into force in April 1993. Both sections proscribe penalties for criminal offences, but only Section 33 proscribes imprisonment terms for violations.

Essentially, §33 replaces the former waste disposal licence with a waste management licence. Under the new section, all waste disposal, by any person, carries with it a responsibility and liability for the safe disposal of controlled waste and they may not knowingly cause or permit waste to be deposited except through a waste management licence holder.

Under the U.K.'s former Control of Pollution Act 1974, only waste disposal was regulated. §33 goes beyond final disposal by proscribing violations for environmental harm resulting from any pre-disposal treatment of waste, e.g., re-cycling, or during waste storage, e.g., as of recyclable materials (glass, tyres, etc.).

As with the U.S. law for environmental violations, provisions are made under §33 for citizens to report observed roadside tipping. §34 also provides for public "self-policing" to encourage reporting by citizens of observed environmental crimes and states in § 39, "Compliance with the duty of care will be secured mainly by waste holders checking on each other in connection with the transfer of waste." This latter section provides, in American environmental law terminology, "cradle to the grave" protection for disposal in the waste chain. Previously, there was no link in the waste disposal chain for regulation of waste carriers and transfer of waste. Hauliers and waste transfers are now controlled by transfer records. Authorities now have investigative, as well as search and seizure, powers where crimes have been committed.

Under §33, the provisions for a person committing an offence shall be liable :

- (a) on summary conviction, to imprisonment for a term not exceeding six months or a fine not exceeding £20,000 or both; and
- (b) on conviction on indictment, to imprisonment for a term not exceeding two years or a fine, or both.

For persons committing an offence under the same section but for special wastes on indictment-conviction, the maximum imprisonment term is five years.

In emulating U.S. environmental law regulation, § 34 goes so far as to provide for citizens reporting on each other when violations have been observed.

§§ 35 to 44 of the Act tightened up regulations for licensing waste treatment and disposal activities. §39 in particular, prevents licence holders from simple surrendering of their licences and walking away from the site as they were able to do in the past. Surrendering of site licences now requires an application, investigation of the site, and satisfaction that the site is left in a safe condition whereby the land is unlikely to cause pollution or harm thereafter. (Orlik, 1992).

It appears from the above summary of environmental criminal punishments, that British "discretion" and "persuasion" are slowly giving way to American style "command

and control" regulation.

8.9.3 U.S. Environmental Crime Punishment

In 1990 the U.S. Department of Justice (DOJ) reported that criminal sentences for environmental offenses were on the increase with successful convictions being 95% of the indictments. Jail sentences were given to more than half of those convicted and large fines were made on corporations. The vast majority of criminal cases were brought under the Clean Water Act and RCRA. A reason attributed to the rise in prosecutions and convictions is that an increased number of environmental crimes were re-classified from misdemeanor status to felony. Prosecutors are generally more willing to pursue felonies than misdemeanors. .

In 1994, the EPA referred 220 cases (a 36% increase over 1993) to the DOJ. Criminal charges were brought against 250 individuals and corporations (a 40% increase over 1993) ; \$36.8 million in criminal fines were assessed (a 19% increase over 1993); and, jail sentences imposed totalled 99 years (a 25% increase over 1993). (EPA Memorandum, 1994)

Title VII of the 1990 Amended Clean Air Act made criminal the release of hazardous pollutants into the air by a Knowing Endangerment clause. An individual violator is subject to 15 years imprisonment, and a corporate violator fined up to \$1 million. Lesser , misdemeanor imprisonment up to one year and fines may be made for negligent pollution releases. In addition, the amended Act authorized a greater number of environmental inspectors ("police") for stepped up enforcement. Additional provisions have also been made to coordinate the CWA with violations other environmental statutes. Knowing violations of reporting and monitoring requirements are punishable as 2-year felonies. Five-year imprisonment and fines may be imposed for knowing violations of implementation plans, new source performance standards, et al. Primacy states may also impose their own punishments. The California case of *People v. Martin*, 211 Cal. App. 3d 699 (1990), held that criminal sanctions were also applicable to persons who "should have known" that their act of unpermitted hazardous waste disposal would cause injury and harm. The California Code provides for imprisonment on conviction for 16 to 36 months in state prisons.

A policy known as The Responsible Officer Doctrine was approved in the case of *U.S. v. Dee*, 912 F.2d 741 (4th Cir. 1990). The case serves as precedent in case law and empowers a federal judge to instruct a jury to convict a manager of an operation for a felony based on failure to prevent or detect an environmental violation. Numerous cases in 1990 illustrate the serious nature of court -imposed jail sentences and fines for managers and corporate officers that were responsible for environmental violations.

8.9.4 Canada Environmental Violations Punishment

The following case examples illustrate the less severe penalties meted out in Canada for environmental violations.

8.9.4.1 Non-Compliance with Mine Cleanup Leads To Conviction

Owners of an inactive surface copper-gold mine at a remote location in northern Ontario Province were charged by the Ministry of the Environment with non-compliance of an order to clean up the site where inspectors found 8 transformers with polychlorinated biphenyl (PCB) staining the ground at their bases. After 20 months of failure to get the mine owners to voluntarily perform a cleanup, the EPA issued an order requiring cleanup and securing the area in 7 days. The owners failed to comply and EPA levied fines against the owners and the owners appealed.

At trial in *Regina v. Consolidated Mayburn Mines Ltd.*, [1992] 73 C.C.C.(3d) 268 (Ont.Prov.Div.), the owners challenged the validity of the EPA orders and argued a defence of due diligence by non-compliance of unreasonable orders. The owners were able to show the court that all but one of the procedures required by the EPA were environmentally unsound and that non-compliance would better protect the environment than compliance. The court then severed those unsound counts from the EPA order. The remaining ground not complied with, and unproven as sound procedure, was for the owners to remove the PCB contaminated soil. For its non-compliance, one defendant individual and the corporation were convicted and fined.

8.9.4.2 Newfoundland: A fluorspar producer was found guilty of severe water pollution under the Fisheries Act by a Provincial Court. Damage to the environmental life of fish was found to be extensive. The company had been warned in the past, but was conditionally allowed to continue its operations provided it kept effluents from waste water to a minimum. Despite repeated warnings to correct increasing levels of effluents, the producer did nothing.

In *Regina v. St Lawrence Fluorspar Ltd.* [1989] 80 Nfld. & P.E.I.R. 171(Nfld.Prov.Ct.), the government fined the mining company C\$15,000.00 on three charges. The Court stated that "Pollution was a serious crime and the sentence was therefore appropriate."

8.9.4.3 British Columbia : In *Regina v. Jack Crewe Ltd.* [See supra, Chapter 5 § 5.3.5] , the Canadian court fined a sand and gravel operator that allowed silt, sand and clays as deleterious contaminants from its washing plant operation to enter a stream, being harmful to a fish habitat.

8.9.4.4 Yukon Territory: In *Regina v. United Keno Hill Mines Ltd.* , see supra, Chapter 5 §5.3.6, the defendant company operated an open pit and was fined C\$1,500 for discharging mine waste effluents into Yukon waters in excess of effluent contaminants discharge limits prescribed by an Industrial Water licence issued by the Yukon Territory Water Board contrary to the Northern Inland Waters Act.

The *United Keno* decision (see Ch.5 §5.4 (vi) and Ch.7 § 1 and arguments for penalties for corporate violations of environmental law is reviewed in full.

SECTION IV
TRENDS AND FUTURE NEEDS

CHAPTER 9
PRESENT AND FUTURE MINERAL TRENDS

9.1 Introduction

As nations grow and populations increase, so does the construction minerals mining industry. With the great surge of world growth since World War II, the demand for building minerals (crushed stone, sand, gravel, limestone, clays, gypsum, et al) has been tremendous. Presently, there is a continuing need for more minerals from the earth to sustain Mankind's quality of living for his growing numbers. Again, the two needs are mutually dependent and cyclic in location occurrence. As referred to in the Introduction, Chapter 1, mining provides minerals and materials for Man's goods; Man creates waste; wastes need to be disposed of; mining creates the voids for waste depositories. "... for dust thou art, and unto dust shalt thou return." (op.cit.)

9.2 Present and Future Global Mineral Needs

On the threshold of the third millennium, the global mining industry faces a range of challenges, not least, a fast depleting resource base and economic and ecological threats in augmenting the mineral production volume to meet the rising demand of a burgeoning global population. The size of the task ahead can be gauged from the current global output of 20,000 Mt of mineral raw materials for a population of 5,200 million. Of this staggering volume, the share of different minerals includes: 8,000 Mt of energy raw materials; 550 Mt of iron and ferrous metals; 160 Mt of non-ferrous metals; 500 Mt of industrial minerals; over 3,000 Mt of quarried stone and dimension stone; and 8,500 Mt of sand and gravel.

For extracting this volume of mineral raw materials, the mining industry globally has to excavate and move some 200,000 M tonnes of earth and rock, 90 % of which is waste or 'residual' and needs to be disposed of in an ecologically sustainable manner. The conflict between mining and environment can be best understood from the concept of a support square. This is defined as "the scrap of land that must supply all the resources that an individual uses throughout life and that must fulfill the same purpose for others who follow. Somehow that space must also absorb most of the solid waste left over.

"The support square has been inexorably shrinking from about 300 m²/person in 1890 to about 160 m² at present, and it may shrink to less than 100m² by the year 2090."

For sustainability, the mining industry has not only to produce more, but also to manage the environment in the face of a shrinking support square. (The Mining Journal, 1995 d).

Further support of this fact of shrinking mineral base is indicated in the statement in Blakeman's 1977 report to Environment Canada: "Because of increased demands in conjunction with transportation costs, development of pits and quarries concentrated in the rural townships surrounding the Toronto-centred market. Consequently, the rural residents (often former urbanites) and municipal councils in these areas not only voiced strong opposition to pit and quarry development, but in many instances local councils prohibited new extractive activities through official plans and zoning by-laws. This action effectively removed from the resources base extensive areas containing potentially available aggregate resources."

9.2.1 Future Aggregate Site Alternatives

As an example of future planning in England, see Chapter 9, §3.2, Mineral Planning Guidelines 6 (MPG6-1994), *infra*, which states a future aggregates objective is to reduce the proportion of supply from primary-won sources in England from 83% in 1994 to 74% by 2001 and 68% by 2006. Planning of this nature is a result of environmental and land-use pressures making the siting or location for new inland quarries difficult. An alternative trend, to move away from inland-won aggregate sources in the developed countries, which began about 1985, was to establish coastal super-quarries. Super-quarries are broadly defined as those capable of producing at least 5 M.t./a., and with reserves of at least 150 Mt. Locating these new large-size coastal operations offers two opportunities to quarry developers, viz., (1) with the sea fronting on at least half of the property, ocean-side sites offer fewer neighbours with nuisance and annoying complaints against the operation; and (2) it provides deep-water loading for long distance, large load transportation by vessels at increasingly interesting lower rates as opposed to escalating trucking and rail haulage rates. It could also reduce the ubiquitous site-hearing complaints of "increased traffic" problems.

Super-quarries were reputedly pioneered by Foster Yeoman Ltd. in 1986 at its Glensandra quarry on the West coast of Scotland. Glensandra was closely followed by Vulcan Materials Company's (USA) joint venture on Mexico's Yucatan Peninsula and Newfoundland Resources and Mining Company's (NRMC) super-quarry at Lower Cove on the Port au Port Peninsula shipping to its terminal in New York City, U.S.

A new coastal marine quarry in Ireland, the Wimpey Fleming Adrigole Quarry, started production in 1993. Annual production for 1995 was about 1.2 M tonnes and production was expected to reach 2.0 M tonnes by the year 2000. It is the second large-scale operation of its kind in Europe. Outbound shipping will transport the aggregate. The markets of the U.K. and northern continental Europe are expected to provide backhaul cargo.

New coastal super-quarries are being developed and planned, e.g., a 5M tonnes per annum operation at Jossingfjord in Norway; one at the South coast of Sweden intended to supply the Berlin and the German Baltic coast markets; and one on South Harris Island, Scotland. NMRC plans to establish more terminals along the U.S. eastern seaboard to take delivery from its super-quarry aggregates operation in Newfoundland. In Nova Scotia, plans for a major coastal marine quarry are delayed pending an environmental review at a deep water site north of Sydney on Cape Breton Island.

9.2.2 Seabed Aggregate Mining

Seabed mining or dredging of marine aggregates offers another alternative for avoiding the increasing environmental and zoning constraints for inland quarry siting and permission. In the U.K., it is already an important alternate source of aggregate for the construction industry. By 1989, mined seabed sand and gravel made up 18% of the 20 m. tonnes consumed in England and Wales. In Japan, seabed sands account for about 40% of their total domestic production of fine aggregates used in concrete. Concern for the marine environment, disturbance to fisheries, and coastline damage is considered in U.K. licencing for marine dredging. Concentration of seabed site licences is avoided as are known, sensitive seafloor areas. Seabed mining by the U.S. has been delayed due to the drafting of regulatory laws that would hopefully alleviate major environmental concerns.

(i) **Remoteness:** Remoteness from population areas, i.e., moving into rural, sparsely populated areas, placing distance between the excavation site and people, is an alternative that has been avoided for decades prior to the green movement. Previously, the low cost, high bulk product could not tolerate the addition of costly freight to construction sites and the market. Proximity to market, i.e., the population centres, for site location of an aggregate surface mine has long been a critical, strategic and economic matter for pit operators. The ability to find a good stone deposit and move in closer to the urban area than a competitor has been a tactic that frequently “weeded out” or hurt the competition. Thus, the ability to ship to market at a fraction of a dollar cheaper per ton than the competition often meant the success or failure of an aggregate mining operation.

It appears more and more strongly that the public will accept the addition of higher hauling or transportation costs to the low cost bulk construction minerals in order to prevent scenic intrusion of excavation in their area. However, it must be realised that construction materials mine operators can neither realistically, nor afford to pick and move to a new pit location every generation. As the population centre continues to grow and expand, moving outward, it encroaches on the surface mine that was located in a rural area just a generation ago, thus, ultimately forcing the mine operator to move further away again. A scenario like that might fit shopping centres and malls in an ever-expanding metropolis, but does not apply to mining of minerals. It bears repetition, “Minerals must be mined where they occur.” Surface mine operators cannot simply “pick up and move” further into rural areas with each successive encroachment of people complaining about the unsightly surface mine

and its “nuisance”. Re-location of a mine is dependent upon the local geology and the occurrence and extent of construction minerals in the earth. All rocks and sands are not suitable for making aggregates , cement, mortar, brick, glass, insulation, roofing granules, et al.

As a consequence of this state of continuing and mounting conflict between mining and public environmental and aesthetical complaints, an alternative trend is for mining to move far away from population centres. Remaining close to the construction market will not always be possible if the geology of the earth does not conform or provide deposits of suitable building minerals. The increased cost of transportation for construction minerals will have to be borne by the consumer.

However, if deposits of suitable minerals can be located in a remote area, the costs of transportation will be the main concern, i.e., finding the lowest means for delivery to market. Obviously, the further from market, the higher the truck haulage cost. Railway movement can become competitive with road movement at distances greater than 50 miles. Large volume rail movements of coal in ‘unit trains’ are well established for the coal industry. Unit train shipments for aggregates, sand and gravel, and other lower priced minerals are beginning to be of interest as viable considerations for the mining industry. Witness the super-quarries, supra, § 9.2.1, with volume shipments by water. Blakeman noted in 1977 that Great Lake “Boat haulage into Southwestern Ontario has increased substantially since 1972, amounting to 2.5 million tons in 1975.” (op. cit., p.23). Long distance haulage of processed construction minerals will require storage and distribution yards in the major urban centres.

In addition to the price increase for transportation from remote quarry sites, an important detrimental environmental concern for consideration is the increased demand of energy consumption for diesel fuel that will be made to accommodate remoteness of surface mines. The fuel consumption costs of moving as much as 50 million tons over 100 miles would result in an annual increase in diesel fuel consumption of approximately 12% over present levels. (Blakeman, 1977, p.24). In 1996, the cost and consumption would be even greater. Can this fuel and energy consumption be justified with environmentally advocated sustainable development for non-renewable fuels ?

(ii) Transportation Costs: Long Distance Refuse Haulage vs. Long Distance Aggregate Haulage:

The construction industry has long-argued it requires proximity to the construction growth and population centres because the low-priced minerals cannot tolerate an added high freight cost. Contrasted with virtually valueless MSW, long distance haulage of MSW and other wastes to distant landfills, is already environmentally justified. It has become a beginning reality and practice. (see discussion in Appendix A-2 §5, infra).

Similarly, with the justification of high haulage costs for MSW, higher hauling costs will be environmentally justified for aggregates in the near-future. Inroads on the

added costs for long distance hauling of aggregate minerals are already taking place in the construction industry, e.g., ocean hauling from super-quarries, hauling from seabed dredging points. The days of proximity for many aggregate sites to the market will wane as aggregate quarriers find remoteness offers less permitting and operating contention. Furthermore, backhauling of waste to landfilling quarries on unit trains can offset the costs of aggregates to market as does ocean back-hauling freight for super-quarries. Nevertheless, the cost of construction minerals will necessarily increase to satisfy the demands of environmental aesthetics and contention. Thus, the trend of increased costs of construction aggregate materials for long distance haulage may be similarly, environmentally justified as are the higher costs for MSW to remote landfill sites. As always, the increased costs will have to be borne by the public.

In keeping with the thesis of utilising surface mines for waste depositories, the long distance haulage of aggregates, and other minerals, to population centres to distribution terminals can be more readily justified and compensated by a return haul load of MSW to the surface mine used as a landfill. Unit trains can be assigned for surface mine-landfill haulage, and are already being assigned to certain landfilling sites. Unit trains for mineral haulage are not uncommon, e.g., coal and clay in North America and Britain. Unit trains for aggregate haulage up to 80 miles (128.72 kilometers) to stockpile terminals for the Washington, D.C., metropolitan market are already in existence.

9.3 United Kingdom

In the U.K., domestic mining of metals is now virtually non-existent, and reliance is principally on imports with very minor relief from re-cycling. In the last decade, the only significant metal mining remaining has been of ironstone for the winning of iron and it has all but stopped. Production of iron drastically decreased from 10,228,000 tonnes in 1971 to 731,000 tonnes in 1981, to 59,000 tonnes in 1991, ceasing in 1992 with 29,000 tonnes. Thus, surface mining of non-fuel minerals has been reduced to mainly that of industrial minerals or construction materials and clays. With the exception of gypsum (2 million tonnes in 1995), the U.K. is self-sustaining for the production of construction minerals.

9.3.1 U.K. Current and Prospective Mineral Production

The British Geological Survey (BGS) reported production of construction minerals (crushed stone, sand and gravel, limestone, sandstone, dolomite, shale, common clays) for the United Kingdom as follows:

1991.....	300 million tonnes	
1992.....	294 million tonnes	
1994	300 million tonnes(with a value of over £1,240 million)
1995	304 million tonnes.....	(estimated) (BGS, 1995)

Projections of aggregate demand by the BGS are for a 55% increase by 2011.

In the U.K., environmental and land-use pressures have resulted in relatively less construction minerals production from inland quarries and more production from coastal super-quarries. Entertainment of the idea for coastal shoreline super-quarries in the U.K. is developing with the world-wide trend. At present, there is only one in operation, located in Scotland.

U.K. Mineral Lands: In 1994, BGS reported 106,900 ha. of England's and Wales' land, or less than 1% of the land area, was permitted for surface mineral workings. For the same year, the Confederation of British Industry (CBI) reported some 96,000 ha of U.K. surface land was affected by mineral workings, amounting to 0.75% of the land area. (The Mining Journal, 1995 a).

The Department of Environment reported in its Survey of Derelict Land that in 1988 only 60% of surface mining lands with planning permission "was covered by satisfactory restoration conditions." Nevertheless, presently, about "59% of reclaimed mineral sites in the U.K. are subsequently used for agricultural purposes, and 4% for forestry, while nearly 30% is used for increasingly popular recreational purposes, e.g., golf courses, nature reserves and water sport-facilities." (Hughes, 1992, p.245).

9.3.2 U.K. Mineral Land Planning and Permitting Trend Indications

The planners of future mineral extraction have been forced to consider more seriously and include systematic reviews of environmental effects as a result of U.K. regulations and procedures, e.g., TCPA Regulations (Assessment of Environmental Effects) 1988 and Dept. of Environment / Welsh Office, Environmental Assessment- A Guide to Procedures, 1989, and the EC Directive on Environmental Assessment, 88/337/EEC 27 June 1985.

Whilst mineral extraction in the U.K. is carefully regulated by planning authorities to minimise ensuing harmful environmental effects, planning authorities are also charged with taking into account local and national demands for minerals, especially where few or no alternative sources exist. It has been similarly recognised in Britain that "geology dictates where minerals are found", and has been a crucial factor in the U.K.'s industrial development. Local and regional planning authorities must identify current workings and resources, reportedly indicating areas which may be needed for future minerals extraction.

The 1990's have brought increasing demands through population growth for new construction. Under the pressures for increased construction minerals production accompanied by environmental controls, the British central government planning has matured to the point where local and regional planning authorities are directed to identify mineral-bearing areas which may be needed for future mineral extraction. Thus, policies for land development include planning for the extraction of minerals. Guidance for the planning of development and use of mineral lands is set out in the statutory development plans drawn up under the TCP (Minerals) Act 1981 and the TCPA 1990, as amended by the Planning

and Compensation Act 1991. Mineral Planning Guides (MPG) are periodically published by the Department of the Environment (see Ch.5 §4.7 for introduction of the “Green Book”/MPG in 1951). After the 1960 revision of the first MPG in 1951, the following MPG’s and subjects were published:

MPG 1 - (1988) the general principles and national considerations of mineral planning with specific advice on the development system

MPG 2 - (1988) planning applications for minerals development; planning permissions; and, the imposition of planning conditions

MPG 4 - (1988) review of mineral working sites, including the compensation implications

MPG 5 - (1988) aspects of the general Development Order of special relevance to mineral interests

MPG 6 - (1989/1994) guidelines for aggregates provision in England

MPG 7 - (1994) the reclamation of mineral workings

Highlights of MPG 6 (1994): First published in 1989, was cancelled and superseded in 1994 with regard to England (not Wales). Arguments throughout this work are stressed in MPG 6’s Policy and Objectives, to wit:

“ 9. The Government wishes to see indigenous mineral resources developed within its broad objectives of encouraging competition, promoting economic growth, and assisting the creation and maintenance of employment. The Government believes that for the economic well-being of the country it is essential that the construction industry continues to receive an adequate and steady supply of aggregates so that it can meet the needs of the community and foster economic growth.

“ 10. At the same time, the Government recognises that aggregates extraction can have significant environmental impact and often takes place in areas of attractive countryside. *** (it) stresses the importance of combining economic growth with care for the environment in order to attain sustainable development. ***

“12. The aims of this Guidance Note are: (i) to provide guidance how adequate and steady supply of material to the construction industry may be maintained at the best balance of social, environmental and economic cost ***; (ii) to provide a clear framework within which MPAs can develop aggregates policies in development plans and carry out development control; (iii) to serve as a national framework for the Secretary of State, et al; (iv) to help reduce the number of planning appeals; ***

“ 67. Safeguarding: Planning authorities should make every effort too safeguard resources of all types of construction aggregates which are, or may become, of economic importance, against other types of development which would be a serious hindrance to their extraction.

“ 68. It will usually be necessary to consider the need for aggregates over a longer period than for most other land use planning issues. When considering the need to extract the mineral as opposed to letting surface development proceed, *** where it is possible to extract minerals prior to some other more permanent forms of development, this should be encouraged ***.

“70. forms of (mineral) development in National Parks, the Broads, New Forest, AONB, et al, should not take place save in exceptional circumstances. , and

“71. *** should normally include an (environmental) assessment ***

“91. Environmental assessment: *** Where proposals for mineral development are likely to have significant effects on the environment, applications will need to be subject to EA under the TCP (Assessment of Environmental Effects) Regulations 1988. Whether, or not, a particular mineral development will warrant an EA will depend upon such factors as the sensitivity of location, size, working methods, proposal for disposal of waste, the nature and extent of processing and ancillary operations.” (UK DOE, 1994a)

Highlights of MPG7 (1994): The Reclamation of Mineral Workings

The objectives and aims of reclamation and after-uses are :

“1. England and Wales are rich in minerals, but in many areas they are also densely populated. There are pressures on land and competing claims on space for housing, industry, commerce, waste disposal, agriculture, forestry, recreation, nature conservation and other uses. *** and with the concern for protecting the environment, it is very important that land worked for minerals should not become derelict or remain out of beneficial use for longer than is absolutely necessary. In seeking to reconcile the winning and working of minerals with other claims on land, one of the main aims of planning control is to ensure that land taken for mineral operations is reclaimed at the earliest opportunity and is capable of an acceptable use after working has come to an end.

“ 2. Unlike most other forms of development, mineral extraction is an ongoing activity as a result of which the land can, and should, be recycled, either to its former use or to a new and acceptable one. “ (emphasis added).

MPG7 is concerned with imposing reclamation conditions for new permissions, e.g.,

“8. In granting planning permission for mineral working, mineral planning authorities should always carefully consider the applicant’s proposals for reclamation of the site***.”

The intended after-use of the reclaimed land is stressed, and how it fits into planning for the local area. MPG7 notes that agriculture is the most common and appropriate after-use for reclaimed mineral land. However, it notes that “There is now much more consideration of non-agricultural after-uses, particularly for forestry or amenity .” The use of surface mines for MSW disposal sites is treated lightly with the emphasis on restoration for agriculture, forestry and amenity and some industrial uses. An illustration for MSW landfilling is included, but not discussed in great detail.

19. The preparation of an EA is again recommended where there is likely to be a significant impact on the environment.

MPG7 gives detailed consideration and information concerning the orderly procedures for pre-mining stripping, storage and saving of soils for the after-uses requiring the growth of vegetation. It also details backfilling with mine overburden, mining and milling wastes, and other types of waste materials, including MSW, in preparation for the various types of after-use. (UK DOE, 1994 b)

In addition to “imposing reclamation conditions for new permissions”, MPG7 also proposes that “new or improved reclamation conditions” may be imposed “ on existing permissions and workings.” The 1981 Act introduced new powers, in effect 1986, to enable mineral planning authorities to revise older permission conditions which may have

been considered adequate at the time of granting, but are now considered ineffective, or in some of the older case, non-existent conditions. (id.)

One broad objective of MPG6 notes is to reduce the proportion of primary land-won aggregate sources in England. U.K. planners have noted a trend in aggregate consumption over the 12-year period, 1977 -1989: "there has been a consistent proportional shift from sand and gravel to crushed rock. Proportions for the National primary aggregate consumption in 1989 were around 44% for sand and gravel and 56% for crushed rock, which is now the largest, single source of primary aggregates used in England and Wales." (op.cit., p.60123)

9.4 United States

In the United States for 1993, the U.S. Bureau of Mines estimated that the mineral industry provided employment for 1.86 million people; that the value of domestic mineral production was \$32 billion, whilst processed materials of mineral origin were worth \$326 billion and exports \$40 billion.

According to a 1994 report of the U.S. Bureau of Mines, during one person's lifetime, he will "use more than 2 million pounds (907,180 kg) of minerals and metals, including 1.2 million pounds (544,398 kg) of sand and gravel, 360,000 pounds (163,395 kg) of iron and steel, 27,000 pounds of clay (12,247 kg), 26,000 pounds of salt (11,793 kg), 500,000 pounds of coal (226,796 kg), 800 pounds of lead (363 kg), 28,000 pounds of phosphate and potash (12,700 kg), 3,200 pounds of aluminum (1,451 kg), 1,500 pounds of copper (680 kg) and 840 pounds of zinc (381 kg)." (USBM, 1994)

9.4.1 U.S. Aggregate Production - Potential Landfill Sites in the Making

Crushed Stone: For the year 1994, the U.S. Bureau of Mines reported total crushed stone production of 1.23 billion tonnes (1.36 billion short tons) with a value of \$6.62 billion. The given tonnage was produced by 1,600 companies from 4,000 active quarries. Additionally, about 8 million tonnes (8.82 million short tons) of aggregate stone was imported. It is noted that aggregate importation has slowly increased from 5 million tonnes in 1990 to 8 million tonnes in 1994. Source countries for importation are Canada (49%), Mexico (29%), Bahamas (12%), other (10%).

The types of stones quarried for aggregates shows that 71% was limestone and dolomite; 15% granite; 8% traprock (diabase/basalt); and the remaining 6% were shared, in decreasing order, by sandstone and quartzite, miscellaneous stone, calcareous marl, shell, marble, volcanic cinder and scoria, and slate.

About 58.1 % of the production was used as construction aggregates, mostly for highway and road construction and maintenance; 9.8 % was used for chemical and metallurgical uses including cement and lime manufacture; 1.4% for agricultural use

purposes; 0.7 % for special uses and products; and, the remaining 30% went to unspecified uses. (USBM, 1994).

Sand and Gravel: For the year 1994, the U.S. Bureau of Mines reported total construction sand and gravel production of 891 M tonnes (982 million short tons). The given tonnage was produced from 6,020 active pits. 42.8% of the production came from operations with an annual production of between 100,000 M tonnes and 499,999 M tonnes ; 25% from operations between 500,000 M tonnes and 1,000,000 M tonnes / a. ; 19.3% came from the largest operations producing over 1 million tonnes / a. . The balance was produced by smaller pits.

The distribution of uses was: 35.5% was for unspecified uses; 27% as concrete aggregates; 15% for road base and coverings and road stabilisation; 9% asphaltic concrete aggregates and other bituminous mixtures; 8% as construction fill; 1% for concrete products (blocks, bricks, pipe, etc); and the balance for assorted miscellaneous uses, e.g. snow and ice control, plaster, roofing granules, water filtration, etc.

Transportation for sand and gravel was by trucking, by far the major means. Waterway and rail served a very minor mode of transport. (id.)

Projected Volumes of Production: The following U.S. projections, as noted, between 1995 and 2000 were reported by the editor of *Rock Products* magazine and the National Stone Association (NSA). (Drake, 1996).

<u>year</u>	<u>crushed stone (billions s /t)</u>	<u>sand and gravel (billions s /t)</u>	<u>source</u>
1995	1.42	1.01	Rock Products
1995	1.4	-----	NSA
1996	1.45	1.04	Rock Products
1996	1.45	----	NSA
1997	1.5	----	NSA
1998	1.58	----	NSA
1999	1.6	----	NSA
2000	1.61	----	NSA

(where 1 s/t = 1.0165 tonnes)

The U.S. Bureau of Mines in its November 1995 Annual Review for 1994 on Construction Sand and Gravel reviewed major concerns for the sand and gravel segment of the mining industry: (USBM, 1995).

- 1) implementation of the Clean Air Act Amendments of 1990 and its complex legal and technical provisions;
- 2) the amended Federal Water Pollution Control Act of 1977, the Clean Water Act, § 404, dealing with “wetlands” and the associated “no net loss of wetlands” policy;
- 3) the Storm Water Pollution Prevention Program;
- 4) the Occupational Safety and Health Administration’s (OSHA) Hazard Communications Standards regulating the use of products containing more than 0.1% crystalline silica; and

5) the provisions of the Federal Endangered Species Act.

Agreeably, these are areas of over-regulation creating difficulties for the sand and gravel segment of mining, as well as other mining segments.

9.5 Canada - Current Mineral Production

According to Natural Resources Canada (NRC), "The mining and minerals industry is a vital industry to the Canadian economy. In 1993, this industrial sector contributed over C\$20 billion to the Canadian economy, an amount equal to 4.2% of the Gross Domestic Product. Mining and minerals-related industries directly employ 335,000 Canadians.

" Canada is the third largest mining nation in the world. *** Almost 80% of Canada's mineral production is exported, making it the world's largest exporter of minerals.

" Ontario (30%), Quebec (17%) and British Columbia (16%) account for more than 60% of Canadian mineral production. Alberta accounts 6%. Producing mines are located in all provinces except Prince Edward Island.

"The value of production of structural (construction) minerals, including clay products, sand and gravel, stone cement and lime increased 7.7% (C\$ 200 million) to reach approximately C\$2.5 billion in 1994.

" Less than 0.03% of the land area of Canada has been used by mining since mining began more than 125 years ago. This intensive use of a small area produces the minerals used every day.

" Mining represents a temporary land use, disrupting relatively small areas of land for a specific (usually short) period of time. Once the ore deposit is depleted, the land is cleaned up or reclaimed for other uses including recreation. "

Production from surface mining operations pertinent to this work follow. The Mineral and Metals Sector of Natural Resources Canada reports the following statistics :

Sand & Gravel - Stone Production in 1992- 1994 and average for period 1990 -1994

(in tonnes)	1992	1993	1994	1990-94, avg.
Sand & Gravel	240,616,000	238,137,000	238,110,000	235,351,000
Stone	89,338,000	89,361,000	91,053,000	93,783,000
Total, s & g-stone.....	340,154,000	327,498,000	329,163,000	329,134,000

(Natural Resources Canada/NRC, 1995)

A comparison of Canadian projections made in 1976 for Southwestern Ontario with present Canadian national volume figures for the production of sand and gravel and crushed stone is interesting. Although based on the figures used for a populous part of Ontario

Province and not the nation as a whole, it shows a sizable shortfall, or an under-estimate of considerable tonnage for those two construction minerals.

Comparison of Sand & Gravel - 1976 Stone Projections with 1994 Production

<u>(tonnes)</u>	<u>projected for 1995</u> (Blakeman, 1977, p. 9)	<u>1994 production</u> (NRC, 1995)
Sand and Gravel	153,800,000	238,110,400
Crushed stone	66,300,000	91,035,000

As readily seen, both construction materials were under-estimated by very large amounts, viz., actual sand and gravel production was 35% more in 1994 than predicted in 1976 for 1995; actual crushed stone production was 27% greater in 1994 than predicted in 1976 for 1995.

Applying the same amount of error from the 1976 projections for the year 1995 to the 1976 projections for the year 2000 yields a corrected projection for 2000 for sand and gravel and stone as follows:

ALL CANADA

<u>(tonnes)</u>	<u>1976 projection for 2000</u> (Blakeman, 1977, p.7)	<u>+ correction factor</u>	<u>corrected 1976 projection for 2000</u>
sand and gravel	183,200,000	+ 0.65 =	281,846,153.
crushed stone	79,000,000	+ 0.73 =	108,219,178

The new projections are made on the assumption that the same rate of growth for the period 1975 to 1994, will continue for the five-year period between 1995 and 2000.

Blakeman's 1977 report (based on work by Redfern & Proctor, consultants) predicted that "the Eastern Ontario Region could face a shortage of sand and gravel prior to 2025, and, in fact, Proctor and Redfern (1975) predict that the region will exhaust its sand and gravel supplies between 1985 and 2010." (Blakeman, 1977, p.10). However, it is also noted that "tremendous resources of stone are available in Northern Ontario, and that there are(remote) extensive resources of sand and gravel, their utilisation being dependent upon the development of efficient transportation ***."

The implication is that production from remote deposits will effectively raise the price of the construction minerals at the market site, and the cost of construction projects will rise correspondingly. The price tag for eliminating visual intrusion for near-urban areas will be an expensive one for the consuming public.

Although unit values of construction minerals continued to increase through 1994, keeping pace with the rate of inflation in Canada, selling prices varied considerably depending on the proximity to consumers. According to Natural Resources Canada, the Canadian Minerals Yearbook 1994, Minerals Sector author, Oliver Vagt, writing on Mineral Aggregates, states "a broad indicator of demand for most primary construction

minerals are housing starts.” He notes that ‘housing starts’ dropped in Canada from 168,000 units in 1992 to 155,400 in 1993 and remained the same, 155,000 for 1994. *** The level of residential construction was expected to remain the same in 1995 with about 156,000 housing starts, according to the Canada Mortgage and Housing Corporation. “ A related statistic from the same work states that “the construction of single-family homes triggers an overall demand of about 30 tons of aggregate per unit, while apartment construction requires 50 tonnes per unit.” (op.cit.)

9.5.1 Canadian Future Construction Mineral Trends

It is noted in the Canadian Minerals Yearbook 1994 that “As existing land-source sources are depleted, there is a growing potential for the economically viable marine dredging of sand and gravel in Canada. Offshore sand and gravel resources in Canada have been used to meet special job requirements in the Beaufort Sea (off-shore of NWT and the Yukon above the Arctic Circle), the Prince Rupert area of British Columbia, and at Roberts Bank port facility near Vancouver. In Atlantic Canada (Maritime Provinces), it has been established that there is a good possibility of defining sufficient quantities of sand and gravel for marine dredging.” (NRC, 1995).

Although stated, supra, that super-quarries were pioneered by Foster Yeoman Ltd. in 1986 at its Glensandra quarry on the West coast of Scotland, NRC states that “large ocean transportation facilities have been used for many years in British Columbia to supply high-quality aggregates or high-calcium limestone, e.g., limestone producers on Texada Island, situated about 100 km northwest of Vancouver Island in the Strait of Georgia, supply raw material to cement and lime producers on the lower mainland and in the State of Washington. Holnam West Materials Ltd., and its predecessor have been shipping from Texada since 1957. Road-base material and rip rap for use in the lower mainland are also important products shipped to ports as far away as Alaska or northern California. “ (op.cit.)

In recent years, “granite aggregate from a quarry near Port Hawkesbury, Nova Scotia, has been transported to markets throughout the region, and when favourable backhauls could be arranged, 50,000 - 60,000 tonne shiploads have been made as far away as Houston, Texas.” (NRC, 1995).

Thus, the trend for greater volume shipments by sea transport appears to becoming more firmly established and economically acceptable and feasible.

9.6 Conclusions and Comments

The natural process for reclamation of surface mines and pits is by backfilling as landfills for municipal solid waste. *The Mining Journal, London*, reported that in 1994 about 0.75% of U.K. surface land, or approximately 96,000 ha (237,216-acres), is affected by mineral operations. Planning authorities believe most of it will be restored to other

beneficial uses , “ *** and that waste disposal may be usefully incorporated into the restoration phase. “ (The Mining Journal, 1995 a).

As argued in this work, the location of aggregate and cement limestone quarries and their production reflect the population growth and centres. This is supported and evidenced by Canadian mineral statisticians using ‘housing starts’ as a broad indicator for predicting aggregate consumption trends. Additionally, “an analysis by the Industrial Minerals Division of Natural Resources Canada’s Mining Sector has confirmed a high statistical association between cement shipments on the one hand, and ‘housing starts’ and one-and five-year mortgage rates on the other.”

A possible fallacy and potential weakness of the trend for siting super-quarries on coasts and shorelines is the probable furor that will be raised by the environmentalist sector over the potential harm that may be done to coastal marine ecology. That battle is presently being fought in Scotland over the proposed super-quarry planned by Redlands Aggregates Ltd. on South Harris Island, Scotland. Apparently, the planned quarry site is in a natural scenic area causing a conflict over environmental concerns. One may ask, “With all the world declared “a natural scenic area”, where will mining go ?”

A prospective positive outlook for coastal super-quarries is for their anticipated reclamation and surface restoration by MSW landfilling. In addition to being remotely located, any potential contaminating seepage from landfilling would more than likely be into the sea which would have a far greater ability of absorption than land sites. The leachate-contained dreaded toxic metals for groundwaters would simply join the already high metal content of the saline waters of the seas.

Attention is again called to the difference in attitude between the British “way” and the American for applying regulations. Persuasion, influence, suggestion and discretion is conspicuous in the foregoing MPG6 and 7. It stands out in marked contrast with the American style of “command and control” with penalties for violations or non-compliance.

9.7 Current and Future Trends for Waste Disposal

Since the predictions for future mineral needs are indicated to be larger, the volume of future void space from surface mining will correspondingly be larger. In turn, the volume of society’s waste will increase, and with it so will the critical need for future landfill space. Non-fuel surface mining voids can presently, and in the future, meet the requirement for safe waste depository space. The urgency for landfill space and waste disposal trends are given and discussed in the Appendix A-1.

9.8 The Evidence and Proof of the Case :

Landfill Technology - Successful Examples Making Mined-Out and Working Surface Mines Usable as Landfills

The evidentiary proof to demonstrate that surface mining pits are currently being, and can be, successfully backfilled with MSW for environmentally safe, complete and full reclamation and restoration of the mine-disturbed land to beneficial surface re-use, is compiled in Appendix A-2. As part of the proffered evidence, pictorial illustrations of current surface mined-land backfilled with MSW in the U.K., the U.S., and Canada accompany and support the study and arguments.

CHAPTER 10

FUTURE LEGISLATIVE PROBLEMS

10.1 Introduction

The approval and permitting, or licencing process for projects, both public and private, as reviewed in this work, seems to bog down most frequently in the early stages following proposal, i.e., during the public hearing stage, to be delayed and followed by prolonged appeals and litigation. This costly time period of tossing a project's application back and forth between proponents and opponents is an area needing much repair by legislation and regulation.

It is urged and advocated that the general public place more credence in the scientific and engineering studies available to various environmental authorities. In keeping with this, it is further advocated that the amount and extent of public hearings be minimised and reduced, in deference to scientific and engineering environmental studies. To avoid prolonged involvement and squabbling by the PIP which often results in defeat of vital projects and impedes environmental progress, an override decision power should reside in the government agency having permission control. Such override decision power may be used where a vital project's defeat by the public hearings was found to be based on public misinformation, by unfounded fears, or that an environmentally curable situation exists to overcome the opposition's reasoning.

At times, a discretionary power residing in a responsible governmental official is sufficient to eliminate an anticipated troublesome PIP. For support, the British procedure is noted supra, at Ch.5 §4.8, Conclusions, viz., Public involvement in the planning and permission approval process for land development is limited. Hearings may be held at the discretion of the Secretary of State for the particular ministry, **but may limit those participating in the hearings. The Secretary of State has wide discretion in the hearings and may, or may not hold them.** The ultimate decision for planning permission, whether contentious, or not, is placed in the discretion of the Secretary. (emphasis added.)

Where discretionary power is not available, a power of decision override, or "command and control" type of environmental regulation should be extended to the licencing process for projects. After the public has voiced its reasons for opposing a project, an environmental study or assessment of the project, paying particular to the public's objections, may be made by the permitting board or council. Where there is substance found in the opponents' objections, the study may determine whether they can be treated by science and engineering to eliminate, or minimise to acceptable standards, the potential risk of the feared environmental harm. Where the opposition's objections are without

genuine basis in fact, the override decision power may be exercised for approval of the project. The following chapter studies the present process in more detail.

10.2 U.K. - Planning and Permitting of Future Surface Mining

At the 1994 British Geological Survey's Minerals Extraction forum with the theme, The Economic and Environmental Balance, it was noted that the British mineral industry's main concern was with the growing difficulty in obtaining planning permission and the length of time it takes, particularly when the issues are contentious and a public inquiry proceeds. "Martin Kingston QC urged the minerals industry to take a more positive view of the public inquiry process (PIP) and to support the system, not undermine it. He saw no better alternative to the PIP for planning judgements and stressed the vital importance of testing evidence by cross examination. The main shortcoming of the PIP is that there is no requirement to provide the best available evidence. The appointment of an assessor early on, who could visit sites at the pre-inquiry stage would do much to expedite proceedings." (The Mining Journal, 1994 b).

A primary flaw in Mr. Kingston's argument of urging "the minerals industry to take a more positive view of the public inquiry process (PIP) and to support the system, not undermine it. " is that it is in conflict with reality and directed to only one side of the hearing process. His urging would be better directed toward all those who misuse it. Reference is made for this point by the article "Public Misuse Of The Mineral Regulatory System" , Ch.8, §2.2. A questionable feature of his suggestion is the selection of an "assessor" to visit the sites at the pre-inquiry stage. Will the "assessor" be impartial in reporting on the site and the alleged environmental effects ? The purpose of the environmental assessment report is to accomplish the same.

As previously argued, the public hearing and appeal process should be sharply limited to avoid delays, costly, vexatious and prolonged and repeated appeals and lengthy litigation. The weak point in the public hearing process, or PIP, is that allegations against projects can be freely made by the opponents without having to prove their assertions. Proposed projects may be slowed down, made unnecessarily difficult, or defeated by unsubstantiated claims of opponents. Even under the present PIP announcing the time and place, the public should be warned that frivolous claims cannot be entertained or heard by the board of inquiry unless substantiated by competent evidence. The preliminary inquiry should be for the sole purpose of opponents filing competent assertions. The inquiry council, or hearing board, may then study the evidence of competent claims filed. After determining those competent assertions that have carried a sufficient burden of proof against a proposed project, the hearing authority may then hold a public hearing on the merits of the opponents' submissions of proof. Those making claims that environmental

injury, or harm to the public will result, should be required to carry the burden of proof as in any court procedure following a filed complaint for an action. This is necessary to avoid frivolous and unfounded claims simply to defeat a proposed project by slander.

After the opponents of a proposed project have shown cause for their assertions, and having sufficiently submitted evidence and proof that their allegations and claims are justiciable, thus having carried the burden of proof to the hearing authority, the public hearing process can proceed. Should a sharply disputed project between the proponents and opponents over environmental concerns continue, and where an EA report or study is not required for a local project, a mini-EA should be ordered by the proper hearing authorities to evaluate and to either prove or disprove the initially made allegations of environmentally-destructive assertions. The burden of proving the assertions made and the cost to carry them forward should be placed on the parties making them.

After the EA or study is made and reported to the authorities, their decision should be final, or at least, the number of appeals should be limited to no more than one, not continuing through numerous appeals to the highest court of the land.

In July 1994, the Scottish Office Development Department published a consultation paper entitled "Review of the Planning System in Scotland" inviting views on how the system might be improved. In its December 1995 review, the Scottish Office stated "The document generated a lively debate and 172 submissions were received making over 4,100 detailed comments about the planning system and the way it works. Details of the responses were published on 5 June 1995. *** It is clear that, while the majority of people indicated general support for the planning system, many share the Government's view that it is not working as well as it should. This manifests itself mostly in the operational aspects of the system, but also in the complexity of the legislation and the procedures it generates. Most of the problems identified are familiar and relate to delays in decision making, ineffectiveness and inconsistency. These shortcomings, in turn, tend to undermine the credibility of the system and its ability to safeguard the public interest. This has resulted in a wide range of suggestions for steps to be taken to speed up decisions and simplify the procedures while, at the same time, reinforcing the means for quality assuring both the planning process and the outcomes on the ground. *** There is a tension between a desire to streamline the overall process, on the one hand, and to build in safeguards in the interests of amenity and the local community, on the other. The Government does not believe these objectives need necessarily be in conflict one with the other and that greater efficiency and effectiveness can be delivered through simpler, clearer and tauter procedures without abandoning the rights of interested parties to make their input in the decision making process. The first priority, therefore, is to ensure that the basic tasks of processing applications, development plans and appeals are carried out as proficiently as possible.

“Planning Permission Appeals Considerable criticism has been directed at *** the delays encountered in reaching decisions on them. The upsurge in local plan inquiry work over the last 2 years, or so, and an abnormally large number of long planning inquiries resulted in a substantial backlog of appeal cases ***. The number of cases processed *** has more than doubled in the course of 1995. By November 1995, 70% of these cases had been dealt with inside 28 weeks. “ (Scottish Dev. Office, 1995) Performance targets for deciding public local inquiry planning appeal cases are 48 weeks, and 28 weeks for written submission cases, with 80% being decided in both types in the proscribed time limit.

Noteworthy are the comments made by a planning manager regularly involved in submitting plans for excavating minerals with full surface reclamation incorporated in all the plans. “CCCL used to pride itself that we had never had a refusal of planning permission and had never gone to Public Inquiry. This was because we did the ‘spade work’ before applying to ensure the best possible scheme the first time. *** Despite this, we have now had 1 or 2 refusals and, although we haven’t gone to Public Inquiry, we seem increasingly to be heading that way. This is because of -

- a) increasingly strong environmental lobby;
- b) “Political” decisions contrary to officers recommendations to approve;
- c) increasing number of “greenfield” sites.

“All open-cast schemes attract some opposition - it varies from 2-3 letters of objection to full blooded war (e.g., anti-open cast residents groups, petitions, public meeting, lobbying, media reports, production of videos and engagement of consultants by resident groups, etc.). On a competitor’s site in Wales, objectors chained themselves to the bulldozers and occupied the offices.

“ Appeal / public inquiries are very expensive (£50,000 to £100,000 plus) and are a last resort. The time scales are as follows -

Conventional planning application with no Environmental Assessment (EA) - local authority statutory time scale for determination is 8 weeks, although most take 4 to 8 months.

Planning applications with EA -16 weeks but more likely 6 to 12 months. “

10.2.1 A Case in Point: Defeat of a multi-Appealed Mining Application in Scotland

M.I. Great Britain Ltd. (M.I.) mines barytes from the Foss deposit near Alberfeldy in Scotland. Barytes (barite) is barium sulphate, a non-metallic mineral of high specific gravity used in drilling fluids by the international oil industry. The Foss operation produces between 50,000 - 60,000 t /y. of direct shipping grade ore. 97% of the Foss production goes directly into the North Sea oil industry. The Scottish operation meets about 25-30% of the drilling mud requirements for the North Sea oil industry, and because of its proximity to the North Sea area, it has a distinctive price advantage over imports from

more distant mines in other parts of the world. Reserves of barytes at Foss are expected to last about 4 to 5 years more from 1995 at its current rate of production before playing out.

In looking ahead to carrying on its business, M.I. possesses a world-class, unmined, deposit of barytes near Foss, in an adjacent location at Duntanlich. Proven reserves in the undeveloped deposit have shown it to be one of the largest known barytes deposits in the world. It could furnish as much as 200,000 t /y of direct shipping ore, sufficient to supply the entire needs of the North Sea market for the next 30 years. The deposit is better suited to underground mining, thereby having less impact and being less intrusive on the surface environment than surface mining. Production from the deposit would be even more competitive on the market than the Foss baryte. M.I. has estimated that its production could reduce the U.K.'s import bill by approximately £8 million per year. Additional benefits are those attributed to any industry, that is, supplying employment for a local workforce, and here, about 90% of the expenditures during the new operation would be spent in Scotland.

In July 1991, M.I. applied for planning permission for an underground mine at Duntanlich, but its application was refused by the Perth and Kinross District Council. M.I. appealed the refusal to the Secretary of State for Scotland in October 1992. A lengthy public inquiry lasting six months began in May 1993. An official "Reporter", appointed by the Secretary of State (similar to Mr. Kingston's proposed "Assessor", above) submitted his account of the proceedings three years later in June 1994. On the basis of the Reporter's account, the appeal was refused. The issue and conflict has not ended even after prolonged public hearings.

M.I. has lodged an appeal of the Secretary of State's decision with Scotland's Court of Session. The charges made by M.I., *inter alia*, allege that "a number of the reporter's findings were not supported by the evidence at the public inquiry, and that the Secretary of State based his conclusions on a draft version of the National Planning Policy Guideline 4 for Mineral Working rather than on the final version which was materially different. In doing so, it is contended that he erred in law in holding that the economic benefits of the proposed mine were out-weighed by the identified environmental uncertainties."

Although the environmental "uncertainties" were not elaborated, nor made clear in the report, they would clearly have to be major to surmount the socio-economic benefits to the local area and the U.K. as well.

The environmental disturbance at the mine site should certainly be minimal; there is no obtrusive surface mine working, nor surface plant concentrator, smelting or refining operations to mar the scenery or to pass gases into the air. The mine site is 9 km. from the nearest town, but is in a scenic area of the Scottish Highlands. The opening on the surface is minimal, being only a shaft for underground mining. There is to be no large plant for the surface other than for crushing, perhaps pulverising and loading for transport to Aberdeen. Aesthetic and surface intrusion could only be minimal. Those, in the present day, are

ordinarily dealt with by plantings and screening from public view. It would appear that the socio-economic benefits clearly out-weigh any biophysical environmental effects in this case. At worst, the environmental concern could be for surface subsidence, which could be dealt with as a condition precedent for underground mining permission by requiring pillars for surface support to be left in place in the mine. (The Mining Journal, 1995 e).

The publisher makes an interesting conclusory comment : "M.I. may succeed in its appeal, but if it does not, the implications are ominous, not only for future mineral working and exploration, but for industrial enterprises in the Scottish Highlands generally. Preserving the region as a theme park heavily reliant on seasonal tourism to sustain the local economy may suit some but there are others who wish to work in the Highlands who may feel that a modest industrial base is a necessary ingredient of a well-balanced community." (ibid.)

10.3 U.S. Zoning / Planning Permission

Reclamation plans that contain fuller restoration of the surface for future amenity lands, are reportedly becoming of increasing importance in swaying local authorities in favourably obtaining quicker approval of new start surface mining operations and waste disposal sites. The days are passing in many communities when a new in-coming industry can sway approval by contributing to the local tax till , offer new jobs and pour money into the local economy. Applicants for permitting must convince the local citizenry as well as local authorities that any environmental disturbance will be close to nil, that no harm will result, and a reclamation plan for complete restoration of the land will be submitted, and that the new industry have financial responsibility to carry out the plan. Only a thoroughly convincing plan will be acceptable for gaining approval.

10.3.1 U.S. -Withdrawal of Mineral Lands .

Over recent years, the legislative response to the public clamour for preservation and conservation of large areas of land in its natural state continues relentlessly to withdraw large areas from mining activity access. The latest example is the California Desert Protection Act which was signed into law by President Clinton on October 31, 1994. The Act transfers jurisdiction over nearly 3 million acres (1,215,000 ha) of desert land in California from the BLM to the National Park Service which effectively withdraws those lands from mining and mineral leasing. Additionally, the Act has placed another 3.6 million acres (1,457,000 ha) remaining under the BLM's authority in the wilderness category which severely limits access to exploration.

Some litigated examples of mineral land prohibitions follow:

(i) The prevention of further mine permitting in three national parks in Alaska was the issue in *Northern Alaska Environmental Center (Sierra Club, et al) v. Lujan (U.S.) (and Alaska*

Miners Assoc.), 961 F.2d 886 (9th Cir.1992), before a federal court. In 1985 the environmentalists/ Sierra Club challenged that the Park Service had not complied with the National Environmental Protection Act's requirement for an environmental impact study (EIS) before issuing a mining permit. The Park Service was then placed under an injunctive court order barring approval of mining permits until an EIS was prepared for each park. A gap of over five years occurred while no new mining permits were issued.

In 1990, the Park Service issued a record of decision (ROD) which recommended a plan for each park by which it proposed "that it purchase all existing patented and unpatented mining claims as funds became available. Mining claims that threaten the environment in the parks would receive priority for acquisition." In addition, the Park Service would seek a change in law whereby future patents of existing mining claims would convey the minerals only, making them subject to stricter requirements for reclamation of the environment to its original state. For those permit applications for claims that could not be acquired immediately, the Park Service would consider the cumulative impact each would have on the parks and require site-specific mitigation. The Park Service also sought lifting of the injunctive order.

The court granted the dissolution of the injunction and the Sierra Club objected and appealed. On review, the appellate court found that the EIS prepared by the Park Service adequately analyzed the possible environmental impacts to make informed decisions for permitting mining claims.

Again, as in British Columbia, the costs to keep mining out of public lands appear to be of little concern to the environmental lobby. The mineral world continues to shrink with decisions for various governments' acquisition of mineral rights and prohibition of mining on untouchable lands.

(ii) In another 1992 case, *Bob Marshall Alliance v. Lujan (U.S.)*, 804 F.Supp.1292 (D. Mont. 1992) the federal district court of Montana decided in favor of wilderness groups that challenged the issuance of oil and gas leases in the Lewis and Clark National Forest as violative of the National Environmental Act (NEPA). The court found that cancellation of the leases was the proper remedy. The leasing agency had failed to give consideration to the "no leasing" alternative of the law while studying the impact statement.

The application of Section 522(e) prohibitions of the Surface Mining Control and Reclamation Act (SMCRA) continues to plague the coal mining industry. Section 522(e) provides that "subject to valid existing rights (VER), no surface coal mining operations shall be permitted after the enactment of SMCRA within" certain enumerated areas, specifically, on any lands within the boundaries of the National Park system, the National Wilderness Preservation system, and other environmentally sensitive areas; on any Federal lands within the boundaries of any national forest; on lands where the operation will adversely affect any publicly owned park or places included in the National Register of Historic Sites.

Although the Act grants surface mining rights in parks, forests and other restricted public lands, for owners of mineral rights with valid existing rights, the term VER has proven troublesome. Former President Bush's one year moratorium on the promulgation of a new regulation regarding VER and requiring that the 1986 policy provisions be used, will expire on 24 October 1993.

(iii) Valid Existing Rights (VER) was examined in a 1992 Pennsylvania decision, *Gardner v. Com., DER (Penn. Dept. of Environmental Resources)* 603 A.2d 279 (Pa.Cmnwlth.1992), where an owner held coal mining rights pre-dating the enactment of SMCRA in land that had since been expropriated for a state park, but where the mining rights had not been taken by the state along with the surface. The owner claimed that the statutory amendment prohibiting all surface mining in public parks, except those subject to VER, deprived them of their right to surface mine coal they owned, and they were entitled to just compensation. The court found that the claim was not ripe since the claimants had not exhausted their administrative law remedies, i.e., they had not applied for a mining permit testing their claimed VER, and had not been denied the permit.

The conclusions that may be drawn that developed nations in placing their untouchable park, forest and wildlife lands beyond the reach of the mining industry for development of valuable mineral deposits contained in such land areas, are manifold. In creating hard and fast environmental regulations prohibiting mining, the national welfare of each nation suffers extensive detriment. The well-worn reasons are very much alive and still valid that a vibrant mining industry creates national wealth, employment and a valuable tax base. By comparison, beautification and conservation of the land, neither measurable in money, nor to be underestimated in value, has its proper place in the world. Both values may be had by not over-regulating ecological interests for the benefit of one to the detriment of the other. Both are essential to mankind and the environment.

Grievous error is made in the overall viewing of the modern mining industry as a selfish, destructive private interest. The mining industry creates national wealth and well-being for the people. Mining has made great strides in recent decades in becoming conservation-conscious and environmentally-minded in both spirit and practice. Numerous mining projects in the highly developed and environmentally conscious nations have proven their ability to enter an ecologically sensitive area to extract the minerals, remove the valuable mineral deposits, restore the earth, and return the area to its natural environs, and frequently in better shape than it was found. Annual award-winning programs have been established for the best mined land reclamation project, for example, by the National Stone Association.

10.4 Canada - Withdrawal of Mineral Lands

Additionally, on the minus side of the ledger to the loss of the developed nations, the mining industry is moving to the undeveloped nations where the benefits of mineral development are far more appreciated in creating wealth and national well-being, and where there is less strict and unnecessary environmental emphasis . Advertisements by the developing nations offering attractive and enticing operating conditions appear abundantly in mining publications soliciting mining company investments to come to their countries. An examples is: the 1st Kazakhstan International Mining Exhibition, 4 -7th October 1995, at Almaty, Kazakhstan. A full-page ad in the August 11, 1995 issue of The Mining Journal, London, announces "Kazmin '95 is a must for any company wishing to participate in Kazakhstan's minerals industry. The conference will provide an excellent opportunity to establish ministerial and state contacts as well as dispensing information on local services, suppliers and 'doing business' in the country. *** The country's mining sector has undergone a major modernisation programme over the past few years and the Government is keen to attract international exploration and mining companies. As part of their commitment to foreign investors, the Government has introduced favourable tax conditions, stream-lined bureaucracy and removed all restrictions on the repatriation of profits after tax." (The Mining Journal, 1995 g.) A similar recent ad was placed by the government of Chad for an International Session for the promotion of Mining for November 1995. This solicitous attitude has placed Kazakhstan as the third most favourable country in the world for new mineral investment. Ironically, regulatory-wise, "the grass is greener" for mining away from the developed nations. This point is further supported by an article in The Mining Journal, London, November 11, 1994:

CANADIANS ABROAD: CANADIAN MINING MONEY
MOVES OVERSEAS



Illustration removed for copyright restrictions

Supporting this, an analysis of Yorkton Securities' 1993 financings indicates it was a participant in \$C280 million destined for international regions.

“ Senior Canadian mining companies are investing similar amounts in construction of new mines in countries such as Chile, Tunisia and Turkey. When the full 1993 picture becomes clearer, Gamah surmises that it will show that Canadian miners are investing outside North America at an annual rate of some \$C500 million. Mindful of this acceleration in offshore activity, Gamah has compiled a directory entitled 'Canadian Companies Active in International Mining' (CCIM). It highlights the current mineral exploration, mine construction and mining activities by 580 Canadian companies in more than 70 countries. “(The Mining Journal, 1994 e).

The loss of mineral production and expenditures by the mining industry in Canada is substantiated by released statistics from its Department of Natural Resources for the year 1993. The overall production value of metallic minerals decreased by 13.7%; value of non-metallic minerals decreased by 9.6%. Nevertheless, in spite of the explorational expenditures downturn in its own country, Canada has maintained its world-wide rank as the third largest mineral explorational spender after the U.S. and Australia.

Much of the land in every Canadian Province is open for mineral activities although certain lands are at times withdrawn for that category. For example, Professor Barry Barton reported “ In 1986, 4.6% of the land in the Northwest Territories and 16.5% in the Yukon was not available for mineral activity because of parks, conservation areas, and native claim negotiations. *** In 1992, 18.2% of the land in British Columbia was inaccessible (parks, ecological reserves) or severely restricted (agricultural, Indian, mineral and placer reserves, class 1 watersheds, populated areas). (Barton, 1993, p.169). Such vast acreage significantly affect and reduce the base for future supplies of mineral resources.

As noted in Chapter 5 §5.5.1, Canadian Mineral Land Takings By Environmental Regulation and Expropriation, access to mining in Strathcona Park in British Columbia has been prohibited even where pre-existing and valid mining rights to mineral claims were held under Crown and statutory grants, as in the given examples of recent cases of *Casamiro Resource Corp.* and *Cream Silver Mines Ltd.* (supra) .

Under Canada's 1990 Green Plan for a Healthy Environment, Canadian conservationists' proposals were endorsed to establish protected areas for each of the natural regions for a total land area comprising 12% of Canada. The percentage is significant as reduction of the land-base area of Canada by 12% is a very large area expressed in acres or hectares.

There are presently reported 39 Canadian National Parks and reserves which takes 2% of the nation's land surface. Under Canada's federal National Parks Act , all mineral exploration activity is prohibited, except under the Act and Regulations. There is,

however, express authority to grant permits for the mining of sand, gravel and stone for construction purposes only within the park.

The conflict of park areas between mining interests and environmentalists has been in serious contention, but dealt with in several of the Provinces. Illustrations are given.

10.4.1 British Columbia

About 1986, the provincial government appointed a Wilderness Advisory Committee in an attempt to resolve conflicts between mining and park considerations. In 1988, it adopted a formal parks policy with the Park Act and Mineral Tenure Act. Under these acts a down-grading from a Class B Park to the classification of a "recreation area" was allowed, which in turn allowed the mineral potential in an area being considered for a park to be evaluated by the government and private exploration. The designation of a recreation area is made by the Lieutenant Governor in Council acting on advice from the ministers for mining and for parks. The principal feature for resolving the conflict between mining and land conservation is featured in §19 of the Mineral Tenure Act. Briefly explained by Professor Barton (op.cit. 1993), §19 works as follows:

"Once designated (as a recreation area), the recreation area is open for staking and exploration. The next phase that §19 envisages is that the government will carry out an evaluation of the mineral potential of the area. The publication of the evaluation, along with a notice of intent to turn the area into a park, commences a ten-year period during which private explorationists are assured that the mineral claims they stake in the area will not be expropriated under the Park Act (B.C. §19(4) and B.C. Reg. 62/89, §17). If explorationists should turn up a major deposit within that period, the plans for a park would probably be shelved or cancelled. However, if at the end of the (ten) year period the area is indeed established as a park, the claims are liable to be expropriated under §19(5) which states: ... no compensation shall be payable to any person in respect of expenses incurred that relate to: (a) exploration and development, or (b) acquisition of the mineral title expropriated or any other mineral title." (Barton, 1993, pp.178-179).

Professor Barton cogently notes that "British Columbia has therefore devised a system that responds to the mining industry's concern with land being 'locked up' before its mineral potential has been ascertained and the concern that investment in a claim not be wasted by the sudden gazetting of a park." (Barton, 1993, p.180).

A most recent example in British Columbia, a province already checker-boarded with parks, the Provincial government struck a devastating blow to deny mining of the Windy Craggy prospect, an undeveloped, but evaluated, world class copper-gold deposit in a proposed provincial park. The proposed park would cover a million hectares in the Tatshenshini-Elsek region, northwest of Skagway, Alaska, and will be nominated as a World Heritage Site where mining will be totally prohibited. In its over-emphasis, cost appears to bear no object to keep mining out. The government later announced "talks" to compensate claim holders in the area. The fact that a world class, valuable base metal deposit, already evaluated and planned for open cast mining, will be lost with its

accompanying benefits to society and industry, along with hundreds of new jobs and a valuable tax base for government, apparently means nothing. Strict mining environmental management controls were to have been employed for the Windy Craggy area as administered by British Columbia's EPA. In spite of what was purported to be compromising legislation between the Park Act and Mineral Tenure Act, the very large and valuable Windy Craggy mineral deposit located before the park was created, fell to environmental clamour to prohibit mining.

It is reported that British Columbia provided 12.8% of Canada's non-fuel mineral production in 1993. A report by Mr. Mike Smith (see below) of the respected accounting firm, Price Waterhouse, noted and corroborates the "drawing closed of the mining industry's purse strings" for mining explorational expenditures in British Columbia during 1993:

EXPLORATION: B.C. SPENDING AT RECORD LOW

"A new report by accountants Price Waterhouse partly blames the New Democratic Government of British Columbia for the lowest level of primary exploration in the province last year since 1968. The report estimates that the mining industry spent only \$C9 million on exploration in 1993, almost half the \$C17 million recorded in 1992. ***

" Since 1991, only one new mine, Eskay Creek, has proceeded to the development stage in British Columbia. Moreover, the province's mining industry recorded a loss of \$C14 million last year and has not made a profit since 1989.

Mr. Mike Smith, author of the report, remarked that the current low of exploration investment in the province is "a significant concern" and is underpinned by high levels of taxation and the provincial government's sweeping environmental reforms, which have created "massive uncertainty" within the industry. In particular, Mr. Smith notes that the government has been slow to agree compensation to Geddes Resources following its decision last year to cancel the Windy Craggy copper project in favour of a provincial park. " (The Mining Journal, 1994 e).

10.4.2 Ontario

This province provides the largest share of non-fuel mineral production for Canada, accounting in 1993 for a third (33.6%).

This Province has also suffered vacillation in its park planning-mining policy over several decades, waxing between permission and denial for mineral prospecting and exploitation. However, in 1983 a change in position was taken from total prohibition of mineral prospecting in parks. "The government announced 155 new parks, and *** permitted mineral exploration and development in forty-eight of those parks, or about 80% of them by area. A new government reviewed park policy in 1988 and reinstated the prohibition of mineral exploration and development as a non-conforming use in all parks in the wilderness and nature reserve categories. At present, exploration and development can only proceed on pre-existing claims, leases, patents, or licences of occupation, which are outstanding in fourteen different parks. *** Fifty-three new parks were announced along with the policy changes in 1988.

“ In considering new parks, the Ministry of Natural Resources considers district land use guidelines and different land use interests. In some cases, such as the Greenstone Belt of northeastern Ontario, the mineral potential (Aston Comment: “Greenstone Belt” is primarily for gold exploration) has been considered to outweigh considerations that indicated park potential for the land.” (Barton, 1993,pp. 176-177.)

10.4.3 Other Canadian Provinces

Professor Barton notes that Provincial “Governments have struggled to improve the way they handle mining-and park issues. In Quebec the Minister of Energy and Natural Resources has the power to delimit lands ‘for non-exclusive purposes of recreation, tourism or plant-life or wildlife conservation’ and to impose special conditions and obligations on the mining rights in those lands or on their renewal. (Que. §213.2) The prior approval of the Minister is required to stake claims in these areas. [Que. §32(5)].

It should be noted that Quebec ranked second of the provinces after Ontario in non-fuel mineral production, accounting for some C\$2.78 billion, or 19.5% of Canada’s total minerals in 1994.

“Similarly, Nova Scotia has introduced procedures to withdraw land from ordinary disposition and to reserve it for special licences and leases. (N.S. §22).

“ *** in the Saskatchewan Crown Minerals Act, (S.Stats. 1984-85-86 c.C-50.2 §10.1 added by Amendment 1992, c.25§5) where mineral dispositions may be cancelled after a negative environmental assessment, or after a Cabinet order for other environmental protection purposes. The Act provides that if there is a cancellation, compensation may be available under regulations.” (Barton, 1993, pp.175-7, 185). In 1993, Saskatchewan provided 9.6% of Canada’s non-fuel mineral production.

In New Brunswick, Professor Barton cites the case of *New Brunswick (Minister of Natural Resources and Energy) v. Elmtree Resources Ltd.*, [1989] 101 N.B.R.(2d) 255 (Q.B.) as illustrating the friction and “*** frustration that builds between mineral explorationists and park officials, but in the context of a legal regime where the issue of a mining lease depended upon satisfying the government as to environmental concerns.

“The area that Elmtree staked was regarded by the government as a unique and sensitive area. Indeed, the Department of Natural Resources and Energy had identified it as a potential ecological reserve, although it had not yet formally established it as such. Consequently, Elmtree was refused a mining lease. Elmtree objected, and although it did not get the lease issued, it convinced the Mining Commissioner that the Department owed it a duty of care to inform it, at the time of recording the claim, of the identification of the land as a potential ecological reserve so it would not spend exploration money fruitlessly. The Mining Commissioner awarded over \$5,000 compensation. On the appeal, the Court held that the Commissioner had no jurisdiction to award such compensation, so the question of whether any such duty of care exists was not dealt with.” (Barton, pp. 186-187.

Additionally, Judge Stevenson, writing the *Elmtree* decision for the N.B. Court of Queen's Bench, stated that, "There is nothing in *** the Act that gives the (Mining) Commissioner specific authority to determine whether the Minister or his department has a duty to make a prospector or holder of a mining claim aware of proposed ecological reserves." Thus, it is apparent that mineral explorationist must second guess where the government will give future consideration for ecologically sensitive reserve lands that will prohibit mineral prospecting. Presently, under the *Elmtree* decision the Canadian government's mere consideration of ecological reserves land is tantamount to its withdrawal from mineral exploration and claim staking.

10.5 Minerals on Native Lands

A 1993 editorial, *Enviromine*, in *Mining Environmental Management*, London, encouraged wisdom, temperance and moderation by both environmentalists and the mining groups in their pursuits. Hence, a realistic balance must be struck between continued development of natural resources and preservation of selected lands once occupied by ancient peoples. (*Mining Environmental Management*, 1993).

A particularly variety of land withdrawal that confronts the present mining industry in developed countries is that containing highly restrictive laws for mining on aboriginal or native lands, particularly in Australia, New Zealand, Canada and the United States. As land areas are increasingly restored to aboriginal tribes, access to mineral resources on those lands become more difficult due to dual negotiations and approval, i.e., with the tribal councils and the administering governmental agencies. The United Kingdom, singularly, does not share the problem of aboriginal claims to lands.

10.5.1 U.S. Aboriginal Land Claims

Indians makes up less than one percent of the population in the U.S., but their role in ownership of mineral resources is considerably more impressive and important. 115,217 sq. mi (298,412 km²). of Indian tribal lands are held in trust by the US government and contain nearly a third of national energy reserves of uranium and coal.

Current mineral development policy is governed by the Melcher Act (the Indian Mineral Development Act of 1982). Indian tribal councils may negotiate and make development agreements for mineral resources on tribal lands, subject to approval by the Secretary of the Interior (SI), which is to be reasonably given. Development can also occur on lands owned in fee simple by the tribes.

The Energy Policy Act of 1992 has provisions authorizing the SI and Secretary of Energy to provide financial assistance to Indian tribes to promote energy resource development and renewable energy projects. In the manner of promoting self-governing programs, the Act authorizes grants to certain tribes to establish tribal offices of surface mining regulation and reclamation for operations on tribal lands under their own

adjudicatory system. Additional funds are available to assist tribal governments, along with technological assistance, for their development of environmental programs on Indian lands.

Most litigation involving resources on Indian lands is over oil and coal. In *Cheyenne-Arapaho Tribes of Oklahoma*, 1992, the aborigines prevailed in showing that the federal government had improperly approved an oil leases to the detriment of benefits for the tribes. In *Conoco v. Arkeketa*, No.92-C-014-B, 19 Indian L. Rep. (Am.Indian Law Training Program) 3085 (N.D. Okla.1992), the court procedurally upheld the Ponce Indian Tribe's oil and gas severance taxation on the oil company. The company had failed to exhaust the tribal hearing remedies before appealing to the district court.

Development has been detrimentally affected by allowing both Indian and state taxation on Indian land mining projects. The power of taxation on reservations was granted to the tribes as early as 1904, and upheld in *Merrion v. Jacarilla Apache Tribe.*, 455 U.S. 130 (1982). In 1991, the decision in a railroad case upheld the right of the Blackfeet Tribe to tax a railroad for its right-of-way across the reservation.

In *Northern Cheyenne Tribe v. Lujan (Sec. Interior)*, 804 F. Supp. 1281 (D.Mont.1991), the aborigines successfully stopped the Secretary of Interior from proceeding with federal coal leases sold on land adjoining the reservation lands on the basis that the government had failed to comply with the National Environmental Policy Act and the Federal Coal Leasing Act 1976. The government neglected a special trust relationship with the Northern Cheyenne. An environmental impact statement found that coal development under the leases would have "significant" and at times "severe" social, economic and cultural impacts on the Northern Cheyenne Tribe.

In spite of frequent litigated disputes with aborigines, access to mineral development on their lands, in general, seems to more easily obtained than in the British Commonwealth nations. (Aston, 1993 (b), MEM).

10.5.2 Canadian Aboriginal Land Claims

Aboriginal land claims are abundant, particularly in Canada's northern and western areas, the Northwest Territories. Negotiations with four aboriginal groups, the Inuvialuit, Inuit, Dene and Metis, have been carried on for several years. Large areas of land are involved and include the issue of mineral rights and ownership. In all cases, access to minerals on the lands are restricted. Canada may well accompany Australia with the term "shrinking Canada". Canadian examples of large land withdrawals and severe limiting of mineral activities follow.

The Inuvialuit people of the McKenzie Delta in Arctic regions reached a successful settlement for their extensive claim of aborigine lands in 1984, and in which an Environmental Impact Review Board was provided for. In 1990, a proposed drilling program by Gulf Canada was denied recommendation by the Board on the basis of Gulf's alleged inability to cope with a major blow-out .

The Denise Indians and the Metis people, hoping to attain the success of the Inuvialuit, claimed approximately 425,000 square miles (1,100,750 sq.km) of the Northwest Territories. An Agreement in Principle was made in 1988. The 'settlement area' agreed upon with the Canadian government covered 340,000 square miles (880,600 sq.km) in the NWT whereby claims to title by the Dene/Metis were extinguished for certain rights. To be granted was surface legal title to 71,000 sq. mi. (183,890 sq.km) and subsurface rights for 4,000 sq.mi. (10,360 sq.km) of the whole. Additional mineral rights and royalties are to flow to the aborigines from the entire 'settlement area'. A similar requirement for proposed mineral development on Dene/Metis lands, to that required in the Australian Aboriginal Land Act, calls for a pre-consultation with the aborigines for explanation of the project, expression of their views, and obtaining their general acceptance of the proposed mineral development.

On a lesser basis, in November 1990 Alberta made a settlement with the Metis people within the province for the transfer of fee simple title to 1,900 sq. mi. (4,921 sq.km.) with rights (not title) for subsurface mineral resources. There are restrictive provisions for sale of the land and for access to explore, develop or work the minerals. The Alberta act provides for an Appeal Tribunal to hear disputes over access to existing mineral leases.

In 1990, the Supreme Court of Canada decided several cases which strengthened the aboriginal position with new powers and scope. In *R. v. Sioui*, [1990] 1S.C.R.1025, in a Quebec statute challenge, the Court considered the 1760 treaty with the Huron Indians treating aboriginal sovereignty as a basis for aboriginal claims. The Court maintained that aboriginal treaty rights should be given a "modern meaning... permitting their evolution over time."

A split-off aborigine group, the Gwich'in or Loucheux, habitating the McKenzie Delta in the NWT and the north slope of the Yukon, had participated with the Dene/Metis in the Agreement in Principle. After the larger group rejected the deadline set for the ratification of the Final Agreement with Canada, the Gwich'in negotiated their own Final Agreement (GFA). In exchange for their extinguishing all aboriginal claims, they received 2360 sq. mi. (6,112. sq.km.), including subsurface minerals title, in the NWT, and 600 sq. mi. (1,554 sq.km) of surface-only title in the Yukon. They are to be free to make arrangements for mineral development on the collectively-held lands in the NWT, and are to receive royalties from all settlement lands and the entire McKenzie Valley. However, access to Gwich'in mineral resources is not as simple as it may sound. Under the GFA, an Environmental Impact Review Board (EIRB) was provided for, and no mineral development proposal may be approved until an initial assessment has been made by the Board for "significant adverse environmental impact" or for a "cause of significant public concern."

As in Shrinking Australia, access to Canada's mineral wealth on Crown lands is being whittled down by aboriginal claims and the national economy is seriously impaired when profitable mining projects may be rendered immobile by historical claims made centuries later. (Aston, 1993 (b), MEM, pp.8-9).

10.5.2.1 Northwest Territories Aboriginal Land Claims Up-Date:

Land claims in the eastern Far North have moved forward since 1990, thus giving a greater sense of security for mining companies to invest in prospective mineral deposits. In mid-1993, the Inuit people ratified their land claim in the High Northern and Eastern Arctic. The federal Canadian government agreed to pursue the creation of a new territory, called Nunavut, to encompass the traditional Inuit lands. The settlement gave the Inuit title to 350,000 km² of land to include subsurface rights for 36,000 km², plus financial and other participatory rights.

In the Western Arctic, the Gwich'in people ratified their agreement with Canada which transferred 22,400 km² of land in the NWT and 1,550 km² in the Yukon Territory, with subsurface rights and a share of resources royalties included. The southern neighbours of the Gwich'in, the Sahtu Dene and Metis peoples followed suit, taking another 41,400 km² of land from the territories.

The Dogrib people to the South are still in the negotiating process for their land claims, while other aboriginals of the South Slave and Deh Cho districts have yet to file claims. On the more recent and brighter side for the mineral industry, the aboriginal peoples of Canada's territories are showing an inclination to support mineral exploration in order to raise their standards of living. (The Mining Journal, 1993 a).

10.6 Proposed Mineral Evaluation of Public and Crown Lands before Preservation

Purposes

As argued in Appendix A-1, before government-owned lands are set aside in preservationist acts for parks, forests, wildlife, scenic and recreational areas, prior mineral studies should be made to locate or eliminate potential and valuable mineral bodies within their proposed boundaries. If economically exploitable mineral bodies are found within the planned boundaries, the mineral industry should be given the prior opportunity to mine the deposits of minerals, reclaim and restore the land to beneficial use before the lands become untouchable and set aside for preservationist purposes. This is a perfect example of the intended purpose of land use planning.

As part of future land use planning, it should be recognised that cases may be presented where a potential mineral body may be located, but present day mineral economics prevent it from being mined. In such cases, future planning should note the

possibility of potential future mineral exploitation at a time when economics and mineral beneficiation technology would allow the mineral body's economically profitable development for the good of mankind.

10.7 U.S. Mine Site Reclamation Legislation Proposed

Considerations for reclaiming derelict mine lands in the U.S. is under consideration by the U.S. Congress. Though the considerations have environmental merit, the weakest point in the discussions is the fact that it appears no thought or consideration has been given to putting those many surface mines to use as landfill sites to accomplish far better and fuller reclamation, to accomplish land conservation, and most importantly, to relieve the urgent need in the U.S. for MSW and hazardous waste disposal sites. All of those environmental goals appear to have been overlooked or by-passed in the proposed federal action to reclaim abandoned surface mines. A grand opportunity is being missed to accomplish better environmental goals at greatly reduced costs to the government and the general public. An article on the proposed U.S. mine reclamation legislation follows:

U.S. MINE SITE RECLAMATION

“ The cost of cleaning up more than 550,000 abandoned hardrock mine sites in 32 U.S. states could be between \$32,000 million and \$71,500 million according to a new report prepared by the Washington-based Mineral Policy Centre. The sites identified in the report include underground mine workings, open pits and waste heaps. The establishment of a national reclamation programme for abandoned hardrock mines is advocated to include a nationwide inventory of sites on public and private lands. A minimum of \$400 million per year for the programme is recommended, to be met from fees and royalties imposed on the mining industry. The Mineral Policy Centre claims that it is not anti-mining but has called for wide-ranging reforms within the industry and has been a keen supporter of revisions of the 1872 Mining Law.

“ Not unexpectedly, its finding and recommendations have been strongly attacked by the mining industry's trade association, the Mineral Resources Alliance, and also by Senator Larry Craig, a Republican from Idaho and author of a Senate-passed mining reform act. Senator Craig said the report admitted that the number of sites was unknown, hence the cost estimate for the clean-up could be much lower than the figure put forward.

“ Of the 550,000 estimated abandoned sites, only 50 are on the Superfund hazardous waste list with an estimated clean-up cost of \$12.5 million to \$17.5 million. A further 500 sites with groundwater contamination could cost \$2.5 million to \$7.5 million whilst another 14,000 sites with surface water contamination would cost between \$14 million and \$43 million. The report identifies some 230,000 sites where the landscape has been disturbed and 195,000 where little, if any, remedial measures would be required. “ (The Mining Journal, 1993 b).

10.8 Conclusions and Comments

Clarification is required for the initially, sounding and alarming “cleaning up of 550,000 abandoned mine sites” complained of by the Mineral Policy Center (MPC) in the preceding article (at §10.7). As further reading of the article clarifies, the alarming figure can be immediately reduced by some 325,000 sites leaving a far lesser number to be concerned over. According to MPC’s own published figures, about 195,000 sites are “reclaimed and/or benign” and require little, if any, remedial measures.” Also, MPC states 231,900 sites have only landscape disturbance”, thus needing only cosmetics to beautify the land. (Then why does MPC include these large numbers of benign sites to inflame the public?) Out of the 557,650 sites complained of by MPC, the truth of the matter is that the number of sites to be environmentally concerned about should be reduced by 76%, leaving only 24% , or 131,750 sites of potential environmental harm. Of the total, it should be noted and emphasised that only 50 of the sites (0.0089 %) are on the Superfund clean-up list because of environmentally hazardous conditions.

MPC calls for a Hardrock Abandoned Mines Reclamation program to be enacted. Utilisation of the abandoned hardrock mines as MSW depositories appears to be the solution, accomplishing not only the goal of MPC but relieving the urgent need for waste disposal space.

The point is made that the domestic mining industry is withdrawing from Canada and the U.S. (Even in the U.K., super-quarries for future supplies of aggregates are advocated for location in remote places in other nations, e.g., Norway, and Spain.) The reason given by the mining industry is that mining has become uneconomical in their own country due to the high cost of overly stringent environmental regulation. Environmentalists argue that the present regulations must be maintained, without relaxing, and counter by calling for greater controls. A happy medium must be found between the two positions. If pollution is presently occurring from mining, either the regulations in place are not being enforced, or they are inadequate. If pollution from mining is not occurring, then present control is obviously sufficient without more control.

SECTION V

CLOSING ARGUMENTS FOR THESIS SOLUTION

CHAPTER 11

NEW DIRECTIONS FOR ENVIRONMENTAL LAW POLICY IN REGARD TO SURFACE MINED LAND RECLAMATION AND SOLID WASTE DISPOSAL

11.1 Introduction

A reasonable direction for improvement in environmental policy and law is sorely needed for solving and improving the two current, large environmental-creating problems, viz.,

- (1) that of maintaining a continued supply of metals, industrial and construction minerals by surface mining with minimal injury to the earth's surface accompanied by the mined-out land's full and complete restoration for its re-use as a matter of land conservation and sustainability ; and
- (2) providing sufficient and ample space-volume for the disposal of municipal solid waste which is presently in critical shortage and in the foreseeable future.

At the same time, a related problem needs serious attention to make the flow smoother for the resolution of the first two problems , viz., that of minimising the defeating contentiousness of the public inquiry / hearing process (PIP).

11.2 Solution Considerations

A highly creditable conclusion was made by Tomes in his 1989 technical paper at the Institute of Quarrying, (op. cit.) , "Quarrying and landfill are two industries which are inextricably linked. We are fortunate in Britain that we are self-sufficient in stone, sand and gravel and can, therefore, be equally self-sufficient in landfill capacity, if we choose."

Although siting of mineral extraction and landfill operations is extremely contentious by the general public, temperance must be sought and appealed to by education of the absolute necessity for such joint operations. The public requires construction materials for the construction of private and public works. It also sorely needs sites for disposal of its own refuse and solid wastes. However, when the public is faced with the nearby location of such a "bad-neighbour" development, the NIMBY syndrome surfaces in protest, whether the potential for real environmental harm exists or not, as basis for alleging future environmental injury. This fearful public attitude is corroborated in the U.K. Department of Environment (1992) Research Report, Environmental Effects of Surface Mineral Workings (op.cit. p.14) which stated, "For a new mineral working or a

major extension of an existing site, (public) apprehension may well exaggerate the anticipated problems.” In fact, the U.K. report cites in its Introduction the basis for the report as “The need for the study arose from *** the increasing pressure on the provision of land for mineral extraction and the consequent difficulties that face operators in seeking planning approval.” (op.cit., p.1). The same report continues, “ Such (public) apprehension can often be reduced , both before and during operations. It helps to ensure that those affected have contact with the operator and are given some understanding of what is involved in mineral operations and any compensatory measures that might be taken.” (id., p.14).

To illustrate that environmental lobbying has been effective in defeating mineral land development in the U.K., in November 1995, the Geological Survey of Northern Ireland, in promoting new mineral development, highlighted an announcement entitled “a window of opportunity”. In it, the Survey called attention to lessening of a major concern to the mining industry by stating that, “ The major concern that environmental lobbying is defeating economic consideration is diminishing.” (The Mining Journal, 1995 h).

11.2.1 Minerals Must Be Excavated Where They Occur

The 1992 U.K. Department of Environment Research Report, Environmental Effects of Surface Mineral Workings concedes that “*** as mining can only take place where the minerals occur, there is a possible distinction that can be made in justifying compensation related to surface mineral workings but not for most other forms of development.” (op.cit. p.116). A mining operation cannot be moved to some other location as could a manufacturing plant in order to accommodate the public’s desire for its more remote and less intrusive location (i.e., NIMBY). It is true that there may be some small leeway in locating aggregate-producing materials since they are produced from massive occurrences of common rocks which frequently cover, or lie below, large surface areas, e.g., granite, gneisses, limestones and other igneous, metamorphic and sedimentary rocks. This is not as true for sand and gravel for there are more geological restrictions governing its mode of occurrence than for the other massive-occurring aggregate-producing materials. However, even these more commonly occurring rocks have their economic limitations with respect to the depth of occurrence and overburden that has to be removed before mining can start.

11.2.2 Consideration of Private Property Rights

Are private property ownership rights being lost to over-regulation ?

It has been noted earlier in the Introduction of Chapter 5, that the environmental regulations, particularly in the US, are of a “command and control” nature which encroach on previously held areas of private ownership and self-control of individual property rights. For example, an owner of mineral-bearing property, whether an individual or a mining company, could previously mine any place on its property, or as many acres as it wished. After planning, zoning, permitting and licencing controls were in place, a land owner could not freely excavate or move about on his own property without the approval

and licencing of authorities. At times, even public notice hearings were involved before approval could be given for exercising excavation of the property owner's minerals on his own land. Clearly, the property rights of the owner have been severely encroached upon, limited, restricted and taken away from him. This is a result of the "command and control" type of environmental regulation. However, to obtain the desired results for the good of the public, the new "command and control" system proscribed environmentally "harmful" acts and effects of mining requiring specific control measures to produce the governmentally and environmentally-desired benefits for the general welfare.

11.2.3 Command and Control Environmental Regulation:

It is recommended that serious consideration be given to extending and employing the "command and control" type of regulation for the siting of future combined open-pit mining and solid waste landfill operations. Even limitations for public hearings on siting of the "bad-neighbour" developments may be necessary to the economy and welfare of the public. Too often, siting approval when subjected to the choice of the public at public hearings ends in rejections, or conditional approval is loaded with so many restrictive conditions that the development is seriously hampered economically. In the U.S, rejection of sites have been made by the public in spite of preliminary approval of the site by environmental controlling agencies. Too often public opinion succumbs to the unfounded fears of the NIMBY syndrome causing public disapproval. Waste disposal sites are frequently rejected in areas where they are sorely needed, rejected on unfounded fears of the NIMBY syndrome. (See *Village of Wilsonville v. SCA Services, Inc, File et al v. D & L Landfill, Inc.*, and *City of St. Peters v. Dept. of Natural Resources*, supra).

As in the Denver airport example given earlier, the critical need for construction materials was rejected by the NIMBY syndrome. Materials had to be found in a neighbouring state and transported at far higher costs. This is absurd when the very same construction minerals may be found near to the Denver construction site. In the end, the public pays and only the environment in Denver's backyard has been served, not in Wyoming's. A similar case in the U.K., as evidence submitted of the NIMBY syndrome driving the costs of production higher is the M.I. Great Britain Ltd. appeal in Scotland for denial of permission to mine the barytes deposit at Duntanlich (supra at Ch.10 §2.1). Without production from that unmined world-class barytes deposit, the cost of North Sea oil production will rise; along with it, the price of fuel oil in Britain will also rise.

11.3 The Spreading of the NIMBY Syndrome as an International Problem

Hitherto, environmental concerns in the undeveloped nations have ranged from nil to minor. As argued in Chapter 1, the Introduction, at §1.1 : "The underdeveloped and the developing nations are striving *** to develop their mineral resources. These Third World

nations have openly solicited foreign mining industry to invest in the development of their wealth of minerals without the costly and stringent environmental and mine permitting regulations of the developed nations. “

As evidence of an already changing attitude in a developing nation, inhabitants of India are already adopting the NIMBY syndrome accompanied by unfounded fears according to the following report from The Mining Journal, London, of June 30, 1995.

OPPOSITION STALLS INDIAN BAUXITE MINES

“ An increasingly strident campaign is being waged against the development of a major bauxite mining project and an alumina refining project in the Indian state of Orissa, sparking much discomfiture amongst the state administration and the project developers. A similar incident in 1990 forced Bharat Aluminium to abandon plans for mining bauxite at Gandhamardan in Orissa after having spent nearly \$US 1 million because of local opposition.

“ According to reports in the London *Financial Times* , the local inhabitants of the Rayagada and Kalahandi districts of Orissa have been told by the newly formed Anchali Suraksha Parishad, which is spearheading the lobby, that the proposed complexes would “disturb the environment, displace the tribals and cause a cultural shock to the local people.” The developers, struggling to counter what they claim is a campaign of disinformation, maintain that these fears are largely unfounded and that the projects will “generally comply” with accepted international environmental requirements “ (The Mining Journal, 1995 f).

Ironically, the same article goes on to say that a competitive joint venture in the same geographic area and dealing with the same governmental body , “have been able to convince the Orissa government that they will offer adequate compensation for any resettlement and will protect the tribal culture. India’s Industry Minister vowed that the projects will be implemented, stating, “In fact, we want more such projects in the state.” (id.)

11.3.1 A Continuing Landfill Siting Problem - The Public Hearing Process or The NIMBY Syndrome Takes Over

As stated in the Introduction, Chapter 1 §1, a third problem for this work is to propose a less contentious, less controversial and less combatant way for both private and public projects to obtain approval, be permitted and licenced, than through the extended PIP / public inquiry process. More public trust and confidence should be placed in the scientific management by the in-place regulatory agencies already charged with the protection of the public from environmental harm. Similarly stated by Browning-Ferris Industries’ brochure (1991) on Solid Waste Disposal, “ The key reason for many disposal problems is the lack of public support for waste disposal facilities of any kind. While many citizens and public official recognise the need for sanitary landfills, they may not be aware that a well-designed and professionally operated facility can actually protect the environment.” (op.cit.)

In a preponderance of projects suffering rejection at the hands of the NIMBY syndrome, the defeat is illogical. The stigma of the “bad-neighbour” industries still prevails. It shows a lack of public trust, or a lack of information by the public, or blatantly ignores, the engineering profession’s modern technological advances for environmental protection against pollution and contamination. All aspects of centuries old industrial repugnance are now treated for environmental protection, e.g., dust, noise, water, visual intrusion, wildlife harm, et al. In view of present environmental technology, there is little basis for defeat of projects when socio-economic considerations clearly predominate.

Landfill site selection has become both overly complex and time-consuming. Browning-Ferris continues, “Today, before a permit application is tendered, the landfill operator must ensure that zoning and land-use restrictions allow for the construction of a sanitary landfill. These curbs are often major obstacles in successfully siting a sanitary landfill facility.

“Regulatory bodies also demand detailed assurance of technical and fiscal responsibility. These agencies have regulations that are meticulously written to guarantee the public that any future landfills will be operated in an environmentally sound manner. For example, before any site receives state operating permits, that site will have undergone rigorous analyses involving the study of the site’s geology, hydrology, soil conditions and land-use compatibility. In addition, a detailed engineering plan is prepared and submitted for approval by regulatory authorities. There are also financial requirements that must meet minimum criteria established by state and federal agencies.”

With those and other assurances required by the USEPA, the NIMBY syndrome has no basis or place in the PIP.

11.3.2 An Offered Solution to Combat the NIMBY Syndrome

To obtain the desired approval for the public good, the “command and control” type of regulations should be considered and introduced in proscribing environmentally beneficial planning regulations in place of the PIP to produce the governmentally and socio-economically desired benefits for the general public’s welfare. A balance must be found between the bio-ecological and socio-economical considerations of the present and future. .

Many state waste management laws already exist which provide a mechanism for state override of local authority which may block the siting of hazardous waste facilities, e.g., N.C. Gen. Stat. § 143B-216.10 et seq. The same override power for landfill siting can be enacted by legislative bodies.

The power of override by the U.S. federal government in other areas of environmental legislation has been reserved by it, e.g., under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA), the EPA Administrator may suspend the authority of the State until such time that the State can and will exercise adequate controls. Similar

provisions exist for other federal environmental acts where the states may have primacy for implementation of the statute, but the federal authorities retain supreme authority.

It should be emphasised that under the best practice model law herein proposed, the mandating of abandoned and active non-coal surface mines to be used as MSW landfills in their reclamation process will automatically eliminate the public inquiry process for their approval and permitting as landfills. To circumvent the PIP for future surface mine-landfills, a simple legislative act that exempts their future siting from the PIP would resolve future problems.

11.4 Deciding the Procedure for Permission of Projects

Between the British and U.S. philosophies for application of environmental regulation and exacting compliance, the choice appears to be between the one extreme of British temperatism employing persuasion and a large degree of discretion by authorities, including voluntary acts by the developer, or that of the U.S., for command and control procedure with strict adherence and strict liability under severe penalties of the law, inclusive of jail sentences for environmental “crimes”. This choice is mirrored by Hughes’ posed question, “*** is environmental control best effected by bodies possessing great discretionary powers and preferring to follow time-honoured paths of persuasion and cooperation, or should it be achieved under strict mandatory regulations administered by publicly accountable bodies ?” (Hughes, 1986, p.73) As Hughes notes, the latter is “not commonly the British way.”

Hughes further argues that “Those who create standards for environmental protection must discover an appropriate compromise between rigid legalism and uncontrolled discretion, bearing in mind the need to achieve economically efficient and cost effective results. What is more, they must frame their standards in such a way that when enforcement action should be taken the circumstances are such that the enforcer feels not only legally, but also socially and morally justified in acting.” (Hughes, 1986, p.74) In the end, it is the electorate that will determine the moral degree of punishment to be exacted for the violation of environmental regulations, and whether violations are to be viewed as criminal, or not.

Whether enforcement of the environmental regulation by imprisonment is morally correct, and to what extent sanctions or punishment is meted out for violation, is of concern for all proposals and works in achieving the end results and product of an improved and cleaner environment.

11.5 The Main Issue for Joint Quarrying and Landfilling Approval

However, the main issue of this study, work and proposal is the taking advantage of two already in-place and permissible developments of universal continuous-need, by combining them for the greater efficiency and improvement of existing environmental works thereby yielding greater efficiency, economic benefits, and improved land reclamation and conservation

The theory herein proposed is that non-fuel, surface mines or pits, upon completion or being "worked-out, should, by legislative enactment, automatically become part of the planning and the regulatory process mandating their reclaimed use for controlled tipping of local and municipal solid wastes as part of the reclamation process in returning the derelict land to usefulness.

Query? Why excavate other holes in the ground or pile and cover waste mounded on the surface just to deposit wastes when voids (holes) are already provided to society by the mining industry? Or, put another way, why make landfill sites on the surface in more permeable soil when more impermeable pits in rock are available and safer? On evidence of research, those excavations/pits made for construction materials, i.e., stone aggregates in particular, are either naturally environmentally suitable for landfill sites, or can readily be made environmentally safe and acceptable as landfill sites.

There are two main, essential characteristics of aggregate (stone) pits that make them desirable and amenable to landfill sites for controlled tipping, viz., (1) the mineralogy of the mined material, i.e., rocks [as granite, gneiss, diabase(trap rock), et al] are generally chemically neutral, and do not contain toxic metals which may be released and infiltrate the ground waters from pit workings; and, (2) the location of crushed stone (aggregate) pits are generally found near urban areas making them accessible to the population concentrations as landfills where most waste is generated.

Under (1), above, crushed stone pits being generally chemically inert, do not have the undesirable characteristic of coal pits to provide acid water drainage. For those pits that are within or below the water table, the pit walls are generally solid rock. Where there are prominent "cracks" (faults, joints) in the walls of the pit, they may be grouted thereby closing them to leakage, or sealed with vertical HDPE liners or impermeable clay lining. Both processes for sealing have been successfully done in landfill sites.

Under (2), above, a desirable cycle of ready-made openings for landfill sites in urban areas where most waste is generated, is currently in place, and regularly re-occurs over each generation or two, and should continue to re-occur for a long time to come. In the cycle, urban areas continue to grow and expand, many into megalopolises, or the joining of metropolises. The demand is great in these areas for construction materials, principally rock, for aggregate and limestones for cement, clay for bricks, etc. All are low-priced and low-profit materials that generally cannot tolerate a high transportation cost to

get it to the construction site/market. Therefore, economics has dictated that the source sites for stone aggregates, in particular, must be, and are, close to the urban areas where the construction growth is concentrated. As population growth continues to occur and expand in the metropolises, the older stone pits are encroached upon by dwellings, et al, and are forced to close and move further away from the population to areas beyond the new expanding edges of the population/growth centres because of their undesirable “bad neighbour” characteristics (noise, dust, traffic). The old, abandoned pit sites should be reclaimed and returned to beneficial surface use. The reclamation trend has been to allow pits to fill with water making lakes and landscaping the surrounding surface. Ensuing development around the former pits then becomes desirable residential areas, golf courses, parks and other recreational uses. The opportunity to utilise the land for critically needed landfill sites has been lost and cannot be recovered. New residential areas view landfills as “bad neighbours”, too, and do not tolerate the abandoned pit as a landfill site unless designated as such before extensive encroachment.

Support to that part of the cycle referred to as pit location in proximity to population centres, supra, is corroborated in Blakeman’s report to Environment Canada, “Although mineral aggregates and industrial minerals are essential to the national economy as are metallic minerals and fuels, *** due to their high bulk/low value characteristics which affect transportation costs, the centres of their production are normally much less geographically remote from populated areas.” (Blakeman, 1977, p.5).

Other, non-fuel open pits, generally located more remotely from urban areas should not be excluded for consideration as landfill sites, perhaps even as hazardous and toxic waste burial sites.

11.5.1 A Reclamation Alternative for Sand and Gravel Pits

Rubblefills are a viable alternative for reclaiming these mining pits. In areas where environmental regulations prohibit refuse or MSW depositing in sand and gravel pits, building construction waste materials are often acceptable. The universal lay prohibition for depositing MSW in gravel pits is based on the non-technical dogma that “all sand and gravel are located in aquifers and refuse will contaminate the water source.” Without combating the lay argument, there is a need for depository sites for construction and demolition waste. Using sand and gravel pits for such waste has merit. By not placing demolished construction waste in MWS sites, more critical space is made available for MSW.

As an example, the 125-acre (50.59 ha) sand and gravel pit in the San Gabriel Valley, California, was started in the 1940’s and mining was finished in 1993. Local regulations prohibit depositing MSW, but construction materials waste is acceptable. The pit became a rubblefill in 1983. Currently, it receives between 250 and 300 truckloads per day at a tipping fee of \$50 per load. Construction waste is generally inert, thus, generates little leachate, and the lay-fear of water pollution is assuaged.

11.6 The Best Practicable Environmental Option

Tomes concluded his 1989 technical paper, saying, “Due to environmental pressures now being exerted on the landfill industry, higher standards and a more professional approach are required. Even though the result of this will mean higher landfill costs, this method (i.e., landfilling quarries) of waste disposal will still be the ‘Best Practicable Environmental Option’. Restoration of mineral workings will continue to be the favoured option for landfill sites and at the same time landfill will be one of the most cost effective methods of restoring pits and quarries.” (Op.Cit., p. 20).

A noted contemporary British civil engineer, John Skitt, County Waste Disposal Engineer, Staffordshire County Council, in his 1979 Waste Disposal Management paper on the subject of land conservation, wrote, “Excavations of minerals are said to exceed the rate of reclamation and the total of derelict land in the U.K. is in excess of 90,000 acres. The annual rate of extraction is five times the space which would be required for the disposal of house refuse.” His apparent insight is further emphasised in a following paragraph, “The relationship of this problem with the disposal of refuse will probably be obvious; **the two might be solved mutually.**” (emphasis added). *** Strange as it may seem the mutual solution of the two problems concerned does not always appear to have been visualised by the planning authorities ; *** .”

Similarly, in a paper written and given by Paul A. Tomes, FIQ, M. Inst. W.M., Company Landfill Manager-ARC Aggregates (at the time), 2d October 1989, and presented to the Institute of Quarrying, Annual Conference Symposium at Bristol, he made the statement in his Introduction, “Every year in Britain we produce around 100 million tonnes of household, commercial and industrial waste.” Further on he states. “The mineral extraction industry creates voids at a rate in excess of 200 million cubic metres per annum.” (op.cit.)

11.7 Final Argument For Thesis Proposal

Thus, with successful examples of surface mines used as landfills already in existence, there is no great novelty in the proposed procedure. However, the novelty of the thesis argued herein, is that the use of quarries as depositories for waste should be intentional by regulation and planned rather than the occurrence of landfilling a surface mining pit being one of happenstance, after-thought, or an *ad hoc* basis, or in desperation, as by a community with an already overflowing landfill forced by extreme urgency and a last resort to find a place to deposit their MSW someplace just to get rid of it. Witness: the siting approval for the Allerton Park (U.K.) quarry (see *infra* at Appendix A-2 §8.3) as a landfill was strongly influenced by the critical need to relieve the North Yorkshire County

of its landfill requirements. The Harrogate area's MSW disposal facility at Rock Cottage Quarry, Wormald Green, had expired and filled in April 1987, just prior to the time of ARC's June 1987 application. The Council had to temporarily expand the Rock Cottage Quarry site until 1991 when area MSW disposal could begin at Allerton Park. Allerton Park quarry held promise of meeting the Council's waste needs for the next 25 years or more.) Allerton Park landfill is currently receiving about 60,000 tonnes / annum of MSW.

The procedure of dual functions, i.e., quarrying and landfilling, should be done by regulation with the benefit of specific pre-planning and permission for a dual operations on approved sites from the very beginning, particularly where the groundwater conditions present no great hydrology problem to the filling of the mining void. Where hydrology might present a problem for waste filling in the former attenuation-type fill, a total-containment type landfill will enable the mining void to be used. Consequently, all mining surface mining voids can be utilised as depositories of MSW without potential injury of contamination to the water resources. Only those mining void sites that were located in potentially geologic zones of disturbance, i.e., subject to earth quake disturbance, should possibly be eliminated as landfill sites.

The three successful operations of crushed stone quarries, offered in evidence in Appendix A-2 §8, viz., Judkins, Weber and Walker quarries, subsequently given permission to deposit MSW as filling after years of mining operation and before closure of the mine, prove the successful employment, utility, practicality, and plausibility of depositing MSW in rock quarries. Inadvertent, or unintentional as it may have been, the procedures have set examples that should, henceforth, be intentional as mandated by environmental regulation, planned from inception of the surface mine as part of its full reclamation.

Consequently, landfilling derelict mined land with waste is not only beneficial in relieving the critical shortage of depositories for MSW, but supplies the greater environmental need to replace the mined out voids from which the minerals were removed. By replacing the void with waste filler, the original surfaces can be restored to the land and the land can once more serve society with a beneficial surface use, e.g., a park, golf course, recreational site, parking lot, or a host of other lightload building and residential surface uses.

Lastly, land use is not only conserved alone by the restoration of the surface to a beneficial use, but also conserved by using the same ground for two essential uses, mining materials for public consumption and depositing the public's solid wastes, as opposed to using two separate tracts of lands for the two separate uses, i.e., mining and waste disposal.

The Mineral Policy Centre, Washington, D.C., calls for a Hardrock Abandoned Mines Reclamation program to be enacted in the U.S. (see Ch.10 §7). Utilisation of the abandoned hardrock mines as MSW depositories appears to be the best solution, accomplishing not only the goal of the MPC, but at the same relieving the urgent national

need for waste disposal space. Instead of requiring multi-billions of dollars for reclamation as MPC claims, the utilisation for MSW as herein proposed would be a self-paying way for full reclamation of the hardrock sites. The new way for the public to view a surface mining operation is not as the “raping of the earth by mining” but the creation of a new waste disposal site to deposit society’s waste in.

11.8 Summary of Supportive Evidence

The use of surface mines for MSW landfills is justified by the evidence presented in the thesis research and is summarised under the following headings: (1) Need and Justification ; (2) Environmental Security; (3) Mined Land Restoration; (4) After-use of Conserved Land.

11.8.1 Need and Justification

Governmental-source information and statistics indicate that there is a current critical need for MSW landfill space, being greater in the U.K. and the U.S. Canada does not suffer the overall urgent need except in its more densely populated areas. That critical need will extend into the foreseeable future with continued population growth.

The nature and logic of the repetitive “urban quarry-landfill cycle“ justifies the use of construction mineral surface mines / pits for MSW landfill sites. The urban quarry-landfill cycle is summarised as follows:

1. past to present industrial mineral economics has dictated that construction mineral (mainly aggregate) quarries must be located on the perimeter or near the markets of growing populations centres;
2. the urban population centres enlarge, encroach on and engulf the perimeter quarry sites;
3. to avoid nuisance claims, the quarries must relocate further away from the expanding perimeter residential areas of the growing population centres, leaving, at best, partially unrestored open voids and unusable land in the growing area;
4. the new growth centres that forced the quarries away generate new and added volumes of waste with resulting demand for more landfill space to an already critical MSW load;
5. starting with 2 , above, the cycle repeats itself , again and again over new generations of population .

The use of surface mines / quarries for MSW landfills is justified -

i) to resolve the present and future critical space requirement for waste depositories;

ii) to furnish fill material for the voids created by mining of the construction minerals since there is insufficient volume of earth material left to restore the mining void to its original surface;

iii) MSW landfilling accomplishes both (i) and (ii).

11.8.2 Environmental Security

Environmental security of MSW landfill sites must ensure the integrity of the quality of groundwater and surface water resources. Landfill technology has progressed to a superior point of even a decade ago with safer and stronger synthetic membranes for containment. Attenuation of landfill leachates can no longer be tolerated. Landfills and their attending leachates must be placed in total-containment landfills with the leachate being withdrawn by pumping, treated and disposed of through the municipal sewer systems. Security for ground waters at landfill sites is already in place under regulatory-required monitoring.

The discovery of peat as an omnipotent absorbent and purifier of waste liquids makes its proposed usage for treatment of landfill leachate collection systems practical for ensuring the integrity of groundwater quality in the immediate areas of landfill sites.

Landfill gas has been found to be a usable and profitable source of energy and can be collected at a landfill site. Where the type of waste deposited, does not generate sufficient volume of gas to warrant investment of a collecting it, it may be vented, flared and monitored for safety against explosions and preventing air pollution.

11.8.3 Mined Land Restoration

Derelict and fully unreclaimed mined lands can be fully restored to society for beneficial re-use by landfilling with MSW, while simultaneously resolving the problem of where to place the waste.

Construction mineral and stone aggregate pits, except for the shallow overburden which was removed and remains stored on the surface of the property, excavates and uses all of the rock mined for production of construction products. Unlike coal pits, little material is left to replace in the mined void. For example, a surface stripping coal mine may remove 60 (or more) feet (18.29 m) to reach an eight-foot (2.44 m) coal seam. After mining the 8-foot (2.44 m) thick bed of coal, for reclamation, the coal miner has 60 feet (18.29 m) of spoil to replace in the 68-foot (20.73 m) deep pit, or 88% of original backfill material. By comparative example, the aggregate miner may remove 8 feet (2.44 m) of overburden to mine 175-feet (53.34 m) of rock. The stone quarrier has only 5% of original material to replace, thus, still leaving a major void. Therefore, the aggregate miner usually leaves the stored overburden on the surface. It would be wasted effort and money to place 8-feet (2.44 m) of dirt in the bottom of a 175-foot (5.34 m) deep hole.

Therein lies another positive argument for utilising stone quarries for landfill sites. The un-replaced, stored overburden furnishes a ready supply of daily cover material for a landfill thus saving further earth disturbance for cover material as required at non-quarry landfill sites.

MSW landfilling furnishes otherwise unavailable material for infilling the mining void. The spoil piles of overburden may be used for both daily cover of wastes, and for the final cover in complete restoration of the surface.

Additionally, land conservation is obviously well-served by utilising a useless derelict mining void for landfilling. It further reduces the use of land for surface landfilling sites alone. The same land is used twice; first for mining and second for landfilling. The amount of land saved should be roughly double when compared to the present scant, non-use of surface mining voids for landfilling. Presently, derelict and abandoned mined lands are virtually useless, and at times become misused for illegal dumping of refuse thereby contributing to pollution of water resources.

Landfilling accomplishes full restoration of the mined land for new surface uses to the benefit of society. Monitoring against air and water pollution must be maintained for a safe period of time after landfill closure, usually mandated for 20 to 30 years.

11.8.4 After-Use of Conserved Land

The restored and conserved land will generally have greatly increased value and become an asset to the property owner. Generally, its re-uses are of a light-load nature, unless otherwise planned for. Well-known restored land surface uses are for amenities, recreation facilities, golf courses, parks, water recreation where ponds and small lakes are creatively left or provided, nature conservatories, wildlife habitats, parking lots, shopping centres, and light residential buildings. Planned after-use lightload residential housing and lightload business structures placed on containment landfills need careful attention in per-planning. Generally, engineered containment landfills should not have heavy-structure buildings placed on them as they would likely destroy the integrity of the impervious cap. Additionally, any piling driven into or through the landfill into the underlying strata would inevitably compromise the containment. Highly acid liquids within the fill could also affect the stability of the structures, attack and deteriorate the construction materials.

By using the near-to-population-centres derelict and active stone quarry sites, the end result amenity and residential uses are fortuitously and conveniently located to the new and expanding population areas.

11.9 Closing Arguments

1) Should legislation as proposed herein be enacted, mandating the reclamation of abandoned, presently mined, and future permitted surface mines by infilling with MSW, the PIP will be clearly eliminated for the first two categories since it will be required by law. However, siting of future combined surface mines and landfills will still be problematic if subjected to PIP unless some provision is made to deal with it as well. A simple legislative act that exempts future siting of new mine-landfills from the PIP would resolve future problems.

2) As opposed to utilising surface mined pits for landfilling, consider one of the leading alternatives for relieving the critical and urgent need for landfill space and sites, that is, to continue and increase MSW disposal by land raising / mounding. Land raising

for MSW is to pile the waste on the earth's surface and cover it, there by raising the natural elevation of the surface. (Landfilling of earth depressions, e.g., canyons, ravines, etc., are not considered land raising. Furthermore, the use of earth depressions, as ravines, interferes with local drainage patterns and is not recommended.)

Such an alternative can hardly be considered as "land conservation" as undeveloped property must be used for the site. Material for daily / intermediate cover, and for capping the site would have to be taken from some other undeveloped land for the landraising waste disposal site, thus further detracting from land conservation and only creating more disturbed land. Additionally, the use of derelict mined land site is being wasted, compounding the injury to land conservation.

3) With the prospect for mines being in more remote locations, at least for aggregate and construction mining minerals, as for coastal super-quarries and sea-bed mining, a less combative and shorter process of public hearings may follow with a higher percentage of approval. However, environmental contentions and opposition will still be present for the coastal locations of the super-quarries, regardless of their remoteness. Witness the current environmental opposition to the super-quarry permission at South Harris Island, Scotland (see Ch.9 §2.2.1, supra).

11.9.1 Closing Statement

Seldom does a better opportunity present itself to accomplish multiple goals for the betterment of the environment than this present one. Thus, it is submitted that by one legislative act, derelict surface mined lands of the past will be fully reclaimed; complete restoration of current and future surface mined lands will be provided to the beneficial use of society ; potential water contamination from the sites will be reduced; land-use conserved and sustained for future generations; relief will be given for the critical space deficiency for disposal of municipal solid wastes, whilst providing a new source of energy and conservation of natural fuels, and the contentiousness and costs of the the public hearing process greatly reduced.

It remains only for the Anglo-nations to adopt the best practice model law as proposed herein (see Appenidix A-3) to make it an accomplished fact for the improvement of the environment by surface mining and muncipal solid waste industries. The generalised formats for proposed legislation in the three Anglo-nations follows in the Appendix A-3.

It is submitted that the claims made for land conservation, preservation and sustainability by utilisation of non-fuel surface mines as MSW landfills in their complete reclamation process, thereby restoring the derelict land to beneficial surface use of society, has been proven and rest our case.

LIST OF REFERENCES

- Agricola, G. (1556), *De Re Metallica*, translation from Latin by H. C. & L. H. Hoover, 1950, Dover Publications, Inc., New York
- American Jurisprudence (Am Jur) (1966), Second Edition, Vol. 26, *Eminent Domain*, 1 § 1-9, In General, Gulick, G.S. and Kimbrough, R.T., Eds., The Lawyers Cooperative Publishing Company, Rochester, N.Y.
- American Jurisprudence (Am Jur) (1971), Second Edition, Vol. 54, *Mines and Minerals*, Irwin J. Schiffres, J.D., Section Editor, The Lawyers Cooperative Publishing Company, Rochester, N.Y.
- ARC, Ltd., (1989), Judkins Quarry Planning Brief, published jointly by ARC Ltd, Nuneaton & Bedworth Borough Council and Warwickshire County Council, U.K.
- Aston, R.L. (1990), 'A Quarryman's Reply *Wolfboro* Decision', *Legal Briefs*, Pit & Quarry, March, pp. 38-39 Hunter Publications, Chicago, Illinois
- Aston, R. L. (1992a), 'A Current Study of Enviromining Laws for Industrial Minerals and Rocks ', MSc Thesis, University of Missouri-Rolla, USA
- Aston, R.L. (1992b), 'A Summary of The Current Litigation For The City Of St. Peter's Proposed Quarry Landfill Site Located In St. Charles County, Missouri', (unpublished), U. Mo.-Rolla, USA
- Aston, R.L. (1993a), 'Enviromining Law', *Mining Environmental Management*, Vol.1, No. 1, March, p.16-17, The Mining Journal Ltd., London.
- Aston, R.L. (1993b), 'Land Title: recent court cases', *Mining Environmental Management*, Vol.1, No.3, September, pp.8-9, The Mining Journal Ltd., London.
- Aston, R.L. (1994), 'The U.S. General Mining Law 1872 -An Overview', pp.217-218, The Mining Magazine, October, London.
- Aston, R.L. (1995a) 'Nimby Syndrome Continues For Ohio S & G Operator ', *Legal Briefs*, Aston, R.L., Legal Ed, Pit & Quarry, April, Advanstar Publications, Chicago, Ill.
- Aston, R.L. (1995b), 'Assays from The Legal Vein- Replacement Water Supply Mandated by SMCRA', *Engineering & Mining Journal*, February, p. NA-16LL, Chicago, Ill.
- Aston, R.L. (1995c), 'Assays from The Legal Vein-Texas Surface-Destruction Test Re-Surfaces ', *Engineering & Mining Journal*, February, p. NA-16LL, Chicago, Ill.
- Bagchi, A. (1989), *Design, Construction, and Monitoring of Sanitary Landfill*, John Wiley & Sons, New York.
- Bainbridge, W. (1900), *The Law Relating to Mines and Minerals*, 5 Edn., Brown A., Ed., Butterworth & Co., London, UK.
- Bartlett, R. (1984), 'The Right to Mine and Extent of Ministerial Discretion', Chapter 3, Bartlett, R. (Ed), *Mining Law in Canada*, Continuing Legal Education, Law Society of Saskatchewan, Canada
- Barton, B.J. (1993), *Canadian Law of Mining*, Canadian Institute of Resources Law, Calgary, Saskatchewan, Canada.
- Beerli, M. (1989), 'Use of Biofilters in Odour and Volatile Organic Solvent Control', Third International Symposium on Peat /Peatland Characteristics and Uses Proceedings, May 16-20, Spigarelli, S.A., Ed, Bemidji State University, Bemidji, MN, pp. 335-348.
- Beerli, M. (1991), 'Odour and VOC Control by Use of Peat Biofillers' Symposium '89 Peat and Peatlands Diversification and Innovation, Vol.II, New Products Proceedings, August 6-10, Overend, R.P. and Jeglum, J.K., Eds, Canadian Society for Peat and Peatlands, Quebec City, Quebec, Canada, pp. 136-146.
- Black, H.C. (1968), *Black's Law Dictionary*, 4th Edn., West Publishing Co., St. Paul, USA
- Blackman, S. (1996) pers comm, Canadian Institute of Resources Law, The University of Calgary, Canada.
- Blakeman, W.B. (1977), *Statutory and Environmental Protection Aspects of Mineral Aggregate and Industrial Mineral Production*, March 1977, W.B. Blakeman & Associates, Ottawa, Ontario, Canada.

- Blakeman, W. (1996), pers comm, Senior Policy Advisor, Policy and Programme Development Section, Ontario Ministry of Environment and Energy, Toronto, Canada
- BGS (1995), British Geological Survey, 'Minerals in the National Economy', United Kingdom production of minerals 1989-1995, Keyworth, Nottingham, UK
- Boehler, A. (1991), 'The Uses of Biofilters in Odour Control', Symposium '89, Peat and Peatlands Diversification and Innovation, Vol.II, New Products Proceedings, August 6-10, Overend, R.P. and Jeglum, J.K., Eds, Canadian Society for Peat and Peatlands, Quebec City, Quebec, Canada, pp. 119-121.
- Browning-Ferris Inds. (1991), *Solid Waste Disposal*, brochure # 9/91 GCP 10M, Houston, Texas, USA.
- Charlier, M. (1995), Staff Reporter, article in March 1, 1995, issue, Wall Street Journal, N.Y., N.Y.
- Coffey, P. and Kavanagh, R. (1989), 'Specialised Peat-based Waste Treatment Systems', Third International Symposium on peat/Peatland Characteristics and Uses Proceedings, May 16-20, Spigarelli, S.A., Ed, Bemidji State University, Bemidji, MN, pp. 324-334.
- Crommelin, M. (1974), 'Mineral Exploration in Australia and Western Canada', 9 UBCLR. 38, p.42, School of Law, University British Columbia, Canada.
- Daigle, J.-Y.(1993), 'Peat Moss for Wastewater Treatment', Open File Report 93-3, New Brunswick Department of Natural Resources and Energy, Mineral Resources, Bathurst, New Brunswick, Canada.
- Dodds-Smith, C.A., Payne, C.A. and Gusek, J.J. (1995), 'Reedbeds at Wheal Jane', *Mining Environmental Management*, N.Rosin, Ed., Vol. 3, No.3, pp. 22-24, The Mining Journal Ltd., London.
- Dominie, K. (1992), *A Report on Provincial Waste Disposal Sites and Waste Management*, Department of Environment and Lands, Government of Newfoundland and Labrador, June 1992.
- Drake, R. (1996), pers comm, Editor, Rock Products, Cleveland, Ohio
- Eger, P. Lapakko, K. and Otterson, P., (1980), 'Trace Metal Uptake by Peat: Interaction of a White Cedar Bog and Mining Stockpile Leachate', Sixth International Peat Congress Proceedings, Duluth, MN, August 17-23, Grubich, D.N., Ed, U.S. National Committee of International Peat Society, Eveleth, MN, pp. 542-547.
- Eger, P. and Lapakko, K. (1989), 'Use of Wetlands to Remove Nickel and Copper from Mine Drainage', *Constructed Wetlands for Wastewater Treatment*; Hammer, D.A., Ed, Lewis Publishers, Inc. Chelsea, MI, pp. 780-787
- Engineering & Mining Journal (1992), 'Wisconsin Permits First Mines Since World War II-Almost', February, McLean Publishing Co., Chicago, Illinois
- Engineering & Mining Journal (1994) "Georgius Agricola, 500th anniversary", July, pp.38-39 WW, Chicago, Illinois
- Evans, P.B. (1994), *The Clean Water Act Handbook*, SONREEL, American Bar Assn., Chicago, Illinois
- Farnham, R.S. and Brown, J.L. (1972), 'Advanced Wastewater Treatment Using Organic and Inorganic Materials', Fourth International Peat Congress Proceedings, Otaniemi, Finland, June 25-30, Otaniemi, Finland, Finnish National Committee of International Peat Society, Helsinki, Finland, Vol. IV, pp. 271-286.
- Gates, P.W. (1968), *History of Public Land Law Development*, U.S. Government Printing Office, Washington, D.C.
- Garrett, T.L. (1994), Book Publications Chair, Committee Reports, Environmental Group, 'Water Quality', Managing Ed., Mansfield, M.E., Natural Resources, Energy, and Environmental Law, 1993, Year in Review, American Bar Assn. & The National Energy Law & Policy Inst., U. of Tulsa, College of Law, USA
- Grad, F.P. (1978), *Environmental Law*, Vol. 2, Matthew Bender, New York
- Halsbury's Laws of England (1980), 4th Ed., Vol.31, Mines, Minerals and Quarries, pp. 256-259; Butterworths, London
- Harding, D. (1996), Public Affairs Manager, Greenways, U.K., pers comm.
- Hatheway, A. W. (1993), *Chronological History of Industrial and Hazardous Waste Management*, unpublished, (copyright 1993), University of Missouri-Rolla, USA

- Hatheway, A.W. (1995), *Perspective No. 26, Blasting Damage; Dynamite and Groundwater*, EG News, Vol. 38, No.3, Fall 1995, pages 37-39, Sudbury, MA.
- Hedin, R.S., Nairn, R.W. and Kleinmann, R.L.P. (1994), 'Passive Treatment of Coal Mine Drainage', U.S. Bureau of Mines, IC 9389, 35 pp.
- HMSO (1991), Research Report, *Environmental Effects of Surface Mineral Workings*, p.13, Department of the Environment, HMSO, London, U.K.
- HMSO (1994a), *Landfilling Wastes*, Waste Management Paper No. 26, 6th Impression. Department of the Environment, HMSO, London, U.K.
- Hodgson, E.C. (1966), 'Digest of Mineral Laws of Canada', Mineral Report 13, Mineral Resources Division, Department of Energy, Mines and Resources, Ottawa, Canada
- Howell, J.V. (1957), *Glossary of Geology*, American Geological Institute, J.V. Howell, Coordinating Chairman, National Academy of Sciences - Natural Research Council, Washington, D.C.
- Hughes, D. (1986), *Environmental Law*, Extraction and Infill; Mineral Extraction, Chapt. 8, Butterworths, London.
- Hughes, D. (1992), *Environmental Law*, 2d Edn., Butterworths, London.
- Institution of Civil Engineers (1991), '*Pollution and its Containment*', Thomas Telford, London.
- James, C.A. (1898), *Mining Royalties*, Longmans, Green and Co., London.
- Johnson, W. (1992), *Clay Colliery Company Ltd. Bowmans Harbour Wolverhampton, Environmental Statement*, Vol. One, Non-Technical Summary by Johnson Poole & Bloomer, February 1992, Telford, UK.
- Kadlec, R.H. and Keoleian, G.A. (1986), 'Metal ion Exchange on Peat' Peat and Water, Fuchsman, C.H., Ed, Elsevier Applied Science publishers Ltd., Essex, England, pp. 61-93.
- Kennett, S.A. (1992), 'Issues and Options for Intergovernmental Cooperation in Environmental Impact Assessment', Canadian Institute of Resources Law, No.39, Summer 1992, U. of Calgary, Canada.
- Kennett, S.A. (1995), 'The Environmental Management Framework Agreement', Canadian Institute of Resources Law, No.52, Fall 1995, U. of Calgary, Canada.
- Kent, H.G. (1996), Planning Manager, Clay Colliery Company Ltd., Telford, England, UK, pers comm, September 1993 and January 1996.
- Kent, J. (1896), *Commentaries on America Law*, Vol. II, Part VI, 14th Edn., Little, Brown and Company, Boston.
- Kusler, F. and Meyers, J. (1990), 'Litigation: Is the Claims Court All Wet?', *National Wetlands Newsletter*, Nov./Dec. 1990, Washington, D.C.
- Lanciani, Rudolfo (1890) (republished 1980), *The Destruction of Ancient Rome*, Arno Press, A New York Times Company, New York.
- Lindley, C.H. (1914), *A Treatise on The American Law Relating to Mines and Mineral Lands* aka *Lindley on Mines*, 3rd Edn., Bancroft-Whitney, San Francisco, USA.
- Liptak, B.G. (1991), *Municipal Waste Disposal in the 1990's*, Chilton Book Co., Radnor, Pennsylvania.
- Mac Swinney, R.F. (1897), *The Law of Mines, Quarries, and Minerals*, 2d Ed., Sweet and Maxwell, Ltd., London.
- Malterer, T, McCarthy, B. and Adams, R. (1996), Use of Peat in Waste Treatment, *Mining Engineering*, Vol. 48, No.1, January 1996, pp. 53-55, Littleton, Colorado.
- Mining Environmental Management (1993), 'Enviromine- Mining's Ancient Past', N. Rosin, Ed., Vol.1, No.1, p.24, The Mining Journal Ltd., London.
- Mining Environmental Management (1994), 'Technology', N. Rosin, Ed., Vol.2 No.3, p.35, The Mining Journal Ltd., London.
- Mining Environmental Management (1995 a), 'Potential use of metal hyperaccumulators', Chaney, R., Brown, S., Yin-Ming, L, Angle, J.S, Homer, F and Green, C, Vol.3, No.3, Sept., pp. 9-11, The Mining Journal, London
- Mining Environmental Management (1995 b), 'Farming for metals?', Nicks, L.J. and Chambers, M.F., Vol.3, No.3, Sept., pp.15-18, The Mining Journal, London
- Mining Environmental Management (1995 c), 'Reedbeds at Wheal Jane', Dodds-Smith, M.E., Payne, C.A. and Gusek, J.J., Vol.3, No.3, Sept., pp.22-24, The Mining Journal, London

- Mining Environmental Management (1995 d), 'Biotreatment of mine drainage', Bender, J. and Phillips, P., Vol.3, No.3, Sept., pp.25-27, The Mining Journal, London
- Mining Environmental Management (1995 e), 'Enviromine', N. Rosin, Ed., Vol.3, No.3, Sept., p. 28, The Mining Journal, London
- Mining Environmental Management (1995 f), 'Minerva', N. Rosin, Ed., Vol.3, No.4, Dec., p.3, The Mining Journal Ltd., London.
- Minor, J. C. (1986), 'Environmental Law : the European dimension ', Chapt. 4, *Environmental Law*, Hughes, D. , Butterworths, London.
- Natural Resources Canada (1995), Mineral and Metals Sector ; Market Trends for Industrial Minerals, publication # 1004; Importance of Mining and Minerals to the Canadian Economy, pub. # 1005; Canada's 1994 Mineral Production (News Release), pub. #1006; Mineral Production of Canada, 1992, 1993 and 1994, and Average 1990-1994, pub. # 1901; Cement 1994 Review and Outlook, pub. # 5105; Mineral Aggregates 1994 Review and Outlook, pub. # 5117; Stone 1994 Review and Outlook, pub. # 5131
- Orlik, M. (1992), 'Legal Obligations in Waste Disposal', Waste Management Conference, Civil Engineering, Aston University, Birmingham, U.K. , 5 November 1992.
- Outerbridge, C. (Ed) (1986), *American Law of Mining*, 2nd edn, Rocky Mountain Mineral Law Foundation (RMMLF), Matthew Bender, N.Y.
- Owens, M. D. and Elifrits, C.D. (1995), 'Survey of the Use of Abandoned Surface Coal-Mined Land for State-of-The-Art Solid Waste Disposal Facilities' , University of Missouri-Rolla, USA.
- Pickering, J.R., (1957), *The Mines and Quarries Act, 1954*, Butterworth & Co., London,
- Plewman, R. (1996) , pers comm, Manager, Walker Inds., Ltd, Thorold, Ontario, Canada
- Priestley, J.J., (1968), ' Civilization, Water and Wastes', *Chemistry and Industry*, (March 23, 1968), pp. 353-363.
- Rana, S. and Virarghavan, T. (1987), 'Use of Peat in Septic Tank Effluent Treatment-Column Studies', *Water Pollution Research Journal of Canada*, Vol. 22, pp. 491-504.
- Riznyk, R.Z., Reid, Jr., L.C., Rockwell, Jr., J. and Reid, S.L. (1990), 'Peat Leach Mound Treatment of On-site Domestic Septic Effluent in Cold Region Environments', *International Conference on Peat Production and Use Proceedings*, Jyvaskyla, Finland, June 11-15, 1990, The Association of Finnish Peat Industries, Jyska, Finland, pp. 383-392.
- Robertson, J .D. and K.D. Ferguson (1995), 'Predicting Acid Rock Drainage', *Mining Environmental Management*, N. Rosin, Ed., Vol.3, No.4, pp. 4-8, The Mining Journal Ltd., London.
- Rock, C.A., Brooks, J.L., Bradeen, S.A. and Struchtemeyer, R.A. (1993), 'Use of Peat for On-Site Wastewater Treatment: 1- Laboratory Evaluation', *Journal of Environmental Quality*, Vol 13, pp. 518-523.
- Rogers, A. (1876), *The Law of Mines, Minerals, & Quarries in Great Britain and Ireland*, 2nd Edn., Stevens & Sons, London.
- Salvato, J.A. (1992), *Environmental Engineering and Sanitation* , Fourth Ed. John Wiley & Sons, Inc., New York, New York
- Schoenbaum, T.J. (1985), *Environmental Policy Law*, 1985 Edn., The Foundation Press, Westbury, New York.
- Schoenbaum, T.J., Rosenberg, R.H. (1991), *Environmental Policy Law*, 2 ed., The Foundation Press, Westbury, New York.
- Scottish Office Development Dept. (1995), 'Review of the Planning System in Scotland: The Way Ahead', December 1995, ahd01228.115
- Seeney, K.,(1988), 'Landfill Trash: Energy From Buried Resource', *Missouri Resource Review*, Mo. Dept. of Natural Resources, Vo. 5, No. 2, Jefferson City, Mo.
- Shinn, C.H. (1884), *Mining Camps, A Study in American Frontier Government*, V.12, 2d Series, Johns Hopkins University, Baltimore.
- Silliphant, Dave (1994), pers comm, Director, Operations Branch, Dept.of the Environment, Fredericton, New Brunswick, Canada
- Skitt, J. (1979), *Disposal of Refuse and Other Waste*, Charles Knight & Co., Ltd., London.

- SME (1995), 'In One Day', Society for Mining Metallurgy, and Exploration, Inc., Foundation for Public Information and Education, Inc., Littleton, Colorado
- Scott, W.D., Meine, F.J, Chouinard, U.S.Eds., and Wallace, W.S., Canadian Ed., (1959), *The American Peoples Encyclospedia*, Spencer Press, Inc., Chicago.
- The Mining Journal (1993a), 'Northwest Territories, Country Supplement', Vol. 321, No.8253, p. 2, London.
- The Mining Journal (1993 b), 'U.S. Mine Site Reclamation', p.51, London
- The Mining Journal (1994 a), 'Bangladesh approves BHP's coal plans ', p. 155, London.
- The Mining Journal (1994 b), 'British Geological Survey's Minerals Extraction Forum - The Economic and Environmental Balance', p.286, London
- The Mining Journal (1994 c), 'Exploration: B.C. Spending At Record Low", p.20, London
- The Mining Journal (1994 d), 'Mine Water Congress', p.235, London.
- The Mining Journal (1994 e), 'Canadians Abroad: Canadian Mining Money Moves Overseas', p., London
- The Mining Journal (1995 a), 'Focus and Comment - Living with Minerals', by Confederation of British Industry (CBI), p. 89, London
- The Mining Journal (1995 b), 'U.S.- Canadian Mining Company Echo Bay Moving Abroad', p., London
- The Mining Journal (1995 c), 'Environment - The Blind River Expansion', p.215, London
- The Mining Journal (1995 d), 'Mining Reform Cost Jobs ', p.258, London
- The Mining Journal (1995 e), 'Focus and Comment - Caravan vs. trucks', p.413, London
- The Mining Journal (1995 f), 'Opposition stalls Indian bauxite mines", p.479, London
- The Mining Journal (1995 g), ' 1st Kazakhstan International Mining Exhibition' p.104, London
- The Mining Journal (1995 h), ' A Window of Opportunity -Northern Ireland', p. 388, London
- Tilton, D.L., Kadlec, R.H. (1979), "The Utilisation of A Fresh-Water Wetland for Nutrient Removal from Secondary Treated Wastewater Effluent', *Journal of Environmental Quality*, Vol.8, No.3, pp. 328-334.
- Tkachuk, D.M. (1993), *Alberta's Wetlands: Legal Incentives and Obstacles to Their Conservation*, Canadian Institute of Resources Law, U. of Calgary, Canada.
- Tomes, P.A. (1989), 'Restoration of Quarries by Controlled Landfill ', Institute of Quarrying, Annual Conference Symposium, 2 October 1989, Bristol, U.K.
- UK Dept. of Environment (1992), *Environmental Effects of Surface Mineral Workings*, (Research Report) HMSO, London.
- UK Dept. of Environment (1994a), Mineral Planning Guide 6, HMSO, London
- UK Dept. of Environment (1994b), Mineral Planning Guide 7, p.60123, HMSO, London
- USBM (1994), Mineral Industry Surveys, Annual Review 1994, US Dept. of Interior-Bureau of Mines, Washington, D.C.
- USBM (1995), Mineral Industry Surveys, Crushed Stone and Sand and Gravel in the third Quarter of 1995, US Dept. of Interior-Bureau of Mines, Washington, D.C.
- US EPA (1994), Memorandum, Fact Sheet FY 1994, Enforcement Highlights, November. Government Printing Office, Washington, D.C.
- Vagt, O. (1994), *Cement*, Canadian Minerals Yearbook 1994, Natural Resources Canada, Ottawa, Canada.
- Walde, T. (1992), 'Environmental Policies Towards Mining in Developing Countries', *Journal of Energy and Natural Resources* , 10, 4, pp. 327-355.
- Wilson, D.G., (1977), *Handbook of Solid Waste Management*, MIT, Van Nostrand Reinhold Co., New York.
- Wood, R.J. (1995), Book Review Editor, *The Canadian Business Law Journal*, Vol. 24, 1994-1995, Canadian Law Book Co., Aurora, Ontario.

APPENDICES

APPENDIX	A-1	Current and Future Trends for Waste Disposal - The Urgency For Landfill Space.....	292
	A-1.1	Introduction.....	292
	A-1.2	Current Methods to Relieve the Urgency for Landfill Space.....	292
	A-1.3	Current Landfill Information.....	294
	A-1.4	United Kingdom	294
	A-1.5	United States.....	295
	A-1.5.1	U.S. Landfilling costs.....	296
	A-1.6	Canada.....	297
	A-1.7	Reclamation of Old Refuse Filled Mine Pits - A Beginning Trend for Safe Waste Disposal in Today's Mine Pits ?	298
	A-1.7.1	Examples of Old Refuse Filled and Derelict Mined Land Reclamation Technology.....	298
	A-1.7.2	Bowmans Harbour Project, Wolverhampton, England.....	298
	A-1.7.3	The Poynter Street Reclamation Site, St. Helens, Merseyside, England.....	308
	A-1.7.4	Miscellaneous U.K. Reclaimed Old Mine Sites...	309
	A-1.7.5	A Planned Reclamation - "The British" Site, Abersychan, Torfaen Borough, Gwent County, Wales.....	310
	A-1.7.6	A U.S. Beginning Trend - Using Abandoned Surface Coal Mines for Landfills.....	313
	A-1.8	The U.S. Public Hearing Process Applied to Landfills.....	317
	A-1.8.1	Nimby Syndrome Examples Defeating a Proposed Waste Site.....	317
	A-1.8.2	Another Example of a Landfill Siting Defeat by NIMBY and Zoning Squabbling.....	319
	A-1.9	Conclusions and Comments	326
APPENDIX	A-2	The Evidence and Proof of the Case : Landfill Technology and Open Pit Feasibility with Successful Examples Making Mined-Out and Working Surface Mines Usable as Landfills.....	329
	A-2.1	Introduction.....	329
	A-2.2	Problems of Solid Waste Landfilling	330
	A-2.2.1	Highlights of Hydrology and Prevention of Groundwater Pollution in Landfills.....	331

A-2.3	Landfill Liners and Waste Water Treatment - In General.....	332
A-2.3.1	Liners - Natural and Synthetic Materials	333
A-2.3.2	Peat-The New Waste Treatment “Wonder”Material.....	336
A-2.3.3	Future Treatment of Mine Waters.....	338
A-2.3.4	Daily Cover Material.....	339
A-2.3.5	Landfill Covers.....	339
A-2.3.6	Landfill Gas and Collection as an Energy Source..	340
A-2.4	Miscellaneous advantages of using mineral quarries and pits.....	341
A-2.5	United Kingdom.....	344
A-2.6	United States.....	345
A-2.7	Canada.....	346
A-2.7.1	A Canadian Solution for Safer Treatment of Uranium Tailings:.....	346
A-2.8	Present-day Examples of Safe Waste Depositing in Surface Mining Pits.....	346
A-2.8.1	United Kingdom Examples of Combined Quarrying and Landfilling.....	347
A-2.8.2	Judkins Quarry and Greenways Landfill.....	348
A-2.8.3	Allerton Park Sand & Gravel Pit, near Knaresborough, North Yorkshire.....	352
A-2.8.4	Miscellaneous U.K.Combined Open Pit - Landfill Operations.....	356
A-2.8.5	U.S. Example of Combined Quarrying and Landfilling.....	357
A-2.8.6	Miscellaneous Examples of Quarries Used for Landfills.....	360
A-2.8.7	A Canadian Example of a Successful Combined Quarry-Landfill Operation	360
A-2.8.8	Miscellaneous Canada.....	367
A-2.9	Conclusions and Comments.....	367
APPENDIX	A-3 A Best Practice Model Law For Land Conservation And Reclamation Of Surface Mined Land By Solid Waste In-Filling.....	369
A-3.1	Introduction.....	369
A-3.2	United Kingdom.....	370
A-3.3	United States.....	372
A-3.4	Canada.....	375
A-3.5	Closing Statement.....	376

APPENDIX	B-1	List of Cases - United Kingdom; EC.....	377
APPENDIX	B-2	List of Cases- United States.....	379
APPENDIX	B-3	List of Cases - Canada.....	382
APPENDIX	C	The U.S. General Mining Law of 1872- An Overview.....	383

APPENDIX A - 1

CURRENT AND FUTURE TRENDS FOR WASTE DISPOSAL THE URGENCY FOR LANDFILL SPACE

A -1.1 Introduction

There is no future long-range indication that the critical need for more void space in the earth's surface for depositing Man's wastes will abate or slacken. The ever-growing population only indicates an increase in the volume of waste with the consequential increased requirement for disposal. In the Anglo nations, this can only mean an increased need for void space for deposition of solid wastes. Simultaneously and similarly, the demand for construction minerals is predicted to grow at an ever-increasing pace with the population growth.

The tenor of this work, specifically and in general, is to promote mandatory regulatory control for reclamation of worked-out, presently operating and future surface mines, quarries and pits to use their voids as depositories for MSW whenever the hydrology of the location is practical, and as part of the pit's complete restoration to original land surfaces. Surface mining voids created annually, let alone those in abandoned mined lands (AML), are far more than sufficient in volume to resolve the annual critically needed space for waste.

Referring to the author's previously stated argument that surface mining pits for construction materials are bound to be located near populations centres by virtue of (1) the demand for urban construction materials, and (2) construction materials must be delivered to the construction site for a low price, inclusive of haulage. To date, mined construction materials costs cannot tolerate a large increase in price for long distance haulage. Consequently, their location near to population centres make them a natural possibility for a MSW site. However, there is noted a recent trend toward greater hauling distances for aggregates from more distant sites with the introduction of super-quarries, seabed mining and low cost ocean transportation. (See Chapt. 9 § 2.1, supra).

A-1.2 Current Methods to Relieve the Urgency for Landfill Space

An obvious solution to reducing the need for burial space of MSW is to reduce its volume. This would hold true for a constant population figure. Nevertheless, any reduction of the waste volume is helpful and important. The two prominent, current trends for MSW volume reduction, viz., recycling and thermal destruction (incineration, pyrolysis, gasification) are being pursued by most nations in the attempt to resolve the inadequate and acute space problem for landfilling. Those two methods of waste volume reduction

unquestionably alleviate the landfill volume and siting problem. Until investigation in the U.S., it was supposed by many that items, such as disposable diapers, fast food packaging and other plastic products, placed a major load on landfills. After investigation, it was determined that diapers took only 1% of the landfill volume, fast food packaging 0.1%, and all plastics 12%. The research further revealed that plastics was not as big a problem as supposed, but paper was a major problem in taking landfill space. Newspapers took up 10 to 18% of the landfill volume and all paper products combined occupied 40 to 50% of the space. (Liptak, 1991, p.24)

Obviously, recycling of such wasted materials as paper and plastics can have a great effect on conserving landfill space. However, in view of continued increasing population gains and products demands, recycling falls short of needed relief and has only a delaying effect of reducing current waste volume at landfill sites. When salvaged material from recycling is placed in new products-stock, a percentage loss of unusable salvaged stock material is inevitable. Recovery for re-use is never 100%. Thus, the entire original product material will eventually be used up and returned to waste, all be it, bit by bit.

It should be noted that the principal reason for re-cycling glass is not to conserve natural resources, but to save fuel. Silica is the earth's most abundant material. As the principal ingredient of glass, cullet (broken / recycled glass) requires less fuel in its reuse to manufacture new glass. The same energy -savings are also applicable to recycling of metals

Incineration is a great volume reducer, but there are residues from burning which must be returned as waste for ultimate burial in a landfill. There is also particulate matter and high levels of nitric oxides emitted from these processes. However, technologies have been developed that are effective in reducing particulate and achieving acceptable levels of noxious gases, e.g., oxygen enrichment of combustion air, moisture content, advanced and controlled combustion, etc., thereby making the thermal destruction of solid waste environmentally acceptable.

An innovative and highly commendable economic solution for reducing the volume of MSW is in its use as a substitute fuel in the manufacturing of cement. Using shredded MSW as a fuel has great merit as opposed to incineration merely to reduce the volume before deposition of the residue in landfills, thereby saving space. Cement industry research continues to investigate cheaper fuels and using waste materials in cement kilns. The use of shredded rubber tyres is one illustration that has met with some success.

Cement research has found for Refuse Derived Fuel (RDF) about 70% by volume of municipal solid waste from post-recycled curbside garbage could be extracted for use by the cement industry. Obviously, this would reduce by two-thirds the volume of waste material for disposal in landfills. With certain qualifications, using RDF could affect reductions in requirements for fuels such as coal as high as 20-25%.

Suitable waste fuels for cement manufacturing are a desirable goal in the reduction of total energy consumption and costs. Pyro-processing accounts for about 30% of total production costs. In the U.S. and Europe, the use of waste derived fuels and spent organic solvents has grown. Very satisfactory waste materials already established as fuels are paints and coatings, surplus oils and greases, solvents, inks and cosmetics. Additionally, research is currently investigating the possibility of using fly ash as replacement in Portland cement. In the interest of conservation and sustainable development of non-renewable fossil fuels, the utilisation of post-recycled MSW should be strongly pursued for pyro-processing, not only in cement manufacturing, but in various other mineral processes, and as a fuel for generation of electrical energy and steam.

A-1.3 Current Landfill Information

After reviewing the world's history of waste disposal (Chapter 4, the burial method), particularly of solid wastes, sanitary landfills became the major accepted method for disposal. In the U.S., landfilling is still the dominant method for municipal solid waste (MSW) disposal. It was reported in 1986 that about 83% of MSW in the U.S. was being landfilled, and 10% being recycled. By 1990, landfilling had been slightly reduced while recycling increased 3% and incineration amounted to 14%. In Canada, in 1987, 95% of MSW was being landfilled. By comparison with Japan, with a far higher population density and where land is held more precious, landfilling amounted to a mere 15% and recycling was about 50%. (Liptak, 1991, p.24). Japan purports its reason for low usage of landfills as a shortage of space. This is somewhat questionable as Japan has much uninhabited mountainous land, but customarily refuses to use it for public use other than scenic beauty. Tokyo's main landfill was expected to be filled and closed by 1995. Tokyo and Osaka are reportedly considering extension of the shore line or creating islands from solid waste, which varies little from dumping in the sea. A major problem for world-wide recycling advocates is that the daily volume of MSW is generating faster than the rate of recycling.

A-1.4 United Kingdom

Minor, in Hughes' *Environmental Law*, 1986, reported that the "EC produces over 2,000 million tonnes of waste per year and the vast majority (70%) is disposed of on land." (op.cit., p.122).

Contaminated land clean up costs were estimated in 1991 to be between £10 billion and £30 billion, and this figure may rise as the cost of eliminating groundwater pollutants is assessed. (Hughes, 1992, p.298).

It is observed in the U.K. that the number of landfill sites has been decreasing in number over recent years, but increasing in size of the sites. As Tomes notes, “ Since 1974 when public waste disposal became a County Council function under local Government re-organization, the number of landfill sites reduced significantly, as the traditional local village tip disappeared. When site licensing was introduced two years later, due to the requirement for higher standards and hence higher costs, even more sites, including private ones, closed down. The practice now is therefore fewer, but larger landfill sites *** . *** it is becoming less cost effective to operate sites accepting less than 25,000 tonnes per annum of waste.” (Tomes, op. cit. p.2).

Alternative methods for waste disposal

In 1989 incineration cost in the U.K. ran on an average of £12 per tonne. New EC directives since that date, and new U.K. environmental scrutiny on emissions have already meant, and will continue to mean, costly modifications of the waste incinerators to meet new emission standards, estimated at £1 million each. Tomes calls attention to the fact that “incineration reduces the waste volume by 90%, but only 65% by weight, with 35% of the products of combustion still requiring landfill at appropriately licenced sites. *** In general, direct landfill will still be in the order of 50% more competitive than incineration. *** Whatever options are chosen for waste disposal, there will always be a requirement for landfill, for either direct placement, or after some sort of pre-treatment. “ (Tomes, 1989, p.18.)

Incineration offers a keen interest in competition to recycling of MSW by virtue of its energy producing ability as a fuel. The energy content of landfill waste in the U.K. has been estimated to be worth £1 million per day. (Hughes, 1992, p.247) .

A-1.5 United States

In the U.S, EPA’s goal of reducing landfilling to 55% and increasing recycling to 25% by 1992 fell considerably short. The total amounts of MSW being generated is rising faster than the rate of recycling. In 1992, the U.S. rate of MSW generation was reported at 4.3 pounds (1.95kg) per day per capita. Thus, a municipal area of 10 million persons would require space coverage of 1,000-acres (404.69 ha), of 8-feet (2.44 m) compacted depth, every year for its waste disposal. (Liptak, 1991, p.25) Based on a 4.1 lbs. (1.86 kg) daily per capita waste figure, or 1,500 lbs. (680.39kg) annually, another interesting analogy is that “after compacting, the 180,000,000 tons (163,292,400 mt) of waste generated each year would cover a football field with a column of trash 38 miles (61.15 km) high.” (Brown-Ferris Inds., 1991). By comparison with waste generation in the third-world nations, at times referred to as the “have less” nations, per capita waste generation in Calcutta, India, is 1.12 lbs.(.51 kg) /day and 5.0 lbs. (2.27 kg) per day in Chicago, Illinois.

Similar to the U.K., there has been a notable decline in the number of landfill sites. In the U.S. in the 1970's, there were reportedly 18,000 operating landfills, which dropped to 10,000 by 1980, (to 9,000 by 1986 according to Brown-Ferris Inds.) and to 6,500 by 1988. One study reports that all but one state is running out of suitable locations for landfills. Landfills reportedly have a life of between 10 and 20 years. Obviously, there is a great need for new landfill locations. Available landfill space has become a major problem in the U.S. Simultaneously, the costs of controlled landfilling has increased greatly due to stringent federal standards.

Utilisation of reclaimed surface mines and pits for landfill sites would obviously more than relieve the critical need for MSW depositories. In 1994, the U.S. Bureau of Mines reported that 625 acres (252.93 ha) of land is daily disturbed by mining, with 337 acres (136.38 ha) , or 54%, being reclaimed daily. (Aston Comment: Much of this daily "reclaimed" land would have to be coal-mined land since hardrock, non-coal land is generally not reclaimed, at least to the extent that coal land is reclaimed. In the alternative, the definition of "reclaimed" land might be questioned.) The reclaimed land is potential landfill acreage that is not being used for that purpose. Further, reclamation that satisfies environmental regulations, excepting coal strip-mined lands, is not complete restoration of the land to beneficial surface uses other than water surface uses.

As in the U.K., the current trend is for larger volume landfill sites, and it is predicted that they will become even larger in the future with greater total capacities and longer life-spans as future demands increase. Even more desirable in reducing tipping costs is their relative proximity to high-density populations areas. Thus, creating large landfill sites on, or in, virgin ground becomes a costly and major excavation-undertaking in addition to being unsound economics and poor land conservation practice. The logic of resorting to the large voids created by surface mining for landfilling, particularly those pits located near the high-density population areas producing low-cost construction materials, becomes even more logical, and economically inviting.

Americans produce waste at ever-increasing rates. The volume of garbage has increased 80% since 1960, and is expected to increase another 20% by the year 2000. The average American disposes of 3.5 to 4.5 pounds (1.59 to 2.04 kg) of garbage per day. "The huge volume of waste produced has caused crises in many areas of the nation ; municipal governments are running out of landfill space, and most states lack comprehensive plans for safe disposal of wastes. (Schoenbaum, op. cit., p. 375)

Landfilling has been the traditional method of waste disposal. The other technological options open at present are increased composting, combustion , source reduction, reuse and recycling.

A-1.5.1 U.S. Landfilling costs:

Solid waste disposal is a \$20 billion industry in the U.S. 25% of that, or \$5 billion,

is spent on the operations of landfills. Costs of well-designed landfills in 1991, as a result of strict state and federal environmental standards, were reportedly approaching \$500,000 per acre. As the availability of landfills decreases, tipping fees increase. In the northeastern U.S., the area with the greatest population density and greatest generation of waste, the average tipping fees increased from \$20 per ton in 1986 to \$40 per ton by 1987; and, doubled again by 1991 to \$80 per ton. (Liptak, 1991, p.26).

A-1.6 Canada

Citing a highly successful operation in Ontario as an example, and quoting from the 1987 Ontario case of *Walker v. CFTO Ltd.*, 59 O.R. (2d) 104, at 107, “a landfill site is a natural outgrowth in the quarry business”. This may not be taken as an authoritative, professional statement, nevertheless, it bears general acceptance in truth and examination because it is the basis in fact of this thesis. The statement is supported by a similar one made by the manager of the Fred Weber, Inc., a highly successful quarry-landfill operation at St. Louis, Missouri, who states, “It’s a natural business for us. Excavating rock for crushed stone creates pits. We fill the pits with trash, compact it, and cover it with soil.” (Seeney, 1988, op.cit.).

Communications with various provincial waste disposal agencies revealed generally that the use of surface mines, pits and quarries have been used to some lesser degree in the past, and a few are being presently used as MSW disposal sites. One or two provinces did not know of any abandoned that had been used.

A reply from the Senior Policy Advisor for the Ontario Ministry of Environment and Energy stated, “The regulations do not specify minimum technology standards for the design of landfills nor do they specifically prohibit landfills from being located in pits or quarries. *** Presently, pits and quarries are being used as landfills in the province.”

An Abundance of Pits in Canada for Landfill Sites: Blakeman’s 1977 report to Environmental Canada, (op.cit.) inventories the number of sand and gravel pits and stone quarries, active, inactive and abandoned in eastern Canada, from the Province of Ontario, eastward, through Quebec and all of the Atlantic (Maritime) Provinces. The inventory is summarised as follows:

Eastern Canada Province	sand & gravel pits (active, inactive, abandoned)	quarries / pit (stone, mines)
Ontario	2,640	190
Quebec	1,405	88
New Brunswick	204	18
Nova Scotia	209	29
Prince Edward Island	114	0
Newfoundland	87	13
Eastern Canada Totals	4,659	338

The total acreage for all pits and surface mines, active, inactive and abandoned is about 84,300 (34,116 ha), of which sand and gravel pits occupy about 70,400 acres (28,491 ha), and quarries and mineral pits occupy about 13,900 acres (5,625 ha). (Blakeman, 1977, p. 174). Of the total, it is roughly estimated that 60% are located close to suburban areas of population centres. Thus, the prospects of solving any critical shortage of landfill space in the most populous areas of Eastern Canada appear to be excellent with a prolific number of potential sites for waste depositories.

A-1.7 Reclamation of Old Refuse-Filled Mine Pits - A Beginning Trend for Safe Waste Disposal in Today's Mine Pits ?

The use of abandoned surface mines to dispose of public trash and waste is not without precedent, probably anywhere in the world. History reveals that openings in the earth's surface have long tempted man to discard waste into abandoned pits and other topographic depressions. The number of such ancient sites will never be known. Various metropolitan areas have been reputedly built on landfilled areas. In some instances, the folly of indiscriminant depositing of waste in mined-out pits has returned to haunt residents of the area. Two completed site examples of required cleaning-up and remediation of such misused former mining sites follow, both in England. A third contemplated site, located in Wales, known as "The British", is currently planned and expected to enter the PIP in 1996.

A-1.7.1 Examples of Old Refuse-Filled and Derelict Mined Land Reclamation Technology

Following are completed reclamation examples of mined land, some that have been polluted with old, uncontrolled refuse and tipping, offered in evidence to prove that landfilled mining sites may be restored to environmentally-safe beneficial surface uses for the public by employing current environmentally-protective technologies.

A-1.7.2 Bowmans Harbour Project, Wednesfield, near Wolverhampton, England

See Figure 3, Map Location of Bowmans Harbour, page 299.

See Figure 4, Aerial View of Bowmans Harbour Site Before Reclamation, page 300.

Synopsis of Project:

Site: 120 acres (48.56 ha) of derelict despoiled land including:
uncontrolled domestic landfill;
derelict metal works and metal recovery area;
former canal arms;
former railway embankments;
greater than 100 abandoned mine shafts and mine workings.



Credit-Clay Colliery Co Ltd., Shrewsbury, UK

Figure 3 - Map Location of Bowmans Harbour Reclamation, U.K.



Illustration removed for copyright restrictions

Photo credit - Clay Colliery Co Ltd., Shrewsbury, UK

Figure 4 - Aerial View of Bowmans Harbour Site Before Reclamation

Objectives: To remove and contain waste and contaminated soils;
control of gas and leachate;
treatment of mine workings and shafts;
homogenisation of soil / backfill material and compaction to allow
development of site for industry and residential uses with amenity land.

Methods: Open cast coaling of residue minerals;
lining of void with low permeability compacted clay;
provision of drainage (gas and leachate) in void;
modern landfill of re-excavated former waste;
long term environmental monitoring;
treatment of mine shafts and workings by excavation and replacement by,
or drill and grout techniques

See Figure 5, Bowmans Harbour-Old landfill Surface Before Reclamation, page 303.

Geology: Boulder clay overlying productive coal measures with dolerite intrusives.

Minerals: Coal, fireclay coal series, new mine coal

The Bowmans Harbour reclamation project started in 1992 and was nearing completion in the Spring of 1996 as evidenced by the construction of a new supermarket (a Safeway chain market; see Figure 7, page 307) on the reclaimed surface in late 1995. The project is illustrative of modern environmental-technology restoration that can be successfully accomplished with derelict mining land that has subsequently been used as an uncontrolled trash and refuse dumping ground without concern for contamination and pollution of the local earth and the groundwaters beneath and adjacent to it.

Before reclamation, the derelict land contained old, shallow underground coal mine workings and a later-date land tip for refuse. Its refuse leachate had escaped into local ground water and the land had become a blight on the local scenery midway between Wolverhampton and Walsall in the northwest Birmingham metropolitan area. (See Figure 5 for view of part of old surface of site, page 303.) The project is situated in part of the formerly well-known Black Country, a highly industrialised area starting with the period of the Industrial Revolution and continuing well into the nineteenth century. The Black Country is dotted with old, abandoned shallow coal, iron and limestone mine workings, and iron foundries, all from the naturally occurring ingredients necessary for the forging of iron and steel that made Birmingham an industrial centre.

The nineteenth century local sky was black with soft coal smoke and ash from hundreds of iron ore furnaces and thousands of chimneys of workers' homes huddled around the large centre of industry and employment. Described by the American consul in Birmingham in 1868, "The Black Country, black by day and red by night, cannot be matched for vast and varied production by any other space of equal radius on the surface of the globe."

The Bowmans Harbour site of approximately 120 acres (48.6 hectares) is one mile East of the centre of Wolverhampton on the West side of the City of Birmingham. (See Figure 3.) The reclamation project was carried out by Clay Colliery Company Limited

(CCCL), a mineral extractor, land reclamation and civil engineering company of Telford, Shropshire.

A-1.7.2.1 The Project Environmental Assessment and Plan : Quoting from CCCL's Precis of Proposals and from their Environmental Statement prepared by Johnson Poole & Bloomer, the site is "comprised of two distinct portions - the southern part, known as Bowmans Harbour, being largely grassland overlying a former landfill site, and the northern area being areas of former factories and industrial tipping. The whole area is visually of poor value and is unsupervised. These characteristics, coupled with their associated ground problems are leading to fly-tipping and general blight.

"It has been considered that the most effective way of reclaiming the land is to excavate the whole site and re-engineer it to create a stable and safe landform that will also be of significant environmental value in terms of visual amenities and after-use capabilities.

"The existing widely spread domestic waste underlying Bowmans Harbour, some 500,000 cubic metres, will be excavated in a carefully controlled manner in accordance with the standards laid down by all the regulatory bodies, and will be re-interred and concentrated in a purpose-made modern engineered repository on the site. Some of this waste will be stored temporarily above the ground, again in a special contained and controlled cell, while the permanent repository is being prepared. During these excavation works, another form of land instability - the shallow coal seams - will be removed and transported to local power stations. The industrial wastes will either be put into the permanent waste facility or will be buried at depth as part of the normal backfill operations in accordance with the current codes of practice and standards. Any particular difficult or special works encountered may have to be taken off site.

"To ensure the above operations in a sensitive and environmentally acceptable manner the working site has been designed to ensure maximum screening value, minimal visual intrusion and proper noise, dust and odour control. Traffic, apart from the staff and service vehicles, will amount to some 30 loaded coal lorries leaving the site daily ***.

"The scheme is programmed to last approximately 2-1/2 years and will result in a comprehensive land reclamation exercise having resolved the problems being experienced in the area. The waste will have been contained and concentrated in a modern repository - thus all landfill gas and leachate will be properly controlled. The shallow mine workings and old shafts will have been removed creating a stable landform; and, the restoration works will create a usable and useful area for public open space and development opportunities. Furthermore, the whole exercise will have been carried out in the most environmentally sensitive way - and shorter time scale - than had each portion of land been tackled independently.



Aston University

Illustration removed for copyright restrictions

Photo credit - Clay Colliery Co Ltd., Shrewsbury, UK

Figure 5 - Bowmans Harbour - Old Landfill Surface Before Reclamation

“ The Advantages of the Proposals are:

- * Maximisation of comprehensive reclamation for the widest range of uses;
- * extraction of approximately 236,000 tonnes of coal- a valuable national mineral resource;
- * removal and treatment of shallow underground mine workings, shafts and voids;
- * treatment and complete containment of existing in situ wastes into a compact modern engineered cell;
- * resolution of methane gas and leachate seepage problems from existing tip and coal seams (unlike other forms of treatment) ;
- * substantial visual improvement to site and surroundings ;
- * employment creation in an area of above-average unemployment;
- * no time scale penalty compared to alternative solutions;
- * potential for any redevelopment to commence an earlier stage than with other solutions;
- * environmentally acceptable means of land reclamation and waste treatment;
- * preparation of proposed highway formation “ (Johnson, 1992, pp. 1-2)

A-1.7.2.2 The Non-Technical Summary of Bowmans Harbour Project

“The Town & Country Planning (Assessment of Environmental Effects), Regulations 1988, requires specific information to be provided on:

1. The nature of the development with information about the site, the facilities, design and size;
2. The date necessary to identify and assess the main effects which the development is likely to have on the environment.;
3. A description of the likely significant effects, direct and indirect, on the environment of the development, explained by reference to its possible impact on: human beings; flora; fauna; soil; water; air; the landscape; the interaction between any of the foregoing; material assets; and the cultural heritage.
4. If any significant adverse effects are identified with respect to any of the above, a description of the measures envisaged in order to avoid, reduce, or remedy those effects.
5. A non-technical summary.

A-1.7.2.3 Environmental Assessment of Bowmans Harbour

“The non-technical summary of the Bowmans Harbour Environmental Assessment was prepared by consultants Johnson, Poole & Bloomer and pertinent parts are quoted following. The EA dealt with (1) the existing site and its environment; (2) description of the proposed development; (3) restoration and aftercare; and (4) environmental considerations.

(1) Existing Site and its Environment:

2. 1 The site is largely featureless scrub land, undeveloped and is crossed in a west to east direction by an abandoned railway line. Adjacent and to the north is the Wyrley and Essington Canal whilst at its southern boundary is the Bescot-Stafford railway line. There is a gradual fall only in levels from the northwest to the southeast. However, to all intent

and purposes it appears flat and therefore well screened from view from most boundaries. Residential districts tend to be situated some distance from the site with the nearest being to the south and north. Slightly elevated views are available from high rise blocks to the northwest and northeast and also from the New Cross Hospital to the North.

(2) Description of the Proposed Development :

Site operations: Operations to secure the land for further beneficial use comprise three main elements, site clearance and restoration of the area; excavation and re-compaction of shallow previously worked seams of coal ***, and the temporary and permanent placement of contaminated wastes into properly engineered repositories.

Site operations will allow for the control of gas and leachate, proper site management, environmental management restoration and aftercare.

Initial preparatory works will include placement of contaminated wastes currently scattered throughout the site into a single temporary but well-engineered repository. This will include proper containment measures allowing for cellular construction and lining of bases and sides. The temporary facility will have a capacity of the order of 125,000 m³.

Minerals extraction will remove shallow previously worked seams of coal helping to pay for the proposed works. A permanent waste repository will be developed from the area of maximum void. This void will include lining measures, leachate and gas drainage systems and will take waste only from within the site as generated by the works. The restoration profile will be raised and left in a free draining domed shape as an open space for future leisure activity.

(3) Restoration and Aftercare :

Environmental management will allow for the following main areas of concern: (1) restoration standards; (2) protection of surface water quality; (3) protection of groundwater; (4) landfill gas; (5) settlement.

Necessary measures to control against potential hazards of landfill gas and leachate will be incorporated into the landfill design. Ongoing monitoring of these elements and settlement of the compacted fills will continue after conclusion of the site operations. Other aspects of environmental management will include dust, noise, odour, vermin, litter, water, traffic and visual intrusion.

The site will be restored to a relatively uniform profile capable of further development for a range of uses from industrial to new-housing residential, and infrastructure development. (See Figure 7, Safeway Supermarket construction on recalimed site, page 307). The permanent waste repository will be slightly elevated to introduce some relief to the finished landform and also in accordance with modern design criteria for restored landfill facilities. The landfill will be capped with a 1-metre blanket of clay and finally with a 2-metre covering of soil making material selected during site operations. Restoration will include soft landscaping appropriate to the medium and long term needs of the site. (See Figure 6, clay sealing, left , on page 307.)

(4) Environmental Considerations:

In order to satisfy the requirements of the EA, the scheme has been rigorously examined and the following areas of potential concern evaluated: Visual intrusion, ecology, water, noise, dust, waste, odour, pest, vermin, mining stability, traffic, vibration, archaeology, socio-economic.

Summary of Assessment:

Visual intrusion: These will be alleviated by placement of screening mounds and over short length, close board fencing; landscaping by planting.

Ecology: the feasibility of relocation of the Southern Marsh Orchid and Bush Grass have been examined and in principle, confirmed.

The site will be one of the largest semi-wild open spaces in the borough and provides permanent or temporary habitats for a number of species of wildlife of varying degrees of interest (including) a potential habitat for the Little Ringed Plover, a rare breeding specie in the country. The development will remove the necessary ecosystem to sustain this condition. However, the ecological salvage area may provide an alternative.

Water: The main potential impact of the landfill operations on water resources and water quality arises from the generation of leachate and its potential to migrate into groundwater and surface systems. Migration measures include the provision of a leachate treatment and drainage system for both the temporary and permanent repositories, basal and side wall lining with impermeable clays selected specially for the task, capping with 1-metre thickness of clay overlain by 2-metres of soil-making substitute.

The scheme as proposed is unlikely to have significant effect upon surface hydrology. However, the impact of de-watering surrounding areas of groundwater cannot be assessed with the present level of study. On going monitoring of the groundwater will be required during and after the proposed works. In the long term, it is unlikely that restoration will have a significant effect upon groundwater conditions.

(Noise and Dust are treated in the EA, but deleted here.)

Waste and Contamination: The site, if left in its present condition offers significant hazards in respect of contamination and gas emission. Research shows contaminated waste areas to be in contact with permeable horizons. Impacts deduced from study, likely, because of the proposed operations, potentially affect construction works and end users. Gas and leachate emissions will be controlled by means of appropriate venting systems, all excavations where waste is placed will be correctly formed and lined with impermeable clay liners. Post reclamation environmental monitoring will be undertaken to assess the success of the engineering designs. Landfill design will be to standards laid down by Government guidelines.

(Odour, Pests and Vermin are treated in the EA, but deleted here.)

Mining Stability : Formation of new temporary and permanent earthworks, excavations below surface horizons and support to adjacent lands and properties will be undertaken within strictly laid down and controlled criteria. Regular inspection of the works for stability assessment will be undertaken. All back-filled areas will be supervised to conform with best working practices. Mine shafts exposed during operations and not removed by extraction of minerals will be further investigated and treated appropriately.

(Traffic and Vibration are treated in the EA, but deleted here.)

Archaeology : No impact is anticipated on archaeological resources.

(Socio-economic is treated in the EA, but deleted here.) “ (Johnson, 1992)

A-1.7.2.4 1996 Update on Bowmans Harbour

Subsequent communication with Mr. Hugh G. Kent, Planning Manager for CCCL, advised that “Generally, the project has been successful in that it successfully re-deposited and contained the waste - subsequent monitoring by Johnson Poole & Bloomer has proved this. But, inevitably, the site has not been without problems, Viz. : - (i) a larger quantity of waste was encountered than estimated, resulting in the need for enlargement re-design of waste repository and a consequent shortage of clean cover material; (ii) a problem with large inflow of water and need for pumping; (iii) the large number of different agencies involved and the sheer logistics of coordination; (iv) CCCL had to file for extra cost; and (v) some unexpected leaching at the surface.

“ Despite these, the objectives have been (or shortly will be) met - i.e., containment of waste on site, control of gas and leachate, treatment of old mine workings and shafts, remediation of contaminated soils and compaction to allow hard development for industry and residential uses, with amenity land.



Illustration removed for copyright restrictions

Figure 6 - Bowmans Harbour - Showing Clay Sealing (upper left) of Reclaimed Landfill and Final Stages of Coal Extraction (right)

Photo credits - Clay Colliery Co Ltd., Shrewsbury, UK



Illustration removed for copyright restrictions

Figure 7 - Bowmans Harbour -After-Use -Construction of Safeway Supermarket on Site Reclaimed Surface

“ There was no injury to health from contamination due to very stringent controls and checks. It’s cost more than envisaged (for various reasons - e.g., inadequate initial information on which to calculate tender price, additional waste, etc.), and there was huge public opposition and the very tight involvement of the public agencies. *** It still cost a lot less than conventional land reclamation techniques not involving coal extraction.

“Some interesting figures for the project are:

- ✓ The total cost of the scheme was £12.4 million
- ✓ 272,220 tonnes of coal was recovered (See Figure 6, coaling on right, page 267.)
- ✓ a £3.6 million grant from Black Country Development Corporation
- ✓ 5.3m m³ of overburden excavation
- ✓ 1.2m m³ of waste re-handled
- ✓ 30 mine shafts were capped
- ✓ 10,000m³ of imported soils required
- ✓ £150,000 to treat old mine workings
- ✓ £1.4 million royalty paid to British Coal
- ✓ £0.2 million consultancy fees
- ✓ £0.5 million for testing waste “

Additional information concerning the waste problem: actually, the amount of encountered refuse turned out to be slightly over 1,000,000 m³ of buried wastes belonging to a local authority landfill of yesteryears. Waste from the disused landfill site uncovered during the initial stages of overburden removal was transferred to a temporary surface repository, constructed with a drainage blanket underneath and a temporary seal, pending preparation of the new, engineered containment facility. Utilising glacial material excavated onsite, a 1 m.-thick liner was compacted beyond minimum requirements to achieve a permeability as low as 1×10^{-11} m/s in parts, whilst for the side walls, a corresponding 1 m layer of clay was placed above a 5 m layer of slightly higher permeability material. With the coaling operation proceeding below the water table, it was required by the National Rivers Authority that the base of the repository be a minimum of 2 m above existing levels so as to offer added protection to groundwater sources.

A-1.7.3 The Poynter Street Reclamation Site, Sutton Heath Extension, St. Helens, Merseyside

This site formerly contained brick-clay mining pits, unstable shallow underground mine workings, brickworks with ovens /kilns, and a water-filled clay pit. in a residential area. The abandoned clay pits had subsequently been used for uncontrolled refuse tipping.

The local Council granted three extensions during the project. “Despite initial fears, virtually no complaints were received and the Liason Committee organised by the Council did not meet for over two years as there were simply no problems to discuss.” The land was stabilised and compacted for residential development. (Kent, 1995)

A-1.7.4 Miscellaneous U.K. Reclaimed Old Mine Sites

A tabulation follows of further completed reclamation projects by Clay Colliery Company Ltd (CCCL) is offered as evidence and proof that derelict mining land, whether coal, clay, or sand and gravel, with or without contained former uncontrolled tipping, located in densely populated areas, can be restored to beneficial, environmentally-safe surface uses. (Kent, 1996)

TIME PERIOD	SITE NAME	LOCATION	DESCRIPTION	RECLAIMED LAND USES
1988-1991	Swan Farm	Little Wenlock Shropshire	large unrestored open cast coal pit close to village	agricultural, wildlife meadows, conservation area, woodland, lake; new rights-of-way network -completed
1990-1991	Croppings Farm	Shropshire	small, open cast coal pit; shallow mine works; sealing flank adjoining public landfill	more favourable land contours made; final: agricultural, woodland and amenity land with pond-completed
1991-92	Coalmoor	Telford Shropshire	old coal working void; old refuse deposits; state of art engineered redeposited landfill site; removal of remaining coal.	restored to agricultural, woodland and amenity lands (completed)
1990-1991	Horsehay	Colwich Staffordshire	small open cast coal pit with shallow mine workings removed; coal and clay removed;	remaining land compacted for carriageway by-pass route (completed)
1988-1991 mined;	Ketley Brook	Telford Shropshire	old coal workings; coal and clay to be removed and site backfilled	451,000 tonnes of coal removed; several hundred thousand tons of clay backfill compacted to accommodate housing development as part of city expansion (completed)
1988	Mount Pleasant	Buckley Clwyd Wales	two derelict clay pits to be reclaimed and backfilled	development of a well-landscaped district waste disposal site
1990	Bagillt	Clwyd Wales	currently operating sand & gravel pit with coal reserves	operation for minerals continues while land reclamation proceeds.
1993-1995/6	Smelt Farm	Clwyd Wales	old, shallow mine workings; former steel works; former waste tip	remaining coal and clay minerals to be removed; reclamation of uncontrolled former waste tip; restoration of two archaeological buildings and historical trail for Clwyd County Council; wildlife meadows, woodland with pond

1990- 1996	Blinkbony	Gorebridge Scotland	underground coal workings	opencast excavation of coal reserves and relamation to follow (ongoing)
1987-1989	Newdale Hall	Telford Shropshire	old, illegal , uncon- trolled waste site in centre of town	recovery of minerals made while containing harmful solidwaste; restoration of surface for housing develop- ment and playing field (completed)

Numerous, additional examples of reclamation of derelict lands in the U.K. with full environmental restoration to beneficial surface uses by Clay Colliery Company Limited can be given. The successful reclamation of surface mine voids using refuse as backfill without harm to groundwater has been proven. In the U.K., such use is a *fait accompli*.

A-1.7.5 A Planned Reclamation - "The British" Site, Abersychan, Torfaen Borough, Gwent County, Wales

The numerous, successful reclamation projects by Clay Colliery Company in the U.K of derelict mined lands, subsequently used for uncontrolled refuse tipping, have lead to a grander scale objective and plan to undertake one of the largest areas of dereliction in the Eastern Valley of Wales, some 16 miles northeast of Cardiff. (See Figure 8, page 311).

The site is one of former collieries with shallow coal and ironstone mine workings, including some 70 recorded mine shafts and adits, mine spoil piles, colliery spoil piles up to 16 m. thick in places, a former uncontrolled refuse tipping area, scrap yard, an abandoned quarry, a disused reservoir, abandoned buildings, and other small industrial operations. Parts of the site contain clinker, ash, furnace slag, masonry, concrete, metal contamination.

Waste from a previous consented landfill, from 1964 to 1968, and covering 6 ha (14.83 acres) is estimated to be 172,000 m³. 'Waste' tipped contains nylon, polythene, household grate ash, metal, glass, and man-made fiber and occasional degradable material. Fly tipping has also taken place in more recent years.

Some of the land allegedly contains low level contaminants, ground gas, and there is a generally inadequate stormwater drainage system causing flooding during heavy rainfall. Five reclamation feasibility studies were submitted to the Welsh Development Agency (WDA). The feasibility studies considered the technical and safety aspects; environmental impacts (e.g., noise, dust, traffic, visual); time to completion; and, cost. Options varied in time from 9 months (for landscaping only) to 36 months, and in cost from £0.5 million (£1.0 million for landscaping only) to £4.0 million. The WDA chose CCCL's Open cast option at a cost of £0.5 and 36 months in time. A monetary aspect that



Illustration removed for copyright restrictions

Credit-Clay Colliery Co Ltd., Shrewsbury, UK

Figure 8 - Plan for "The British" Reclamation Site, U.K.



Illustration removed for copyright restrictions

Figure 9 - Idealised Cross Sections of "The British" Site
Before, During, and After

Credit- Clay Colliery Co Ltd., Shrewsbury, UK

offsets the costs in offsets the costs in the selected option of open cast restoration is that the coal recovery operations are anticipated to be largely self-financing. See Figure 9, page 312, for an idealised cross section of the planned reclamation process for "The British" by excavation and coal recovery.

It should be noted that the recovery of coal, clay, and sand and gravel in the above reclamation project is expected to contribute to a sizable reduction in the project's costs.

"The British" site cannot be offered into evidence because it has not been accomplished, and therefore, not proof. However, it is offered as evidence of technology planning for reclamation of derelict lands. A proposed reclamation scheme outline specification for treatment of The British Site has been compiled by CCCL following discussions with the Torfaen Borough Council Environmental Health Department and the National Rivers Authority. The Scheme Outline is provisional and subject to their detailed approval.

A-1.7.6 A U.S. Beginning Trend - Using Abandoned Surface Coal Mines for Landfills

Closely approximating the U.K trend of reclaiming coal reserves from derelict surface coal pits, including some that have been filled with uncontrolled refuse and industrial debris, followed by complete surface restoration, is an incipient trend of using abandoned surface coal mines in the U.S. The use of working aggregate and sand and gravel pits in the U.K. is also an incipient trend in the U.K., the U.S. and Canada. (See examples in Appendix A-2, infra.) A few years ago, this may have been somewhat startling news. Serious consideration amongst mining and geological engineering professionals in former years has generally been lacking when the subject of using surface mines for MSW depositories was mentioned. The suggested use of sand and gravel pits or abandoned surface coal mines has generally been negative. The primary reason for rejection of coal pits in the past has been that they already present a hydrology contamination problem of acid drainage without creating a potentially additional source of polluting leachate seepage. The beginning trend is certainly still not universally accepted in the U.S., nor in Canada.

The following review of information concerns the beginning use of abandoned surface coal mines in the central U.S. for MSW landfills. The information is derived from a 1995 Survey of the Use of Abandoned Surface Coal-Mined Land for State-of-The-Art Solid Waste Disposal Facilities made within the Geological Engineering Department of the University of Missouri - Rolla by Michael D. Owens and Dr. C. Dale Elifrits.

A Summary of a 1995 "Survey of Use of Abandoned Surface Coal-Mined Land for

State-of-The-Art Solid Waste Disposal Facilities "

by Michael D. Owens, M.S., and C. Dale Elifrits, PhD

A critical shortage of acceptable landfill space in Missouri is attributed to the stringent federal regulations governing disposal of MSW under the Resource Recovery and Conservation Act's (RCRA) Subtitle D. At present (1995), there are only a few disposal sites within the state that meet the federal criteria, thus, very little of the state's MSW is disposed of within its borders. Waste is consequently being hauled long distances from throughout the state at a high cost to local governments. The shortage is attributed to a lack of sites specifically designed to meet the Subtitle D standards, yet there is no shortage of potential sites that could meet the standards were Missouri to emulate the use of abandoned surface coal mined land (ASCML) as its neighbouring states have done.

At least eleven state-of-the-art landfills are operating in abandoned surface coal pits, meeting the standards of Subtitle D, in the adjoining Upper South states of Kentucky (3) and Kansas (2), and the mid-West states of Illinois (3) and Indiana (3). The survey was limited to the Western Interior Basin and the adjoining Illinois Basin, having similar geology and past mining practice. Regional MSW regulators indicate that it is acceptable to use abandoned surface coal mines which are treated no differently than any other site. "The use of mine spoil for more than daily cover, specifically for liner construction material, is viewed without suspect as long as the 1×10^{-7} cm/s maximum hydraulic conductivity and compaction to 95% of standard Proctor density at 2% below to 4% above optimum moisture content are achieved. The use of mine spoil for daily cover is acceptable in all cases."

Base level construction: Location of the base level of construction may be made within the spoil pile by standard penetration test or by establishing the top of the undisturbed underlying clay/fireclay. Spoil piles, located in the pits, must be excavated down to the base fireclay bed. This is followed by a controlled fill to "establish a sub-base or by direct placement of the constructed liner on the underclay. In the cases where a sub-base is constructed, non-selective spoil is used to form the sub-base such that the liner can then be constructed at a uniform thickness to conserve fine-grained materials. With this method, the controlled drainage for the leachate collection system is facilitated by the precision grading of the sub-base. *** dynamic compaction is being used in Kentucky to densify the spoil at depth.

"The underclay is in a naturally occurring shale unit directly below the mined coal beds. The underclay serves two functions : (1) as a strong bearing unit for subsequent loading, and (2) as a vertical hydraulic barrier. " Re-compacted spoil forms the sub-base over the clay base.

"Bearing capacity is not a reported concern at any of the sites. The hydraulic conductivity of the underclay generally ranges between 1×10^{-8} cm/s for unfractured units

to 1×10^{-5} cm/s for units with secondary permeabilities due to fracturing. (by in situ packer tests).

Mine Spoil and Liner Construction: Mine spoil is utilised for daily cover at all of the sites, and for liner construction material at some. Spoil from the site, if it can be used for liner construction, reduces costs and avoids costly borrowing of material from adjacent undisturbed land or from off-site.

“An impermeable liner at one site was constructed of spoil with the following physical properties:

- 1) 50-70% passing the #200 sieve
- 2) liquid limit of 36.8%
- 3) plastic limit of 18%
- 4) plasticity index of 18.8%
- 5) standard Proctor density of 112.1 pcf at 14.2% moisture content
- 6) modified Proctor density of 121.1 pcf at 11.4% moisture content“

“Subtitle D requires that a composite liner system be constructed to protect ground water. The liner requirements consist of a composite system using a minimum of two feet of compacted clay with hydraulic conductivity less than or equal to 1×10^{-7} cm/s which is covered by a 30 mil flexible membrane liner (FML), or 60 mil, if an HDPE liner is used. The clay liner system is constructed in 6 to 8-inch (15.24 to 20.32 cm) lifts, compacted to 95% standard Proctor density at requisite moisture content, and precision graded to facilitate drainage of the leachate collection system directly above. The recommended material properties for the clay are:

- Liquid limit greater than or equal to 30%
- Plasticity index greater than or equal to 15%
- Greater than 50% passing the #200 sieve
- Clay fraction greater than or equal to 25%

Liners using mine spoil consistently meet the hydraulic conductivity and strength requirements. Elimination of oversized particles in the upper 6 inches (15.24 cm) is important so that the integrity of the flexible membrane is not compromised.

Daily cover: Subtitle D requires a daily cover of the working face of at least 6 inches. The spoil heaps provide acceptable and ample daily cover material. Some alternative covers are being used, e.g. 4 mil thick Canvex plastic tarpoleans, over areas 100 feet x 75 feet (30.48 m. x 22.86 m.). Use of tarps result in a 50% reduction of spoil material as daily cover. A spray-on bituminous emulsion is in use as daily cover at another site.

Underground Workings : At a few pit sites, underground coal drifts have been encountered. One at a Kansas site required extensive grout filling and sealing. Another site has used seismic surveys to search for unknown underground workings.

Water Management: Local acid mine drainage is exacerbated by disturbance of the spoil piles. Run-in water that come in contact with the active face, as well as diverted sheet-flow or run-off water that has not made contact, is collected in 25-year, 24-hour event detention basins. The water is tested and treated, if necessary, on-site or at publicly owned treatment works (POTW) to comply with the Clean Water Act. Sedimentation/ detention basins that

control sheet flow away from the active area can, after testing, often discharge directly into the natural drainage as long as no adverse impact results and according to the facility's NPDES permit. .

A southern Indiana site employs an anoxic drain discharging into a constructed wetland. Surface water is diverted to a sump, then pumped to an elevated detention basin. Discharge from the basin is into a "closed filter blanket composed of crushed carbonate rock situated down-gradient toward the headwaters of the constructed wetlands. " The included iron sulphides and deleterious matter are precipitated in the wetlands which raise the pH of the water. The wetlands proceed down-gradient around the perimeter of the site in a series of basins with each having improved water quality. The pH values are improved from 3.5 to an exiting pH of 6.5 resulting in a better water quality than the former uncontrolled drainage from the undeveloped site.

Phreatic Water in Spoil: Hydrogeologic testing of the Fulton County, Illinois, site found the hydraulic conductivity in disturbed spoil to be much higher than in the undisturbed adjacent land, viz., at 2×10^{-2} cm/s, yet almost impervious at the spoil-underclay contact.

Successful de-watering of ASCML depends on the elevation of the top of the underclay with respect to elevation of the local drainage system. After pumping, retained water in the spoil piles that were previously resting in pit water, can be a problem by continued drainage in the de-watered pit.

Ground Water Protection: Subtitle D requires ground water monitoring up and down gradient of the site, and must monitor the uppermost aquifer. Monitoring wells are completed in the spoil, within the underclay, and to depths below the underclay. Baseline conditions are established by a minimum of four independent samples collected quarterly for one year, for determining contamination. Missouri requires a minimum of four monitoring locations: one hydraulically up-gradient, and three down from the disposal site.

The following determine the number, spacing and location of the monitoring wells at a site: (1) aquifer thickness; (2) hydrogeologic properties of unsaturated and saturated materials; (3) hydrogeologic properties of the unit just below the uppermost aquifer; and (4) ground water flow rate and direction.

Final Cover and Closure: The final capping must be comprised of a low hydraulic layer similar to the clay liner, a 40 mil FML of very low density polyethylene (VLDPE), an optional drainage layer, and one to two feet of top soil.

Post-Closure Plans: Subtitle D, Sub-part F of RCRA requires post-monitoring, maintenance and performance for 30-years for the site with quarter-annually inspection of cover, semi-annual ground water sampling, methane gas monitoring, leachate disposal and monitoring, cover repair, clean out of swales and sedimentation / detention ponds, and record-keeping.

Owens and Elifrits estimate that the clay liner and constructed sub-base can conservatively exceed 5000 cubic yards per acre.(3,822.25 c.m.) Processing of spoil on-site is estimated at US\$2 to \$3 per cubic yard (.76455 cubic metre).

A-1.8 The U.S. Public Hearing Process Applied to Landfills

The wide spread phenomenon of opposing proposed “bad neighbour” industry projects in a community by the local citizens, particularly waste disposal and treatment facilities and surface mines, is referred to as the NIMBY (Not in My Backyard) syndrome. As noted by Schoenbaum in his 1992 edition of Environmental Policy Law, “The NIMBY syndrome can frustrate siting a facility that is part of a larger federal or state strategy of environmental protection or pollution control. *** No one wants to live in the vicinity of a waste treatment facility, and local residents generally band together to oppose the siting or expansion of a waste disposal site. Often such campaigns are waged in the name of preserving the environment. See, e.g., *Village of Wilsonville v. SCA Services, Inc.*, 426 N.E.2d 824 (1981).” (Schoenbaum, 1992, page 375)

A-1.8.1 Nimby Syndrome Examples Defeating a Proposed Waste Site

The following case is offered in evidence of the negative effect that the NIMBY syndrome can have in defeating the planning of larger federal environmental programmes. In *Village of Wilsonville v. SCA Services, Inc.*, 426 N.E.2d 824 (1981), the villagers brought a common law action in nuisance to require the removal of an approved site for a hazardous waste landfill.

The federal government imposes federal standards under the Resource Conservation and Recovery Act (RCRA) for hazardous waste treatment and disposal facilities, leaving the siting decision to the states. As Schoenbaum (op.cit) notes, “This presents the important issue of the extent to which local opposition *** should affect the siting decision.”

On hearing the case, the trial court was faced with divided expert testimony on the risk of future harm resulting from the planned location in Wilsonville, but granted the injunctive relief preventing the waste disposal site. On appeal, the Supreme Court of Illinois affirmed the granting of the injunction.

In opposition to a lower court’s finding that the likelihood of substantial future harm was remote, the Supreme Court stated, “*** we think it is sufficiently clear that it is highly probable that the instant site will constitute a public nuisance if, through either an explosive interaction, migration, subsidence, or the ‘bathtub’ effect, the highly toxic chemical wastes deposited at the site escape and contaminate the air, water, or ground around the site. That such an event will occur was positively attested to by several expert

witnesses. A court does not have to wait for it to happen before it can enjoin such a result.” (389 N.E. at 837).

Another, more recent, re-occurring example of *Wilsonville*, employing the NIMBY syndrome tactics to defeat a landfill expansion in the guise of environmental concern, is found in *File et al v. D & L Landfill, Inc.*, 579 N.E.2d 1228 (Ill.App. 5 Dist. 1991), supra in Chapter 6. In *File*, the Concerned Citizens Group was less concerned with potential effects of pollution and groundwater contamination from the MSW site than with decreased values for their properties affected by the presence of the landfill.

Again, Schoenbaum makes the observation that “Local communities have also used local zoning and land use requirements to exclude unwanted waste facilities.” For support, see *County of Cook v. John Sexton Contractors, Inc.*, 389 N.E.2d 553 (1979). Public hearings on local zoning (land use planning) are frequently misused with concerned citizen groups representing and using arguments for “environmental concern” to prevent “bad neighbour” industrial projects from entering their community, when in reality their “concern” is for lowering of their property values, not for the benefits of the larger common good.

As previously argued in Chapter 3, groundwater contamination is commonly conjectured and alleged as a future possibility in zoning and mine permitting hearings for “bad neighbour” applicants, even made in the post-environmental stringent regulation period. The allegations of potential water contamination are commonly made without basis, as well-illustrated in *Florida Rock Industries v. U.S.*, supra, where the federal government argued that quarrying in the local limestone would pose a risk of contaminating the sole aquifer supplying drinking water for the city of Miami, and Dade County, Florida. The government did not actually contend that limestone mining would contaminate the aquifer. The government's argument simply suggested groundwater pollution from Florida Rock's future quarrying. This speculative argument failed in view of the Court's noting of fact that none of the presently operating quarries in the immediate area in the same rock formation had polluted, nor were they presently polluting, the aquifer in question.

The power of intimation and suggestion that detrimental hydrological contamination “may result” from a newly planned surface quarry if approved, as used by the federal government in *Florida Rock*, failed under the scrutiny of the examining court. Unfortunately, this same “scare” tactic without foundation in fact has been too often successfully used in defeating quarry and landfill permitting at many public inquiry hearings. A weakness of the Public Inquiry Process (PIP) is that the hearings are not subject to a requirement to use the same factual legal scrutiny as the courts. The general public may enjoy defeating a permit for personal reasons on the basis of a whim, or at least, on unfounded and non-factual information, while the courts deal in fact and truth.

A-1.8.2 Another Example of a Landfill Siting Defeat by NIMBY and Zoning Squabbling
The following article was written in 1992 as a review of the frustrating, lengthy delay and costly, extended litigation that can be incurred by the public hearing and zoning process for siting of a MSW landfill. St. Peters, a city with a population of near 50,000, is located in St. Charles County, Missouri, with a population of approximately 225,000 people. Both city and county are in the St. Louis suburban area.

St. Peters, foreseeing a need for continued MSW landfill space in 1989, acquired an abandoned limestone quarry site of 29-acres two miles outside its city limits in an unzoned area of St. Charles County. It obtained the site from its landowners by threatened use of the power of eminent domain (condemnation) for the public good. In the ensuing litigation over zoning requirements with St. Charles County for landfill permitting, a local homeowners' association, Heatherbrook, joined in the jurisdictional squabble between St. Peters, St. Charles County and the state agency (DNR) responsible for waste disposal. St. Charles opposed St. Peters' claimed power of condemnation to obtain the landfill site. The homeowners' association opposed the landfill proposal for fear of depreciated land values for the near-by properties, typically of the NIMBY syndrome. The litigation has been the subject of several court trials starting in 1989 and has been heard by state Courts of Appeal three times, the last being in mid-1994.

Although the zoning and jurisdictional issues of *St. Peters* are pertinent to landfill siting, of greater interest and included are the state agency's environmental conditions imposed for a landfill.

A SUMMARY OF THE CURRENT LITIGATION FOR THE
CITY OF ST. PETER'S PROPOSED QUARRY LANDFILL SITE
LOCATED IN ST. CHARLES COUNTY, MISSOURI

by R. Lee Aston, J.D., LL.M., (1992) (unpublished)

Geological Engineering Department, University of Missouri-Rolla

Preface:

Siting approval for solid waste sanitary landfills, whether utilizing an abandoned quarry, or not, frequently undergo the same objections by the public as do newly proposed aggregate quarrying sites. Proposed landfills and proposed quarrying operations are both victims of the NIMBY syndrome which result in highly emotionally-charged, antagonistic, arduous public and administrative hearings, only to be followed by long, drawn-out litigation. Such is the case for permitting of a mined-out crushed stone quarry as a solid waste landfill site currently caught up in litigation in the state courts of Missouri.

Background facts:

In May 1989, the City of St. Peters, Missouri, (hereafter the City) acquired a mined-out, 29-acre, limestone quarry about two-miles outside its city limits for the purpose of converting it to a municipal solid waste landfill and recycling facility. The intended site lies within an unincorporated part of St. Charles County. Eighteen months later, the City submitted to the Missouri Department of Natural Resources (DNR) its permit application

pursuant to Sec. 260.205.2(3), RSMo. Included were copies of rezoning approval, a conditional use permit, and a refuse disposal area license. The City also submitted its argument to DNR that it was not legally required to have obtained those permits and authorizations from St. Charles County to develop and operate a solid waste disposal or processing facility.

Having conducted a preliminary review of the City's application, the Waste Management Program (WMP) of DNR [as of July 1, 1991, the Solid Waste Management Program] returned the City's application as "incomplete". WMP found under its Policy #405 that the City had failed to obtain a land use permit and sanitary landfill operating permit from St. Charles County. The City appealed the decision in thirty days resulting in a suit against DNR. [*City of St. Peters v. Dept. of Natural Resources*, 797 S.W. 2d 514 (Mo. App., W.Dist., 1990)]. The Court ordered a rehearing of the matter for the City.

However, on rehearing, WMP found under Policy #405, the applicant may submit, as an alternative to the actually required permits, licenses and approvals, letters from local governments or agencies stating that unconditional approval for the required permit, license or approval will be issued on issuance of a DNR permit. In finality, the WMP accepted the City's argument that it was exempted from the sanitary landfill operating permit requirement. WMP was to conduct its technical review of the City's application and was ultimately satisfied that City had complied with all relevant local zoning regulations necessary to permit and operate a solid waste facility. A Joint Stipulation (J.S.) Order was signed by the hearing officer which allowed the technical review of the permitting process to proceed.

Recent litigation:

On 21 August 1991, a local citizens' group, Heatherbrook Homeowners Association (Heatherbrook) et al, aggrieved by the decision of DNR to proceed with the permitting, filed a Petition for Review with the Circuit Court of Cole County, Jefferson City, Missouri, naming the Missouri DNR and the City of St. Peters as defendants in the suit. Heatherbrook sought an injunction to prevent DNR from issuing a permit to City to prevent "irreparable harm" to the site's nearby homeowners. Heatherbrook argued that there were two other law suits currently pending in the Circuit Court of St. Charles County relative to the issuance of the permit, viz., (1) *Heatherbrook v. Mo. DNR and City of St. Peters*; CV191 Cir. Ct. Cole Co. (1991), and, (2) *St. Charles v. St. Peters & Mo. DNR.*, No.CV190-7257CC, Heatherbrook contended that until the suits were settled further processing of the permit should be enjoined, and that:

- (1) the Joint Stipulation Order of WMP and the City misrepresented the zoning controversy to the hearing officer who approved the permitting procedure for the City.
- (2) the Joint Stipulation Order "was unsupported by competent and substantial evidence;
- (3) the JS Order was not legally authorized;
- (4) the JS Order was procedurally unlawful."

Heatherbrook also took issue on City's claim that it was not legally required to obtain those permits and authorizations from St. Charles County to develop and operate a solid waste disposal or processing facility; and, that City's position was based solely on a legal opinion by an attorney for City; and that the opinion was an incorrect statement of Missouri law.

Hence, Heatherbrook sought:

- (1) review of the Joint Stipulation Order by the Circuit Court of Cole County;
- (2) that under the DNR rules, City is subject to Chapter 260 and 10 CRS 80-2.020(2)(E);
- (3) that City is not exempt from St. Charles County's zoning requirements for location of a solid waste landfill in an unincorporated area; and
- (4) the Joint Stipulated Order for permitting be set aside.

On the same date, Heatherbrook filed (August 21), the Circuit Court of Cole County ordered DNR to send up the record for review and commanded DNR to take no further action in the permitting process until ordered by the court.

Prior to the August 21 order, DNR had scheduled a public hearing for August 29 to be held in St. Charles County for the purpose of investigating the application of St. Peters for the solid waste disposal area operating permit. The Court's order negated the scheduled DNR public hearing on August 29.

In response to the Cole County Court's injunctive order, DNR filed its pleading that:

- (1) modification, or setting aside, of the injunctive order should be made so that the public hearing could be had on 29 August as scheduled;

- (2) the homeowners would not be prejudiced by the scheduled hearing;

- (3) they would, in fact, have opportunity to express their views at the hearing.

- (4) Heatherbrook's petition for injunctive relief had been heard *ex parte* (i.e., one sided);

- (5) DNR had not been notified of the injunctive relief petition by Heatherbrook, or given an opportunity to oppose the relief granted to Heatherbrook (i.e., *bi-partite*);

- (6) no investigation by the court was made as to the claim of "irreparable harm"; and,

- (7) the court did not have jurisdiction in the matter since the decision of the DNR Director concerning the City's application for permit was "contested" and could be reviewed by the administrative hearing officer, i.e. , not final.

- (8) Heatherbrook did not have standing to file the action against DNR

Determinative points of law concerning DNR's response:

- (a) concerning DNR's arguments 4, 5, 6, above: only temporary injunctive relief may be granted *ex parte* where the "irreparable harm" is allegedly occurring, or is so imminent that there is not time to have a *bi-partite* hearing for granting of the injunction to prevent the occurring injury from doing more damage, or an "imminent harm" from occurring and causing injury to the applicant or his property. Obviously, here, the danger of harm from the investigatory permitting process by DNR was only speculatively *in futura* by Heatherbrook, certainly not imminent. There were to be more opportunities for

Heatherbrook to join in any public opposition to the permitting process of the City's planned solid waste landfill. DNR claimed it had been denied "due process of law" by not being allowed to participate in the *ex parte* hearing.

(b) concerning DNR's argument (7), above: jurisdiction of the filed action by Heatherbrook against DNR to prevent issue of the permit to St. Peters was premature. Under administrative law procedures, until administrative remedies have been exhausted, final appeal for review of an agency decision cannot be made to a Circuit Court (Sections 260.235 and 536.150, RS Mo.).

(c) concerning DNR's argument (8), above: DNR argued that since Heatherbrook had not been a party to the contested case and had never attempted to intervene in the agency action, they lacked standing to file the action. DNR's argument against "standing" for Heatherbrook is subject to debate.

Heatherbrook was definitely an interested party in obtaining injunctive relief by virtue of its proximity to the proposed landfill and potential direct "irreparable harm" resulting from possible future granting of a permit by DNR. The fact that Heatherbrook's timing of filing against DNR was premature, holds greater weight. It is true that as a non-party to a formerly contested action between DNR and St. Peters, they lacked standing.

Total-action ban on permit's review process lifted:

The Cole County Circuit Court recognized the weight and strength of DNR's arguments, and for "good cause" modified its Order of August 21 completely halting DNR's investigation of St. Peters' permit application. A new Court Order of August 26 allowed DNR to hold the public hearing on 29 August as scheduled, and to complete its technical review of St. Peters' application, with the *proviso* that no affirmative permit decision be made by DNR until further order of the court.

Motions for Dismissal of Heatherbrook's complaints:

On 11 September 1991, DNR and City of St. Peters filed for dismissal of: (A) Heatherbrook's complaint; and (B) St. Peters moved for dismissal of the action of St. Charles County against St. Peters.

A. DNR's Dismissal Arguments for Heatherbrook's Suit:

1) Lack of subject matter jurisdiction;

As stated above, under determinative points of law, the Circuit Court of Cole County lacked subject matter jurisdiction to hear Heatherbrook's complaint by virtue of the fact that the owners' association failed to exhaust the administrative remedies for appeal under the Missouri code (see Sect. 260.235 RSMo.). Although Heatherbrook attempted to bring their action under Sect.536.150, that section expressly prohibited the action against a "contested" case, providing only for relief in "uncontested" cases. The issue between DNR and St. Peters over permitting was clearly a "contested" action in view of the former suit between those parties, *City of St. Peters v. Dept. of Natural Resources*, 797 S.W. 2d 514 (Mo. App. 1990)] referred to above in Background Facts.

2) Heatherbrook's Lack of Standing to file an Action:

Heatherbrook lacked both standing and a vested right to seek preventive action of DNR for an administrative review of an application for a permit. Their attack on DNA's procedures and any subsequent findings were prematurely filed. Heatherbrook had failed to intervene as an interested party in the former contest between DNR and St. Peters; further, until after DNR makes its technical review, and only in the event it arrives at an affirmative decision awarding a permit to St. Peters, Heatherbrook has no vested interest to protect, and no right to file an appeal for review. Even then, Heatherbrook would have to file an administrative appeal to the Missouri Administrative Hearing Commission, not one for judicial review by a court. The issue was not "ripe" for judicial review.

3) Lack of Demonstrated Irreparable Harm or Injury:

Heatherbrook failed to show how they would be aggrieved, or "irreparably harmed", by DNR's decision to conduct a technical review of St. Peters' permit application. The alleged harm can only be speculative and in the future, in the event that St. Peters actually started a landfill operation. Heatherbrook's alleged fears of harm may still be precluded by the possibility that St. Peters' permit application may be denied by DNR. In the event the permit application is approved by DNR, Heatherbrook's remedies are not exhausted before a landfill operation could be started.

4) Landfill Permit Application Review or Approval is Not Final:

DNR's position was that the Joint Stipulation Order issued by the hearing officer was only interlocutory in nature, i.e., it was not final or ripe for purposes of review or contesting.

B. St. Peters' Dismissal Arguments for Heatherbrook's Suit:

The City's arguments addressed the same issues posed by Heatherbrook as did the Missouri DNR's. St. Peters did cite one additional fact; that, although they claim they are not subject to the zoning of St. Charles County requiring a permit for the landfill site, they did acquire a conditional use permit from the County for operation of the landfill site.

On the same date, 11 September, St. Peters also filed its Motion for Dismissal of their suit with St. Charles County. This was one of the two pending cases Heatherbrook argued must be settled before DNR could proceed with the permitting investigation.

On 24 September 1991, the Circuit Court of Cole County suspended its Order of 21 August with reference to DNR's certification of the records for the *Heatherbrook* suit against St. Peters and DNR. Decision on St. Peters' application to use the limestone quarry as a sanitary disposal site awaits the outcome of the pending cases in St. Charles County.

Environmental Demands for a Conditional Use Permit for the Landfill

In St. Peters' case, the application was for 29 acres, (11.74 ha) located largely in a mined out limestone quarry site adjacent to the Missouri River. St. Peters declared that the amount of material, of household refuse type, to be dumped daily was between 100 and 500 tons (90.72 to 453.6 mt). After the collected materials had been processed through

recycling, the residue was to be placed in the landfill. Recycling was to be done at the landfill site. Equipment to be acquired by St. Peters was to be loader, compactor, recycling, trucks, including water truck, and scales.

In granting the conditional use permit for the sanitary solid waste facility, thirty environmentally oriented conditions were imposed on St. Peters by St. Charles County. The conditions are becoming fairly typical for waste landfills in or near large cities. A summary of the conditions imposed follows. Thirteen (13) were to be met before the solid waste landfill operation started. Seventeen (17) were required during operation.

- 1) Compliance with federal EPA and Missouri DNR requirements for installation and operation of a sanitary landfill;
- 2) Obtain all federal EPA and MDNR licenses and permits required;
- 3) No ingress or egress during operation until specified planned adjacent highway improvements had been completed;
- 4) Unless infeasible, construct the materials recovery facility (MRF) at an off-site location before accepting any solid wastes into the landfill;
- 5) Submit and obtain approval from St. Charles Co. Planning Dept. and the County Highway Dept.

for an industrial site plan, including:

- a) designated entrances/exits with any changes to existing highways to be paid for by St. Peters;
 - b) proof that all entrances/exits to property are at or above the 100 year old flood plain level;
 - c) storm water controls for the property;
 - d) planning to prevent refuse trucks from depositing mud on public streets, by pavement of roads, or a wheelwash;
 - e) flood protection construction of levee to a 500-year frequency in compliance with Federal Management Agency and U.S. Army Corps of Engineers;
 - f) control of blown litter and trespassers by construction of an 8-foot high chain link fence, with lockable gates around entire property;
 - g) aesthetic controls by construction of a landscaped barrier visually screening site from adjacent road;
 - h) maintain a 200-foot buffer zone, with additional landscaping, between the landfill-pit and all adjacent residentially -zoned land;
 - i) indicate lighting; no lighting to reflect on to adjoining land.
- 6) obtain a land-use permit for planned improvements;
 - 7) complete all planned and approved improvements;
 - 8) extend and install water lines to the site; ensure other adequate fire protection services; place adequately spaced fire hydrants on the property;
 - 9) construction of an enclosed system for leachate collection, which may include a treatment plant;
spraying of leachate on the property is prohibited;
 - 10) (a) Water quality monitoring: quarterly basis of water sampling from existing well(s) within 1,320 feet of property; or alternatively, place one monitoring well within adequate distance. St. Peters has option of providing an alternate source of water;
(b) posting of routing signs for refuse haulers to access property;
 - 11) Equipment requirements for daily operation, and backup machinery, required by DNR;
 - 12) Dust control with on-site water truck;
 - 13) Liner: If required by DNR, artificial; minimum thickness of 60 mm; spread at least 15-foot high along sides of sanitary landfill; if required by DNR, remaining sides to require a clay liner;

Operational Conditions:

- 14) obtain, maintain, construct, install and utilize all item for conditions 1 -13;

- 15) inspection permission for all government entities between 9 a.m. and 4 p.m., Monday through Saturday;
- 16) receiving of waste limited to 6:30 a.m. to 6:30p.m., Monday-Saturday; closed on Sunday;
- 17) no acceptance of yard waste (vegetation); any composting to be done off-site;
- 18) no transfer station to be on property;
- 19) equal access for dumping to all St. Charles County residents and refuse haulers, and same tipping fees shall apply to all, provided that all haulers meet the same stringent criteria as applied to waste from City of St. Peters;
- 20) solid waste only accepted by designated entrances; only from licensed haulers, except single axle trucks; no barge waste from Missouri River;
- 21) daily cover required for working face for bird and odor control;
- 22) daily litter control including approaches where abutting site;
- 23) regular basis testing for all monitoring wells, incl.# 10, as per DNR regulations; copies of results to St. Charles County; in event activities on site cause contamination of active wells within 2,640 feet of site, St. Peters will bear 100% of all costs of providing water to properties with contaminated wells;
- 24) reimburse St. Charles County for any reasonable costs incurred in monitoring landfill operations;

Conditions for Closure of Landfill Site:

- 25) no construction of completely enclosed structures on fill area;
- 26) ensure complete closure in compliance with all governmental regulations in effect;

Automatic Expiration of Conditional Use Permit upon occurrence of any of following:

- 27) a final and unappealable denial, revocation or forfeiture of permitting by federal E.P.A.;
- 28) upon expiration of any state or federal permit for landfill or recycling operation; responsibility is on operator to obtain renewal of this conditional use permit before its expiration;
- 29) if City of St. Peters, or anyone on its behalf:
 - a) applies to any federal, state or local government for disposal of any hazardous or infectious waste at the property;
 - b) expands any uses on the property, including incineration, unless approved under a separate conditional use permit application;
 - c) relinquishes any portion of ownership, management or policy-making for any portion of the property, or any of its facilities to anyone other than city-employees;
 - d) violates any of the conditions of this conditional use permit, as determined by a final and unappealable decision;
- 30) If the County Commission,
 - a) determines that:
 - i) either the County Health Department or the Planning & Zoning Department notifies St. Peters of a violation of state statutes, or local health, or zoning order, or conditional use permit, and
 - ii) by written notice to City of St. Peters, and
 - iii) City of St. Peters has not rectified or corrected the violation within a reasonable time specified in notice; and
 - iv) said violations are a threat to health, safety and welfare of county residents; and
 - b) may enter an order revoking the conditional use permit when it has become final and unappealable.

St. Peters Case Update

During the prolonged litigation over the landfill siting, the City of St. Peters argued its right to the power of condemnation of the quarry property located two miles outside its

city limits by relying on a Missouri statute which authorised 3d and 4th class cities to acquire property up to five-miles beyond city limits (by condemnation or other ways) for incinerators, purification plants and sewage disposal plants. St. Peters had relied on the equitable maxim / rule of *ejusdem generis* (of the same kind, class, or nature), that is, that although a landfill site was not specifically named or enumerated in the statute, it was of the same nature as those named, viz., dealing with waste treatment.

After five years of litigation, 1989-1994, the last decision by the appeals court was that a 4th class city, as St. Peters, does not have the authority granted to it by the state for the power of condemnation of property for a waste disposal site without its city limits. Therefore, the abandoned aggregate quarry, two miles (3.22 km) outside its city limits, it had obtained for the landfill site, whether by condemnation or by threatened condemnation, could not be licenced for that purpose.

The court rejected St. Peters legal theory of *ejusdem generis*. The court countered with the equitable maxim / rule, *expressio unius est exclusio alterius* (the expression of one thing is the exclusion of another). Since the state had expressly named the purposes for which cities may acquire property up to five miles (8.05 km) beyond their city limits, no other purposes, i.e., landfill sites, were authorised.

Millions of dollars have been spent on the public hearings and litigation , ending in a defeat for the landfill permission. Although the landfill site had been defeated by a jurisdictional issue and turned on a hairsplitting point of law, the landowners and NIMBY had been victorious. In the interim years, St. Peters has disposed of its waste by contracting its haulage to the nearby combined quarry and landfill of Fred Weber Inc. at Maryland Heights, Missouri. (See Appendix A-2 § 8.5 - United States - An Example of a Successful Combined Quarry-Landfill Operation).

A-1.9 Conclusions and Comments

Treatment of resultant contamination of ground and groundwaters from the misuse of former mining workings by the deposition of refuse without the necessary preparation to make the underlying ground safe from refuse deposition is not claimed to be the sole work and concern of the British people, or that they have singularly dealt with the problem. To be sure, examples may be found in other nations, but the suggestion is made that the British may be in the lead in dealing with such remedial measures. The rationality for Britain's earlier and successful dealing with refuse-filled derelict mining lands is suggested as being motivated by its population density. Thus, land being at a higher premium than in less populous countries, the practice of land conservation and reclamation has consequently a higher priority.

Thus, the conclusion is drawn that it has been successfully demonstrated and accomplished in the U.K. that solid wastes in surface mine workings can be safely

deposited even in the midst of a metropolitan area without injury to the environment or to the public and human well-being. The Bowmans Harbour and Poynter Street examples illustrate that, even where the former mine site had been filled and contaminated by untreated and uncontained refuse and waste dumping, the mined land can be re-worked and the land conserved for the benefit of more public use.

It appears a trend is well-started in the U.K. for utilisation of surface mined lands to accommodate society's wastes and refuse. Further illustrations are entered in evidence in the subsequent chapter.

In Canada, in siting surface mines as landfills there appears to be a varied, an almost indifferent attitude, certainly not of one vital concern for waste disposal space urgency, whether utilisation of the surface mines, is made, or not. Blakeman, in his 1977 Land Use Studies to the Lands Directorate, Environment Canada, suggested a subsequent possible use for derelict quarries might be as landfills.

In 1993, Natural Resources Canada reported the number of major crushed stone and sand and gravel operations to be 250, nationwide. Based on the premise and correlation demonstrated between 'housing starts' and population centres, and the economic requirement of proximity of aggregate pits to the population centres and markets, the major Canadian producers are certain to be well-located as potential landfill sites for those population centres.

The inquiring survey in Missouri into the incipient use of abandoned surface coal mines as MSW landfills is indicative of the urgent need for waste sites in the present time and a critical need to solve the problem. The economics of waste disposal is forcing the investigation of unused mining voids as a lower cost way to solve the universal problem of "where to put the waste".

The quickest relief for easing the critical need for more landfill space would be by incinerating all MSW. As noted supra, incineration reduces the waste volume by 90%, and 65% by weight, which is a tremendous savings for landfill volumetric space. The 10% volume residue (35% by weight) would still require depositing in a landfill. This argument does not detract from the proposed recycling-use of surface mines as landfills. It would extend the lives of all landfills utilising surface mines, abandoned, currently mined, and future mined, as depositories and give society a surplus of future landfill sites to be considered. The urgency for landfill space would be eliminated in the future.

Furthermore, incineration has the very desirable attribute of producing energy. As noted by Hughes, supra, the energy content of landfill waste in the U.K. has been estimated to be worth £1 million per day. (Hughes, 1992, p.247).

Currently, a pertinent news item of interest in the December 1995 issue of *New Civil Engineer*, a U.K. publication, is summarised as follows:

MAKE LANDFILL LAST RESORT, SAYS ENVIRONMENT
SECRETARY

“ New targets for reducing the amount of rubbish sent to UK landfills and increasing the volume of waste that is recycled were set this week by the government. By 2005, the Department of the Environment wants to cut the amount of waste going to landfill sites by 14%, and wants to recovering value from 40% of municipal rubbish. ***

“ Today some 70% of the controlled waste in England and Wales is sent to landfill sites, but the government wants this cut to 60% over the next 10 years. Environment Secretary John Gummer intends *** to push on the process of cutting landfill use. A white paper was published which sets out the “waste hierarchy”, i.e., reduction being the first priority, followed by reuse. Only when neither of these are possible should recycling, composting or incineration be considered, and landfill should be the last resort.

“ Gummer said that local authorities needed to recognise the importance of incineration as an option, but stressed that there was no place for “nimbyism”. He urged councils to take planning decisions themselves on such projects rather than passing the buck to the DoE. “The local authority has a duty to say that an area needs an incineration facility where this is true, and they should not let someone else take the strain”, he said. “ (emphasis added)

The point of greatest interest to this work is the Environment Secretary’s advisory to avoid “nimbyism” by taking the decisions of planning and permission into their own “hands”. Such a course comports with the recommended reduction of public hearing involvement and employing the command and control type of decisions for the public welfare. Permission for combined mining-landfill projects should be left to the discretion and decisions of regional / state or provincial boards in collaboration with environmental agencies. “Historically, one of the key features of our (the British) planning system has been the relative freedom given to decision makers to approve, refuse, defer or generally meddle with applications put before them.” is an observation made by Oxford planning solicitor Scharf in Planning and Law. “ The recent history of the planning system shows an evolution from an ‘application-led’ system in the 1970’s, through an ‘appeal-led’ system in the 1980’s into the ‘plan-led’ system of the 1990’s.” (June 1994, p.iv)

APPENDIX A-2

THE EVIDENCE AND PROOF OF THE CASE : Landfill Technology and Open Pit Feasibility with Successful Examples Making Mined-Out and Working Surface Mines Usable as Landfills

A-2.1 Introduction

The main argument of this thesis is that reclamation regulation for mined-out, non-coal surface mines, or pits, should be re-examined and replaced by new legislation. Under current regulation in all three Anglo nations considered herein, reclamation of worked-out surface mines is not extensive enough to obtain the maximum re-use of the mining voids that were created. Current reclamation of non-coal surface pits is minimal. Regulation fails to recycle and utilise a residual resource that may be put to far greater benefits for society. In a time of re-cycling used materials and resources, open pit voids should likewise be re-cycled to extract maximum use. Current mine reclamation regulation is highly deficient and wasteful when critical national urgencies exist for waste depository and landfill sites. Complete restoration of mining voids by landfilling waste should be mandated by new environmental legislation mandating backfilling of mined land with refuse, solid wastes, or wastes that can be safely stored in the mined voids of : (1) abandoned mined lands (AML) ; (2) currently mined pits; and (3) future planned pits, and that they be environmentally assessed for simultaneous permission to mine and accept MSW, and/or other feasible wastes.

Current mode of reclamation for surface mines in the U.S. is to slope off the top bench on a one-to-three slope, allow the hole to fill with water, or to allow it to seek its natural level (which may, or may not, be some distance below the adjoining surface elevation), fence in the hole, landscape, and/or contour the surrounding surface, removal of all mine buildings and debris, and finally sow the surface with grasses and seedling trees. The water-filled hole may, or may not, become a recreational spot depending on size and the ownership, or simply may become a wildlife habitat watering hole if not too heavily frequented by man, or an aesthetic centrepiece to a new residential subdivision. As an example of the latter, a March 1995 "wanted" ad placed in Pit & Quarry magazine sought an abandoned quarry filled with water near a populated area in the USA or Canada., presumably to be the centrepiece of a planned residential area. Even more specifically, reference was made by the court in the *Florida Rock* case (see Ch.5 §4.5.1) to the desirable landscaping and use of worked out mines for residential areas and golf courses.

The premise of this thesis is that the majority of all non-fuel surface mines are naturally environmentally safer (or can be made safer) for the deposition of wastes than

either (1) holes made in the earth's permeable overburden/dirt surface for landfills, or (2) landfills constructed on top of the earth's surface by mounding. In either case, permeable dirt is poor material in which to place or to use to cover wastes in the earth's surface. The use of impermeable clays, which incidentally is a surface-mined mineral, are commonly employed to prevent leaking of the excavation made in the dirt. The basic hypothesis is that a landfill made in a rock-lined pit has a better chance of containment of leachate from the infilled wastes than from a landfill in permeable dirt.

Thus, in advocating mandated use of surface mines for landfills by law, a review of the primary considerations for landfill follows, after which, examples are given as proof of the successful operation of surface mines as landfills in which containment measures have been taken to prevent pollution of ground and surface waters.

A-2.2 Problems of Solid Waste Landfilling

The primary problem that accompanies landfilling on any site is the danger of leachate escaping from the landfill and contaminating ground waters, and even surface waters. A related, secondary, but prominent problem is the gas generated from landfills, mainly in the form of methane and carbon dioxide, and in some instances, hydrogen.

Another current problem that confronts the consideration of surface mines as landfill sites are the firmly implanted environmental fears by landfills for water contamination that pervades the public mind of today. These fears are based on water contamination in recent years from landfills in general. Figures, true in 1991 as a result of investigation at that time, formerly served as legitimate basis for some of those fears.

In 1991, only 33% of the municipal landfills in the U.S. were provided with groundwater monitoring; only 15% of them had liners; and, only 5% had leachate collecting systems. Furthermore, the report states that 35% of the sanitary landfills were in counties having geological faults; 14% were located on flood plains, and 6% were situated in wetlands. Obviously, those statistics must have applied to landfills that preceded RCRA's more stringent current monitoring and location controls for landfills, and were from a period when attenuated landfills were in abundance as opposed to current containment-type landfills. The fears of using surface mines and pits were, perhaps in some cases, justified, particularly if reliance on attenuation were the sole hope of prevention of groundwater pollution. The degree of undeserved fear to which the use of surface mines had fallen is illustrated by a California law passed in 1988-89 "prohibiting the establishment of landfills on sites previously developed as aggregate mines." (Rock Products, Dec. 1995, p.59).

It is readily seen that the public image of landfills being the cause of water contamination was partially justified. The public image of landfills lags behind landfill

technology to the current detriment of landfill siting . Information for the public must be corrected and their knowledge made current.

A-2.2.1 Highlights of Hydrology and Prevention of Groundwater Pollution in Landfills

Elementary is the statement that when refuse or MSW is buried in a landfill, any contact with water produces a mineralized liquid called a leachate. The leachate, if not successfully and permanently totally contained within the landfill, may eventually seep into the groundwater carrying with it the dissolved contaminants and cause water pollution problems.

The hydrogeology of a surface mine site should be known before a landfill within it can be properly designed. The controls of the movement of water through the area of the mining void could potentially affect the landfilled refuse if not properly contained within the site. Should there be a leak or seepage of the leachate from the contained waste within the landfill, the hydrogeology controls the migration and attenuation of the dissolved solids of the leachate as they are carried by the groundwater. Three hydrogeologic factors considered in the design of landfills should be: (1) the position of the landfill site within the groundwater flow system; (2) the position of the top of the zone of saturation, or water table, with respect to the deposited refuse; and (3) the texture and composition of the surrounding earth materials, which would affect their ability to transport and attenuate dissolved solids in any escaped leachate. Dissolved solids include all organic and inorganic components dissolved in the groundwater. Whenever possible, it is desirable for the landfill base to be above the seasonally high GW table. At sites with a shallow groundwater table, the landfill base may have to be constructed below the GW table. In that situation, total containment will be required. Consequently, because of the relative level of the GW table to the landfill's constructed base, either below or above, containment landfill construction will be either of two types, viz., total or partial containment.

The best solution to avoiding the potential leakage problem of leachate might be to prevent its production. The decision for making a landfill totally moisture-proof, i.e., totally contained, is guided principally by regulation requirements and economics of the site, except in an arid climate. In some areas where groundwaters are not a great problem, total containment may not be an economically practical solution, nor may it be an entirely desirable one (see *infra*, for accelerated bio-degradation). Therefore, next best solution is to minimise the amount of leachate produced.

The containment-type of landfill is designed to restrict leachate from seeping into the groundwater or an aquifer, to minimise its degradation. Containment-type landfills may be either partial or total, depending on their relationship to the GW table. If total containment is necessary, more than one liner will be required. A geomembrane laid over a clay liner offers a greater degree of permeability and assurance of groundwater protection.

Maintenance of an optimal amount of moisture in a fill is necessary for the anaerobic process of biodegradation of the fill's refuse, as well as for its methane production and final stabilisation. The amount of run-in moisture during refuse infilling activities can be controlled and reduced by effectively controlling the run-off waters. Effective sealing of the mining void's bottom and walls with liners, followed by a tight capping on completion, will minimise leachate production.

As stated above, total isolation of the fill material from moisture may not be desirable. Moisture is necessary to the bio-degradation of the waste in order to stabilise the land. If the future restored surface is to have utility once more, the land must be stabilised. The sooner stabilisation is attained for the fill content, the sooner the benefits of surface use will be realised.

Earlier stabilisation may be accomplished by accelerating the waste biodegradation through leachate re-circulation. It has been shown that controlled leachate re-circulation, including addition of nutrients to maintain optimum moisture and pH, can enhance anaerobic microbial activity, break down organics as evidenced by reduced toxic organic carbon (TOC)* and chemical oxygen demand (COD)** , convert refuse organics to methane and carbon dioxide, and precipitate heavy metals. Heating of re-circulated leachate to 86° F (30°C) also greatly accelerates stabilisation. Research at the U.S. Department of Energy's Argonne Laboratory indicates that circulating water through landfills could triple the speed of biological degradation, boost methane gas production, and make it possible to return the landfill to other uses in 10 years or less. (Bagchi, 1989.)

* TOC is a test measuring the carbon as carbon dioxide; the inorganic carbon compounds present interfere with the test, hence, they must be removed before the analysis is made, or a correction applied. (Salvato, 1992, p 480).

** COD is usually measured in relation to certain industrial wastes. The chemical oxygen demand is the amount of oxygen expressed in ppm or mg / l consumed under specific conditions in the oxidation of organic and oxidisable inorganic material in the water. It does not oxidise some organic pollutants (pyridine, benzene, toluene) but does oxidise some inorganic compounds that are not measured, that is, affected by the biochemical oxygen (BOD)*** analysis. (op.cit., p.477).

BOD (biochemical oxygen demand): This characteristic of surface water, sewage, sewage effluents, polluted waters, industrial wastes, or other waste waters is the amount of dissolved oxygen in milligrams per liter (mg / l) required during the stabilisation of the decomposable organic matter by anaerobic bacterial action. Complete stabilisation requires more than 110 days at 20°C. Incubation for 5 days (carbonaceous demand satisfied) is generally used for domestic sewage, one pound of 5-day BOD is roughly equivalent to 1.5 pounds of ultimate BOD. If one pound of 5-day BOD is completely aerated, requiring 1.3 pounds of oxygen, 0.14 pounds of inert residue will remain. (ibid).

A-2.3 Landfill Liners and Waste Water Treatment - In General

Liners, used in waste depositories designed to contain wastes and leachate within and to prevent pollution from leakage into groundwaters, are currently made from various synthetic organic, polymer compounds. Resistance to corrosion, puncture, and

mechanical strength are important features required for the liners. Liners are usually very large, often measured in acres. Joining of sheets to cover larger areas must be reliable in that there will be no separation during the installing process or under the weight and compacting of the deposited wastes. The strength of the material is obviously very important. At present, three types of synthetic liners dominate the market, viz., high density polyethylene (HDPE), PVC and HYPALON (chlorosulfonated polyethylene). All three types are available with embedded woven fabrics providing high levels of resistance to puncture, tearing and bursting.

In the aggregate quarries investigated, clay is the common material used to line the quarry walls to seal off the fill. (See Figure 10, page 334.) Where deemed necessary, additional methods for sealing the quarry walls may be used, e.g., synthetic geotextile curtains draped or hung on fill side of the quarry wall clay liners; guniting and grouting of the quarry's rock walls, where there are cracks, joints or open seams, may precede refuse filling and clay lining; admixtures, e.g., fibre glass may be applied to rock wall coatings. Another newcomer to the landfill scene that is creating great hope and expectation for simultaneous treatment of leachate and leakage prevention is peat, or sphagnum. This natural material is discussed later.

A-2.3.1 Liners - Natural and Synthetic Materials

For smaller, local-type landfills, a knowledge of the contributing community's waste, or the wastes to be accepted will be helpful in determining the parameters of the liner(s) to be used. However, in larger, regional-type landfills where the distances for hauling wastes are seen to be greatly increasing in recent years, the knowledge of community waste is stressed less. Landfills will have to designate their parameters for the range of material they accept.

The types of materials used to construct landfill liners and final caps /covers are generally: clayey soils, clays, synthetic membranes, or amended soil and admixtures.

Clayey soil liners are compacted earth with a high percentage of clay. They may have its slight permeability further reduced by being treated with additives as bentonite, lime, asphalt, or cement. This type of liner material is not recommended for containment-type of landfills.

"Clay" is a loosely defined term for a naturally occurring mineral and includes a large variety of minerals within the clay family. However, in practice, clay-like soil materials are sometimes referred to as clays. Geological and mineralogical definitions are given for the terms as follows:

"Clay mineral": The clay minerals are finely crystalline, hydrous silicates with a two-layer type (e.g., kaolinite) or three-layer type (e.g., montmorillonite) *** . The most common clay minerals belong to the kaolinite, montmorillonite, attapulgite, and illite or hydromica groups. Mixed layer clay minerals are either randomly or regularly interstratified intergrowths of two or more clay minerals. (Howell / AGI Glossary, 1957)



Illustration removed for copyright restrictions

Photo credit - Clay Colliery Co Ltd., Shrewsbury, UK

Figure 10 - A Clay-lined Repository Ready to Accept Waste

Clay : The term as used carries with it three implications: (1) a natural material with plastic properties, (2) an essential composition of particles of very fine size grades, and (3) an essential composition of crystalline fragments of minerals that are essentially hydrous aluminum silicates or occasionally hydrous magnesium silicates. The term implies nothing regarding origin, but is based on properties, texture and composition, which are course, interrelated -- for example, the plastic properties are the result of the constituent minerals and their small grain size. (Grim, 1942)

2. Clays differ greatly mineralogically and chemically and consequently in their physical properties. Most of them contain impurities, but ordinarily their base is hydrous aluminum silicate (USGS).

3. A soil consisting of inorganic material, the grains of which have diameters smaller than .005 millimeters (U.S. Bur. Soils Classification)

4. Fine-grained soil that has a high plasticity index in relation to the liquid limit and consists mainly of particles less than 0.074 mm (passing No.200 sieve) in diameter. (Waterways Expmnt. Sta. Corps of Engrs. Tech.Memo. 3-357, 1953)." (op.cit)

The landfill base below the GW table, even in a clayey bed, should still have a constructed liner placed on top because many clay beds have sand seams in them and minute vertical and angular fractures that are difficult to determine by subsoil permeability methods. Seepage of leachate can take place through the minute clay cracks. Differential settlement of the clay liner can also cause minute cracking in the clay allowing seepage through it. A deficiency of water in a well-sealed fill can cause the clay to dry denying it the moisture needed for maximum plasticity. Clay liners, used alone, are vulnerable to potentially harmful conditions resulting from the refuse degradation that may weaken the clay's impermeability. Hydrocarbons in the refuse can lower the impermeability of the clay. Acidic and caustic leachates can in some cases dissolve the soil binding agents in clay causing its impermeability to break down.

The addition of a synthetic membrane over the compacted clay liner, even on a naturally occurring clay sub-base, will ensure a clay liner against leachate degradation and give greater seepage protection against groundwater contamination.

Synthetic Membranes: Synthetic liners, made from polymers, are named after the major constituent polymer. Seven polymer-liners that were most commonly used in former years are: butyl rubber, chlorinated polyethylene (CPE), chlorosulfonated polyethylene (CSPE), ethylene-propylene rubber (EPDM), low-density polyethylene (LDPE), high-density polyethylene (HDPE), and polyvinyl chloride (PVC). Each has disadvantages and advantages. The earlier HDPE and LDPE liners were preferred over others in many applications, but offered poor puncture resistance. Their puncture resistance has been improved and their popularity has continued.

With regard to puncturing of liners, great care must be exercised in laying them in the landfill and with ensuing passage over the membrane during fill and compaction to avoid tearing and puncturing. However, in 1994 a Japanese company developed a waste liner that sealed itself *in situ*. "The middle layer of the liner is made of a material that

swells on contact with water. If a tear appears, the middle layer of the liner expands plugging the hole within minutes.” (Mining Environmental Management, 9/94, p.35).

Geogrids, geonets, and geotextiles are used as curtain drains and find use as substitute or reinforcement for landfill rock-drain beds or hung on the walls of quarry landfills to direct leachate downward within the fill to the bottom whilst protecting the walls from leachate seepage. One product boasts its new geotextile drainage composite to have “the capability of geosynthetic equivalency to a gravel drain with ten times the drainage capacity of conventional nets *** and capable of replacing several feet of stone or gravel.” (ibid).

A-2.3.2 Peat- The New Waste Treatment “Wonder” Material

Increasing attention is being given to the use of peat-based technologies for waste treatment. The use of peat has great potential for lining in landfills, particularly for the MSW containment-type required herein, holds great promise for making landfills truly, totally contained. In addition, peat has the prospect of neutralising leachate, or, at least, vastly reducing the contaminants within it to a point that it will not contaminate groundwater surrounding the landfill if leakage were to occur.

According to an article in January 1996 of *Mining Engineering* on utilising peat in waste treatment, “It has been demonstrated that peat can successfully remove metals, nutrients, suspended solids, organic matter, oils and odours from domestic and industrial effluent.” (Malterer, McCarthy & Adams, 1996)

“Peat is primarily composed of organic materials consisting of relatively undercomposed and decomposed plant remains. It accumulates in wetland areas, largely under moist, anaerobic conditions. *** Peat has a high adsorption capacity for transition metals and polar organic molecules.

“In natural peatlands, it was found that peat has a strong affinity for heavy-metal retention. Eger et al (1980) studied the drainage pattern of iron mining stockpile leachate through a white cedar bog. They found that the most flow occurred across the surface and through the top 0.30 cm of the bog. Contact with the peat resulted in more than a 30% removal of nickel and more than a 99% removal of copper. Eger and Lapakko (1989) further reported that the peat-bog treatment could have an extended lifetime of between 20 and several hundred years.

“ Peatlands have also been used to remove nutrients from secondary sewage effluent. Tilton and Kadlec (1979) studied the removal of secondary effluent nutrients by peat when they applied it to a natural peat land in Michigan. They reported removal rates of 99% for $\text{NO}^3\text{-NO}^2\text{-N}$, 77% for $\text{NH}^3\text{-N}$, and 95% for total dissolved phosphorous. ***

“ Frostman (1991) reported the use of a (constructed) peat/wetland system for treating iron mining stockpile seepage waters, which have low concentrations of metals. The moderate pH (5 to 6) of the waters are particularly conducive to metal removal by peat. The peat / wetland system was constructed so that seepage waters entered the system

through an underlying limestone bed. The seepage waters then passed over and through a sphagnum moss peat bed. Initial reports on the system indicate that it is performing well in meeting the required nickel and copper water-quality standards.

“ Peat / wetland systems have also been used for the passive treatment of coal-mine drainage. Passive wetland systems treat mine water by chemical and biological processes that decrease metal concentrations and neutralise acidity. Hedin et al. (1994) describes three current types of passive technologies: (1) aerobic wetlands; (2) organic-substrate (peat) wetlands; and (3) anoxic-limestone drains. Organic sub-strate wetlands promote anaerobic bacterial activity, which results in the precipitation of metal sulphides and in the generation of bicarbonate alkalinity. They report that this type of system removes acidity from mine water at rates of 3 to 9 g /m²/ day. “

For sewage-treatment systems, “ researchers at the University of Maine, Rock et al (1984), conducted extensive laboratory and field studies on the ability of peat to treat septic-tank effluent (STE). *** full-size sphagnum mosspeat filter fields were constructed with 0.75 m thick layers. Either a gravity or a pressurised distribution system was placed within the layers. The bed widths were varied (i.e. 4.8 x 19 m. and 6.8 x 6.1 m) depending on the loading rates. The filter fields provided excellent fecal coliform removal (99%) with the 5-day BOD reduction exceeding 90% and the COD reduction exceeding 80%. At the University of Regina (Canada), Rana and Virarghaven 1987, Virarghaven 1993, studied the effects of filter depths and hydraulic-loading rates on the efficiency of peat filter beds. Even at high STE hydraulic-loading rates, the removal of BOD and total suspended solid (TSS) was excellent. Fecal coliform removal was good with effluent levels as low as 60 CFU / 100 mL.”

Peat leach-mound systems were found to perform well under subarctic conditions. “ Near Anchorage, Alaska, Riznyk et al. (1990, 1993) designed and monitored peat leach-mound fields that treated domestic septic tank waste water. During a 2-year period, the quantity and quality of applied waste water was measured for BOD, COD, TSS, NO³-N, TKN, total phosphorous, pH, fecal and total coliform bacteria, colour, turbidity, dissolved oxygen and temperature. The analyses indicated that the quality of the peat leachate is similar to waste water that has undergone tertiary treatment. In addition, sphagnum moss peat was tested to treat STE in New Brunswick, Canada (Daigle, 1993) The peat leach fields were 0.7 m thick, placed over 0.15 m of crushed rock. Distribution pipes were laid in a crushed stone layer on top of the peat. The pipes were then covered with an additional 0.20 to 0.25 m layer of peat. The STE and filter leachate were analysed for BOD, TKN, NH⁴-N, NO³-N, SS, pH and fecal coliform. The results from these three waste water treatment systems showed high efficiency, in the range of 84% to 99.99% for reduction of STE contaminants.

“ In the early 1970's Farnham and Brown (1972) successfully treated secondary effluent through spray irrigation on constructed peat-sand filter beds. *** under

maintained anaerobic conditions, fecal coliform was reduced by 95% and phosphorous concentrations were reduced from 7 to approximately 0.5 mg /L. “

These encouraging results led to a further test conducted at the US Department of Agriculture Forest Service campground in Minnesota. “They reported that the peat-sand filter bed accomplished almost complete removal of fecal coliform bacteria and phosphorous. About 90% of the waste water nitrogen was removed during the second and third years of operation, but declined to about 50% by the fifth year because of oxidation of the peat and release of nitrogen from the peat itself. “

With regard to metal removal, “The U.S. Bureau of Mines (Jeffers et al., 1991) developed small beads made of sphagnum peat moss and polysulphone for absorbing metal ions in low concentrations. They report that the beads effectively removed arsenic, cadmium, copper, lead, manganese and zinc from waste water. Metal concentrations in waste water were generally reduced to <0.1 mg /L, and treated effluent frequently met national drinking water standards.” More than 100 different water samples have been tested, including acid mine drainage from mines and waste water from mineral processing operations, chemical plants and municipal water treatment facilities.

“Kadlec and Keoleian (1986) also reported on the strong affinity of peat to absorb metal ions. Humic acids were considered to be the primary metal complexing components in peat, especially in the well humidified sedge peats. *** An important finding was that metals have different selectivity for different peat types, and the design of peat-based metal removal systems must take this into account. Peat treated with sulphuric acid improves its ability to absorb copper.”

Peat biofilters using peat moss have been highly successful in absorbing odourous gases. “Beerli (1989, 1991) reported two cases in Quebec, Canada, “ *** one, removing malodourous nitrogen compounds released during treatment of hog manure by biological aerobic reactors on a hog farm; the other, at a waste water treatment plant at Magog from sludges in the filter press room where amines, ammonia, daimines, hydrogen sulphide, mercaptan, organic sulphides and skatole were emanating. The use of biofilters in Europe were reported by Coffey and Kavanaugh (1989) and Boehler (1991). Malodourous waste gases were being successfully treated at sewage treatment plants, vegetable and animal waste treatment plants. More than 100 industrial-scale peat biofilters were reported in operation in Europe in 1989. “

The authors conclude that “There appears to be a high potential for using peat to treat waste water effluents from industrial and domestic sources. “ (Malterer, McCarthy & Adams, 1996)

A-2.3.3 Future Treatment of Mine Waters

It is thought that a proper understanding of the movement of water through mine voids, fractured material and collapsed rock material would help in devising an *in-situ* remedial treatment for contaminated mine drainage.

One such treatment method for the control of acid mine water quality uses bactericides. As reported at the International Mine Water Association's 1994 congress in Nottingham, U.K., "The *Thiobacillus ferro-oxidans* bacteria catalyse the oxidation of pyrite to acid which solubilises metals to contaminate mine water. Bactericides can effectively inhibit bacterial activity, curtailing acid production by up to 95% thereby reducing dissolution of metals in mine water, and reducing toxicity and treatment costs." (The Mining Journal, 1994 d).

A-2.3.4 Daily Cover Material

Most landfills in the U.S. use a daily cover at the working face of at least six inches in thickness as required by Subtitle D under RCRA regulation. Although daily cover serves several essential purposes, it also uses up valuable landfill space. As an example, the total volume of daily cover material placed in a California landfill is reported to be 20% of the whole. Landfill void space can be better utilised for MSW rather than clean dirt. However, some other daily covers have been approved by regulatory agencies and are being used, e.g., a bituminous emulsion that can be sprayed on after compacting the daily fill material ; or 4 mil thick Canvex plastic tarpoleans, over areas 100 feet x 75 feet which are removed on the next day's work. The use of thinner daily covers as mentioned, result in a 50% reduction of spoil material as daily cover and a substantial decrease in the loss of fill space. The rate of decomposition of the refuse should be increased without the obstructive daily cover lenses within the fill to slow down the percolation and circulation rates of moisture.

A-2.3.5 Landfill Covers

The purpose of a cover is to give the completed landfill a rain-proofed, attractive, well-contoured, natural-appearing dressing before returning it to beneficial surface use. To keep the land in that condition, the fill must be maintained in a stabilised condition, that is, future slumping of the surface must be prevented and avoided. As noted, above, final stabilization of the fill might be hastened by actually encouraging infiltration and possibly adding nutrients such as domestic sewage to the infiltrating water. Once stabilisation of the fill has been realised, further decomposition by infiltrated water is to be avoided. The cover serves to minimise uncontrolled infiltration of rainwater into the landfill which will affect the decomposition, leaching, and settlement of the landfill.

Well-constructed landfill covers are placed in a series of layers. The lowest, or first layer, called the grading layer, gives the landfill a working surface to apply the subsequent layers over it. The grading layer is usually between 1 and 2 feet (.3 and .6 m.) thick of a well-compacted coarser-grained material, such as sand, of relatively low permeability should be used. For better sealing, a synthetic membrane may be placed below the grading layer.

Next, the barrier layer is placed on top of the grading layer. The barrier layer is, as its name indicates, a barrier to prevent water penetration into the fill. If a relatively

impermeable clay is used, the thickness should be about 2-feet (.6m) thick. If a clay of higher impermeability is used, as bentonite, the barrier layer may be lesser in thickness, but not less than 1-foot (.3m). A thicker layer performs better in the event of differential settling of the waste. Again, a synthetic membrane may be placed on top of the grading layer in lieu of the clay. However, usual practice is to use an impermeable clay to form the barrier layer.

The protective layer which overlays the barrier layer serves two main purposes, viz, to protect the barrier layer from freeze-thaw and desiccation cracking, and, to provide a medium of sufficient thickness for root growth. The protective cover should be from 2 to 3.5 feet (.6 to 1.06 m) in thickness, depending on the geographic location and subjection to depth of freezing. Penetration by roots growth is to be avoided to prevent roots from making moisture entries into and through the barrier layer.

Lastly, the final cover is applied of an organic soil for facilitation of grass seed germination and growth. Necessary lime and fertilizers should be applied for several years to encourage a healthy, quick cover for prevention of soil erosion thereby giving stability to the cover layer and preventing moisture penetration.

A-2.3.6 Landfill Gas and Collection as an Energy Source

A related, secondary and important problem is the gas generated from landfills, mainly in the form of methane and carbon dioxide. The methane component is unstable and creates a hazard when escaping from landfill sites. 5 to 15% methane forms an explosive mixture with air. Left uncollected, landfill procedure to dispose of the gas is by venting and burning of it at the vent (called flaring). However, it was in 1986 by W.L. Hall at a conference in Solihull, England, that "a new industry has grown up in the U.K., the U.S. and Europe. *** to control, collect and possibly utilise the energy from landfill gas." (Tomes, 1989).

The larger volume MSW landfills, i.e., 30 feet (9.14 m) or deeper, and large in area, e.g., 30-acres (12.14 ha), are better producers of methane. The production ratio of methane to carbon dioxide varies for MSW, but is generally in the ratio of 3:2, depending always on the amount of organic material contained. Nitrogen, hydrogen and oxygen make up the minor contents of landfill gas. Hydrogen is usually present in larger amounts during the early stages of decomposition. Carbon dioxide increases the hardness and acidity of water; acidity increases the solution and leaching of non-organic soluble constituents in the refuse. This increase in acidity somewhat inhibits the generation of methane. An alkaline pH is more conducive to methane generation. The lives of methane producing landfills varies greatly with content and size, but can be expected to be in the 10 to 20 years range when of sufficient size. The production of methane can be encouraged and accelerated as discussed earlier, viz., by accelerating the waste bio-degradation through leachate re-circulation, heating of re-circulated leachate, or circulating water through landfills to boost methane gas production.

Landfill gas (LG), or methane, has potential as an alternative energy source. Recovering LG is an advancing technology. It offers economic advantages as a cheap source of energy to local governments and industries located in the area of a landfill operation. LG collection offers the added benefit of reducing potential environmental hazards from escaping gas.

Examples of profitable collection in connection with combined quarrying-landfill operations are offered in evidence at Appendix A-2 §§ 8.1-8.7, *infra*. See also U.K. examples of LG collecting for energy at Judkins and Allerton Park Landfills, et al, and at Fred Weber Inc., St. Louis, Missouri. Another LG-collecting site, though not a quarrying-landfill operation, demonstrates the economic potential in LG-collecting. A recovery facility operated near Fort Lauderdale, Florida, cost US\$6 million to build in 1986. It is located next to a 100-acre (40.47 ha) landfill which produces 3.5 million c.f. (99,109.5 m³) of high quality methane gas per day, the equivalent of 250,000 barrels of oil. The gas is sold to Florida Natural Gas company for residential and commercial use. (Sceney, 1988, p.11)

It should be noted that in the U.K., LG successfully collected at Judkins Quarry-Landfill (see Appendix A-2 §.8.2, *infra*) and at Allerton Park (see Appendix.A-2 § 8.3, *infra*), requires planning permission for installation of a gas turbine engine for the generation of electricity whether the electricity is used on or off site. If gas collection and energy generation is pre-planned, planning permission is required before the landfilling operation begins.

A-2.4 Miscellaneous advantages of using mineral quarries and pits

A favourable and arguable feature of utilising quarries and mining pits for landfilling is the available supply of cover material ordinarily found on the mining land. The overburden/dirt from the stripping process removed to get to the rock and minerals sought is stored in piles on the property. The available supplies of stored overburden will usually range from a stripped depth of anywhere between zero and thirty feet (0 and 9.14 m), or more, for non-metallic mines. For strip-coal mines, the depths of removed overburden may be considerably greater, even surpassing over one hundred feet (30.48 m) in depth. Consequently, piles of stripped overburden may run into millions of cubic metres that are available for landfill daily cover material. Having this material already present can mean a tremendous savings and advantage over an unprepared site.

A current problem, which may be curtailed by new regulation, is that top soil, when present, may have been stockpiled separately and sold. Ordinarily, the sub-burden, that material immediately below the top soil, is retained in site stockpiles, or used in bunds or berms. Consequently, none of the best vegetative coverage material from the original

pit surface may be available at the time of closing the landfill. Reclamation regulations could prohibit sale of top soil from newly permitted surface mining projects.

By replacing the formerly stripped dirt, sub-burden and saprolitic rock in the landfill, it becomes unnecessary to import daily cover material from borrowed sites. The result is greater land conservation. The elimination of environmental disturbance of other properties for 'borrowed' cover material, then, becomes an additional benefit, as well as an economic benefit to the operation. This additional, economic benefit, in turn, makes the operation of a mineral excavation for a landfill a less expensive operation and lowers the cost to the general public for waste disposal.

Another point in favour of the available supply of overburden of former quarries and pits is the advantage of having adequate cover material which reduces the problem of windblown litter. When in plentiful supply from quarry properties, its generous application can reduce portable/mobile and permanent fencing use and costs. Windblown litter can be a real environmental problem at landfills. It is a very visible criterion often used by the public in rating the operation of the landfill.

Still another possible advantage in utilising mined pits and quarries is the lack of concern for creepage of the earth's mantle which does not affect its stable rock walls. "Creepage" is the slow and minute movement of the mantle that takes place annually where there is any topographic slope. In surface mounded landfills placed on any topographic slope or inclination, the surface is subject to the minute movement of mantle 'creep' which could, over a period of years, place a rupturing strain on polyethylene liners causing a tear for leakage of leachate. Thus, the stable rock walls of quarries, not being subject to creep, would not have the potential for rupturing liners placed within the pit.

Several more obvious advantages for using surface mines are those concerning traffic, noise, visibility and aesthetics for the proposed landfill site. Public objections raised to new landfill sites are generally for those issues. When using an established surface mine for a landfill, those four problematic concerns have already been resolved during the mine's former presence. There will be no increased, heavy traffic for landfilling as traffic volume and patterns already exist for mining and local residents have become accustomed to it.

Noise levels at a landfill are generally not as great as for mining. Noise screening has already been placed for the prior mining in the form of bunds /berms and tree growth. There should actually be a decrease in the level of noise from a landfill.

Visibility of a below-surface landfill will be less than for a landfill placed on the surface. Also, odours and the chances for wind blown litter are reduced in a below-surface mine. Again, the noise screening placed for the prior mining is an accomplished feature that need not be constructed.

Landscaping and beautification of surface mine property entrances along public highways has been the order of the mining industry for over a decade. The aesthetics of

the visible exterior of the landfill property have already been installed by the prior mining operation.

Anticipated concerns by the public over water contamination by an incoming landfill should be considerably diminished as the prior mining operation would have encountered them and been obliged to remediate the problem.

These numerous existing advantages of an already publicly accepted surface mine site can assuage the normal objections of local citizens to a new landfill site.

(i) Elements of Modern Landfill Management (Tomes, 1989, p.4)

- 1) Site preparation
- 2) Site Operations
- 3) Environmental Monitoring
- 4) Restoration and aftercare

The technology employed during the first three stages of landfill management, indicated above, are equally important to making the final stage successful. However, other than the prevention of leakage of contaminating leachate into the groundwaters, and the control of landfill gas emissions which this work is concerned with, it is the final stage, the successful return of worked out mined land and poor quality land to a more productive after-use that is the goal of this work. The details for those first three stages are not the purpose of this work, but are left to the landfill technologists. As pointed out by Tomes, "Adequate supplies of impermeable capping and restoration material are essential, but it is their application that is critical. Capping material will only restrict ingress of water and egress of gas, which is its purpose, if it is of the correct moisture content and is compacted in layers. The application of soils, conversely, must ensure compaction does not take place which would hinder agricultural development." (Tomes, op. cit.).

Thus, here again, one of the advantages of using a mining pit for landfilling is the generally "adequate" supply, if not abundant supply of restoration material found in the spoil piles of stripped overburden stored on the quarrying property. The stripped material from mining is being returned to its original place.

In keeping with the hypothesis herein, where ever lithologically, structurally and hydrologically possible, all open pits should employ landfilling with solid wastes as part of the complete land restoration process restoring the surface to its original elevation after the void of a mineral body has been removed. The contention herein is that virtually any surface mine can be made environmentally-safe for deposition of solid wastes by installation of properly-designed lining and leachate control systems. The only exception to landfilling a worked-out surface mine should be for the consideration of creating a small lake in the former pit for the purpose of land aesthetics, wildlife habitats and watering, or recreational uses.

(ii) Remoteness from Landfills is diminishing problem

It is recognised that some argument may be made that parks, forests, wildlife areas, etc., are usually established in remote areas, and that any open pit mines within those environmentally sensitive remote areas would be too remote from urban areas to use for landfilling operations during the reclamation process.

Toward refutation of an argument of remoteness of landfill sites from the waste generating point or the collection point of accumulated wastes, long distance transportation is becoming an ever increasing mode to waste disposal sites. Trucking of wastes to disposal sites hundreds, and even thousands of miles, away from the generating, or collection source point, has become a present reality. Currently, railroads in the U.S. are promoting, with persuasive environmental arguments, their use for haulage of waste over long distances as opposed to truck haulage. An example in the U.S. is a public-private venture between Norfolk Southern Railway Company (NS) and Virginia's Roanoke Valley Resource Authority which features the "nation's first use of rail as the sole transportation link between a solid waste transfer station and a landfill." NS is publicising the fact that their "Waste Line Express" consisting of a 12-railcar train "can keep 96 garbage trucks off public highways leading to landfills." Added environmental benefits are stated in a comparison with truck haulage, "on a ton-mile basis, railroads emit one-tenth the hydrocarbons and diesel particulates, and one-third the oxides of nitrogen and carbon; per gallon of fuel, a train can move a ton of freight more than three times as far as a truck."

In the U.K. British Rail has developed a rail service by which regular shipments of waste are transported by the trainload at regular time intervals to distant sites for disposal.

New waste developments, as in this example, indicates rapid changes forthcoming in the waste disposal industry.

A-2.5 United Kingdom

It was reported in 1972 "that England and Wales produced over 14,000,000 tonnes of domestic and trade waste. At 220 lbs./cubic yard (99.79 kg/.76 m³) in the collection state, it would occupy 28,000,000 cu.yds. (21,407,400 m³) of space in its compressed tip state." (Skitt, 1972, p.1). With the predicted population increase in the U.K. of 13,000,000 by the year 2,000, John Skitt noted, " Together with enormous quantities of industrial wastes of almost infinite variety, the handling and disposal of these rapidly increasing solid wastes constitute a problem of almost terrifying proportions for the societies of today and tomorrow." Skitt's further comment gives support to the thesis herein : "Excavations of minerals are said to exceed the rate of reclamation and the total of derelict lands is in excess of 90,000 acres (36,422.5 ha). The annual rate of extraction

(*from mining*) is five times the space required for house refuse. *** The relationship of this problem with refuse disposal might be solved mutually." (Skitt, 1972, p.7). (It should be noted that Skitt's figure of mined land includes that of coal mining.)

In 1989, the volume of household (MSW), commercial and industrial waste for Britain was reported to be around 100 million tonnes. The 12th Report of the Royal Commission on Environmental Pollution, by Paul A. Tomes, stated the volume deposited in landfills for 1988 to be over 90 million tonnes, and that landfills were the "Best Practicable Environmental Option" for disposal of that waste. Tomes' 1989 report to the Institute of Quarrying stated that the mineral industry was creating "voids at a rate in excess of 200 million cubic metres per annum . (Again, mined coal tonnage is included, and voids by overburden removal is not included.) The restoration of quarries and pits involves considerable expenditure and landfill is arguably the most cost effective method of fulfilling that requirement subject to planning and technical suitability." (Tomes, 1989, p.1).

In 1993, mineral extraction for "sand, gravel, hardstone and limestone" in Britain was reported to be 222 million tonnes, which equated to 120 million cubic metres of void space (1.85 tonnes/m³). It should be noted that the volume of pit overburden removed for the mineral extraction is not included in the calculation of space voids, consequently, that volume figure would be somewhat larger. (Tomes, personal communication, 1994).

Based on 1994 figures, Tomes further reports that "Britain's annual production of MSW (household waste) of 20 million tonnes requires 20 million cubic meters of space per annum of void space. This means that void space created by mineral extraction in total exceeds household (MSW) production by a factor of 10. It should be noted that in Britain we produce 100 million tonnes of household (MSW), industrial and commercial waste per annum, the majority of which, is suitable for landfill, so we require an annual void space of approximately 100 million cubic metres. On the basis that at least 50 million cubic metres is unavailable for landfill *** Britain can be just about self sufficient in landfill void made available from mineral extraction." (Tomes, personal communication, 1994).

The use of abandoned quarries and pits in Great Britain has been made for depositing materials as coal mining wastes, noxious sewage sludge, flue-gas desulphurisation wastes, and pelletised incinerator residue for back fill.

A-2.6 United States

According to the USEPA (1994 report), the U.S. lead the world in waste production, generating some 200 million tons (181,400,00 metric tones) per year, and 3.6 lbs. (1.63 kg)/day/ capita. Landfilling has been the major method of waste disposal for

MSW. In 1986, approximately 83% of MSW was being deposited in landfills. By 1990, it had been reduced to 73%. Between 1986 and 1990, incineration had doubled, from 7% to 14% of MSW, whilst recycling had increased from 10% to 13% during the same four-year period. (Liptak, 1991, p.24).

In 1986, EPA's goal had been to reduce landfilling to 55%, increase incineration to 20% and recycling to 25% by 1992. However, by 1994, incineration had only increased by 2% from 1990, to a total of 16% of MSW.

Two-thirds of that waste is placed in landfills. EPA's prediction is that much of the heavily populated East Coast will run out of approved landfill space in the current decade. EPA further estimates that 80% of the nation's landfills will close by the year 2000.

A-2.7 Canada

There has been virtually no adverse litigation to the siting of landfills. A personal communication with the New Brunswick Department of Environment emphatically states, "Mined out open pits do not meet the stringent siting guidelines for sanitary landfills in the Province and would not be acceptable under the regulations." (Silliphant, 1994).

A-2.7.1 A Canadian Solution for Safer Treatment of Uranium Tailings:

A safer procedure for the handling of uranium tailings has been found which would avoid serious contamination in the event of tanker spills during transportation.

An Ontario mining company refining uranium concentrates into uranium trioxide produces a by-product raffinate containing uranium, sulphuric acid and waste minerals. Formerly, the liquid raffinate was shipped by tankers to other uranium refining plants for extraction of the residue uranium whilst the remaining effluent was disposed of in managed tailings areas.

A new recycling plant has been built at Blind River, Ontario, which converts the raffinate liquid to a non-corrosive powder that is reportedly "virtually insoluble in water and easy to handle." The powder, which still contains small amounts of uranium, is stored in drums prior to shipment for further refining of the residual uranium. The raffinate has been made safer during public transportation and in the event of tanker spills while en route. (The Mining Journal, 1995 c).

A-2.8 Present-day Examples of Safe Waste Depositing in Surface Mining Pits

The use of worked-out surface mines as depositories for solid waste is not unknown in the past, or in the present day. In older time, any topographic depressions might be used for filling with trash, garbage, solid or liquid wastes without regard to

contaminating ground or surface waters. In more recent times, prior to rigid environmental regulations, it appears from the scant information available that where some concerns were applied, as prohibition of burning and requiring application of daily dirt cover, few other precautions, as clay liners, leakage prevention and monitoring was done at the time of filling.

However, in more recent years, successful examples, applying environmental precautions and safeguards against contamination of ground and surface waters may be found at different locations throughout the three countries in this study. Currently operated examples from each of the three Anglo-nations of the study are submitted in evidence that the use of non-fuel surface pits may be used for MSW landfills without fear of contaminating local ground and surface waters, and minimising harm to the local environment during the operation. Upon closure of the joint operations, the disturbed area has not only served society by providing essential minerals, then providing a depository for society's wastes, but has been finally restored to its former condition, and in some cases, restoration of the land has been an improvement over the original condition.

A-2.8.1 United Kingdom

Two examples are reported in detail, following, viz., (i) the Judkins Quarry and Landfill at Tuttlehill, Nuneaton, Warwickshire; and (ii) the prime example for consideration herein, the Allerton Park Quarry, a sand and gravel operation near Knaresborough, because it was planned as one project, i.e., both mining and landfilling for land reclamation. Additionally, infra, a listing of eleven other mineral extraction sites is given that have been infilled with wastes for quarry reclamation and complete restoration of the mined land to the original surface and to provide beneficial use in conserving land. Both examples of landfilling given are operated by Greenways Landfill, a division of ARC Ltd, which operates the landfills in conjunction with the ARC-operated aggregate pits. Greenways has the responsibility for the landfilling operations. In 1991-1992 Greenways Landfill disposed of more than 3.5 million tonnes of waste at its quarry-landfill sites. See Figure 11, page 349, for an idealised drawing of Greenways combined quarrying and landfilling operations.

It is interesting to note that Greenways has developed an "Environmental Initiative", a self-designed proclamation of dedication to quality in the management of waste disposal. In brief, Greenways states, "The Environmental Initiative is a concept of total quality of service, while ensuring the impact of our operations on the environment is kept to a minimum." Such environmentally-protective dedication bears out the argument made in the defence of the "new breed", or new generation of operators in the solid waste and surface mining industries in the Introduction, Chapter 1, §1, " *** the Solid Waste Disposal Industry respond(s) to Defendants' Answer by way of Amendment to its Complaint saying that they are a **new generation**, being neither culpable, nor responsible for the acts of their antecedents and forebearers. Both, new-generation industries are

responsible, conscientious, law abiding citizens conforming to environmental regulatory controls. They are very aware and concerned with preservation and conservation of the earth's environment, and that their acts in performing its essential earth-disturbing job are carried out with care and concern for the protection of the public good and environment. “

A-2.8.2 Judkins Quarry and Greenways Landfill

This quarry operation mines the pre-Cambrian Hartshill quartzite for crushing into aggregate for an assortment of construction material uses, e.g., road building, railway ballast, coated stone (asphalt/bitumen mix), ready-mix concrete and other concrete products. Its rate of production (1989) is approximately 450,000 tonnes per year. In 1989, it had a remaining life expectancy of eight to twelve more years.(See Figure 12, page 350.)

The quarrying operation was begun in 1845 and ownership was transferred to ARC Ltd. in 1973. The quarry is approximately 1.6 km (1-mile) long , 70 m. (270 feet) deep, and covers 79 ha (195 acres). Large areas of the tract are occupied by the pit, crushing, washing and screening plants, concrete products manufacture, product stockpiles, silt disposal lagoons, active and disused quarry waste tips (including the prominent “Mount Jud”) and the landfill site operated in conjunction with the Warwickshire County Council.

After primary and secondary crushing, the stone is screened, washed and graded according to size and use. Washing, whilst cleaning the stone, removes fine, silt-size material which is suspended in the wash water. The waste wash water is conveyed to settlement lagoons for the fines to settle. The fine, settled sediment is periodically removed, stacked on the surface and dried for use as a refuse covering material in the landfill operation. The clarified lagoon water is subsequently discharged into the adjacent canal.

In 1978, Greenways, working with the Warwickshire County Council came to an agreement that the Judkins Quarry would become a site for disposal of household and commercial waste. “In January 1981, the Judkins Quarry Working Party was established Nuneaton and Bedworth Borough Council.” A frame of reference terms was formulated for the project. A Draft Brief was published in 1983 and submitted to the general public for their views and comments. The Brief was adopted in 1986 and served as guidance for the Judkins landfill development. By 1989, finding that the several planning permissions they held, with the oldest being over 30 years old, would no longer be adequate to regulate the activities and give comprehensive guidance on the eventual restoration and after-uses, ARC-Greenways, in conjunction with the Warwickshire County Council and the Nuneaton and Bedworth Borough Council, prepared a detailed planning brief. Its purpose was to and comprised representatives from ARC Ltd., Warwickshire County Council and provide a planning guidance for continued mineral extraction, landfill, but mainly for



Illustration removed for copyright restrictions

Figure 11 - Idealised Typical Quarrying and Landfilling Operation, ARC- Greenways, U.K.

Photo Credit - ARC-Greenways, U.K.

Figure 12 - View of Judkins Quarry, U.K



Illustration removed for copyright restrictions

Photo Credit - ARC-Greenways, U.K.

Figure 13 - View of Judkins Quarry - Landfill

development and restoration of the Judkins site and its after-use. The final restoration concept was to develop a "Country Park" style of facility while preserving Mount Jud as a local landmark. (Mount Jud is not a natural-occurring feature. It is a man-made, conical spoil pile towering a few hundred feet above the surrounding land, which the community wants preserved.)

LG Collection as an Energy Source: A collection system of stone lined ducts was installed to vent the gases in a controlled manner. Early accumulations of LG were flared until sufficient volume had built for a usable energy source. Encouraged by the 1983 Energy Act, which stimulated private investment in electricity generating, Greenways found sufficient quantity and quality of LG flowing from the landfill to power generators supplying 540 kilowatts of energy to the national grid. As the landfill progressed, gas production increased and power generation has increased to 1.5 megawatts.

Because of the large size and depth of the quarry opening, the estimated life of the landfill is forty years in serving the local area only. (See Figure 13, page 351.) Dried silt or clay from the quarrying operation and dredging from the settlement lagoons provide lining and cover material for the landfill. Groundwater monitoring has accompanied all steps through the project.

Upon closure of quarrying and partial surface plant area reclamation, land use proposals will commence whilst landfilling will continue. Considered after-uses include an industrial-office complex, small industries sites, recreational areas including a 9-hole golf course, public park and outing facilities, boating on the adjoining canal, footpaths. Collection of LG will continue whilst the landfilling continues, and for some years afterward. Greenways will continue to monitor the site for leakage from the landfill for years after its closure. After the landfill closure, a large area will become available for more and new surface uses. (ARC Ltd., 1989).

A-2.8.3 Allerton Park Sand & Gravel Pit, near Knaresborough, North Yorkshire

This surface mine is of particular interest to this study because it was planned from almost its beginning as one operation, i.e., both mining and landfilling. This is the essence of the thesis, that new surface mines should incorporate into the planning and applied permission the process for landfilling with MSW as part of the reclamation of the mined land.

Allerton Park is seven miles North of Wetherby and 4 miles East of Knaresborough and adjoins the A1 carriageway. In 1987, ARC applied for permission on a 63 ha tract (155.67-acres) for extraction of sand and gravel, proposing to mine "about 4 million tonnes over a 15 to 20 year period, and to progressively restore the site to agricultural use by controlled landfill using domestic and non-toxic commercial and industrial wastes." Permission was first granted in 1988 for extraction by the North Yorkshire Council. In 1991, the site licence was issued and landfill operations began

alongside continued mining. 41 ha (101.3-acres) of the site was designated for mining and landfill.

Project Statement: In its application statement, ARC pointed out the environmental acceptability of the location. It should be noted that the statements are those of the modern, environmentally-concerned and environmentally-responsible type of operators in the mining and waste disposal industries as put forth in the Opening Statement of the Introduction, Chapter I §1, i.e., “ *** a new generation and ‘breed’ of operators with environmental awareness, *** “.

Noting that “ Minerals can only be worked where they occur naturally. “, ARC stated that “ Much can be achieved at a modern mineral operation to minimise the potential nuisance at the site itself. Site screening; landscaping; tree planting; noise and dust suppression are accepted by responsible mineral operators as essential requirements for any mineral site.”

With regard to the potential, omni-present concern over added local traffic from the proposed project, ARC proposed building its own roadway on its property for direct access to a junction on the A-1 carriageway, adding, “ The location of the proposed Allerton Park development has a great advantage because it will enjoy direct access to the A-1 carriageway, thus allowing the market area to be supplied using primary routes and avoid the local problems so often associated with quarry traffic.”

Geology: With regard to site geology and protection of the ground water, a pre-proposal investigation revealed the Quaternary gravel and sand deposit was underlain by the Triassic Sherwood sandstone. “All boreholes penetrated some boulder clay, often to a depth of at least 20m., so proving this area as the precise location of a large glacier which deposited its detrital load on shrinking northwards. Many of the boreholes also penetrated sand and gravel which has a wide thickness variation from 0.3 m. up to 15.4 m. This layer is the product of late-stage torrential outwash from perhaps a dam near to the glacier which first eroded through the boulder clay before depositing its relatively well-sorted load of sand and gravel. At its lowest point, proved so far, the base of this in-filled valley is at a depth of 26.7 m., corresponding to a level of about 30 m. above the Ordinance Datum.

“ The boreholes also show that this sand and gravel layer was subsequently buried under a relatively large thickness of overburden, varying between 3.2 m. and 5.8 m., consisting in some places of the entire overburden sequence above (herein omitted) but in other, mostly thinner, locations, only top soil and boulder clay. “

Groundwater Protection: The Sherwood sandstone, below the sand and gravel deposit, “forms part of an aquifer and must be protected from pollution by leachate generated within the landfill. Preliminary meetings with the Yorkshire Water Authority were held to establish the protection measures which will be required.



Aston University

Illustration removed for copyright restrictions

Photo Credit - ARC-Greenways, U.K.

Figure 14 - View of ARC-Greenways Allerton Park Sand and Gravel Pit-Landfill, North Yorkshire, U.K.

“ The boulder clay covering the mineral will be suitable for lining the base and walls of the cells and for capping upon completion. The base of each cell will be protected by 3 m. of compacted boulder clay in the areas where it is not already present. The side walls of the cells will be similarly protected where they come into direct contact with the mineral. Where extraction takes place below the water table, the level will be raised by compacted boulder clay to 1m. above the water table before infilling commences. Exploration and monitoring work will be carried out to establish the true level of the water table and obtain information on ground water flow through the gravel.”

Landfill Method of Operation: “ The landfill will take place in clay lined cells and progress from north to south. The cells will be sized so that waste can be brought to final levels and capped with clay before the field capacity of the waste is reached.

“ The total volume of overburden on the site is in excess of 2 million m³ which will provide sufficient material for the cell construction and capping. As the extraction progresses South, the mineral base falls so that the removal will take place below the water table. Before infilling commences in these areas, the void will be filled with compacted clay (1 x 10⁻⁹ m/sec) overburden to 1m. above the water table. “ Additionally, Greenways agreed to incorporate HDPE liners into future cells.

Urgent Landfill Relief for Local Area: In 1988, North Yorkshire County 's MSW disposal at Rock Cottage Quarry at Ripon was filled and the Council was forced to find short term replacement sites for its solid waste. The coming onstream of Allerton Park's landfill in 1991 was timely to provide long term facilities for the Harrogate / North Yorkshire area. The quantity of waste from the Harrogate area was reported to be 110,000 tonnes per year, which required 140,000 m³ of void space. Allerton Park anticipated a total void of 4 million m³ which would amply provide for that amount of annual waste input.

LG Energy Generation : An electricity generation scheme fueled by LG is planned as part of the Government's Non-Fossil Fuel Obligation (NFFO). It was anticipated that 0.5 megawatts of electricity would be supplied to the National Grid.

Land Restoration : Progressive restoration has been taking place during operations. As top soil is taken up by stripping for new mining areas, it is attempted to replace it in newly completed areas without storing. Where this is not possible, top soil is store in mounds and the surface grass seeded until it can be surface-replaced. When landfilling is completed, the area will be restored to forestry and agricultural use.

“Following final placement of the top soil within each parcel of land, an Aftercare Programme is drawn up and submitted to the local Planning Authority for their approval. The results of such plans are reviewed every 5 years and supplemented where necessary.” (Quotations are taken from ARC's Allerton Park written statement in conjunction with their planning application, Estates Department, 1987.) (See Figure 14, page 354 for view of pit and landfilling operation.)

A-2.8.4 Miscellaneous U.K. Combined Open Pit - Landfill Operations

A brief description of eleven other combined surface mine-landfill sites operated by ARC-Greenways are given below in tabulated form.

Site name	County / Shire	mineral mined	date mining started	date landfill started	gas collected	area ha.	land use restoration
<i>* indicates additional information below</i>							
Stangate*	Kent	limestone/sandstone (ragstone)	1945 to 1975	1981	yes	33	agricultural
Offham	Kent	ragstone	1947	1981	yes	?	agricultural
Ongar	Essex	brick/clay	1895/1981	1985	yes	28..5	agricultural
Sutton Courtenay*	Oxford	sand / gravel	1930's	1977	no	360	agricultural industrial amenity
Dix Pit *	Oxford	gravel	?	1985	no	32	pasture
Edwin Richards	West Midlands	dolerite	1850's	1991	yes	?	recreational
Burntstump	Nottingham	sandstone	?	1960's	yes	?	agricultural
Kaimes*	Kirknewton Scotland	whinstone (basalt)	18th	1987	no	?	agricultural
Aldeby	Norfolk-Suffolk	gravel / sandy marl	1953	1989	no	?	agricultural
Bradgate	Leicester	diorite	1900	1980's	no	?	grassland
Llanddulas*	Clwyd Wales	limestone	late 1800's	1985-86	yes	?	agricultural woodland

* Stangate Landfill - serves some of the London boroughs, is licenced to accept domestic, industrial and commercial waste. The site uses the dilute and disperse principle and uses compacted ragstone-spoils over the base, which acts as an attenuation blanket. A combination of ragstone/hassock and HDPE lining is used for sidewall sealing. A tyre-shredding plant operates at Stangate to allow safe disposal of commercial vehicle tyres.

*Sutton Courtenay Landfill - This landfill has a rail-siding and receives waste on to the site, thus reducing road traffic in the local area.

*Dix Pit Landfill - Landfilling is designed and operated on the principle of total containment using in-situ clay as an impermeable lining.

The site is of archaeological and scientific importance. It contained the Devil's Quoits, an ancient monument constructed by Neolithic man some 4,000 years ago. The monument was a stone henge in a great ditched enclosure in a circle of about 36 blocks of stone, each 6 to 7-feet tall and several tonnes in weight. Care was exercised in mining about the prehistorical monument. In the 1970's, mining revealed a clearer picture of the original form of the Quoits. During restoration of the site, Greenways worked with Oxford

Archaeological Unit to restore the Quoits as a place of national historical importance over a 3-year project.

Also, on the same site, Greenways, working with Earthwatch, has unearthed more than 200 bones and teeth of large pre-historic animals, as woolly mammoths, horse, bison and hyena. At least 25 mammoth tusks have been found, the largest almost 3 metres long and 300 lbs.

* Kaimes Landfill - This site serves the city of Edinburgh and nearby communities. It is the only landfill site in Scotland that receives waste by rail ; 120,000 tonnes of waste are received each year by rail in sealed containers.

* Aldeby Landfill - This site is partially engineered with HDPE liners as wall seals.

* Bradgate Landfill - Prior to depositing MSW, the walls and base of the quarry were lined with clay (Mercia mudstone) won from the quarry rim, overlaying the diorite.

* Llanddulas Landfill - Operated on a containment principle; base and side (wall) seals were formed with a comprehensive composite lining system consisting of clay and high density polyethylene (HDPE).

In addition to the above eleven quarry-landfill sites, Greenways operates 14 other quarry-landfill sites inclusive of Judkins and Allerton Park. These are scattered about the midlands and the Southeast, and one site each in Wales and Scotland. The twenty-five landfill sites and 8 household recycling centres handle about 2.7 million tonnes of waste per year. Landfill gas at six sites are reported to generate 9.6 megawatts of electricity. (Harding, 1996)

A-2.8.5 U.S. Example of Combined Quarrying and Landfilling

The Fred Weber Inc. Quarry and Landfill, Maryland Heights, (St. Louis Co.), Missouri

The following information on the Fred Weber Inc. operation was furnished by Mr. Marc Ramsey, Manager of Weber's stone plant and landfill.

The Fred Weber quarry began its aggregate mining operations in its present limestone pit in 1928. It currently produces 2,000,000 + tons (1,814,000 metric tons) / a. of crushed stone in various sizes. The landfill business was started in 1974. Three expansion permits have been granted since. The sanitary landfill area covers 54 acres (21.85 ha). (See Figure 15, page 358, for a panoramic view of the Fred Weber quarry-landfill operation.)

With regard to zoning and public hearings for the combined operation, Mr. Ramsey feels that because of being a local industry of long standing and maintaining good community relations over the years, permitting with local approval has not been a problem. Due to their excellent past record, he states, "Our standing in the community and our operating record have been the key reasons for our succession of permit approvals. We anticipate this to be the case in the future for our additional requests."

The geological and technical features for the Weber landfill-quarry pit are as follows:

The quarried stone is the highly calcareous St. Louis and Salem limestone. Hydrogeological tests show that the limestone walls of the quarry have a low permeability.



Illustration removed for copyright restrictions

Photo credit - Aston, USA

Figure 15 - View of Fred Weber Inc. Quarry and Landfill , St. Louis, Missouri, USA

No other protective coatings on the quarry walls are necessary. The limestone formation is underlain by a 40-foot (12.19 m) thick bed of very low permeable Warsaw shale which forms the floor of the quarry landfill. Floor depths in the quarry are as much as 200-feet (60.96 m) below the surface elevations. The bottom of the landfill is about 120-feet (36.58 m) below the normal water table.

The hydrologic key design of the landfill is based on an inward gradient ground water migration / flow. Any flow on water will be inward, i.e., there is no chance for leakage from the landfill.

Landfilling Materials: Accepted fill materials are MSW, construction and demolition wastes; mattresses and shredded rubber tire material is accepted; incinerated residue is not accepted. The landfill accepts between 800,000 and 900,000 cubic yards (611,640 and 688,005 m³) of waste annually; 60% is MSW, 30% is demolition waste, which includes metal (pipes, steel reinforcement bars), and 10% other.

Two other parts of the quarry have already been filled, covered with soil and re vegetated.

Liners: no high density polyethylene (HDPE) liners are deemed necessary or used; only a compacted soil liner 12-feet (3.66 m) wide is used along the sidewalls of the quarry. The soil liner is applied in 18-inch (45.72 cm) lifts, horizontally against the walls.

Monitoring Wells : Four wells are sampled quarterly for Subtitle D (CWA) parameters. Nineteen additional wells serve as piezometers to confirm that the hydraulic gradient is toward the quarry-landfill.

Leachate Collection and Disposal: Leachate is collected and pumped to a sewage treatment facility that serves the area. The leachate strength is weak and no special charges are incurred for disposal. The collections system is composed of a porous, 3/8-inch, pea gravel blanket, one-foot thick, sloped to one end of the pit. Leachate is collected at a low end sump and removed via a lift station to the Metropolitan Sewer District trunkline.

Landfill Gas (LFG) Collection System: LFG is composed of 50% methane and 50% carbon dioxide. It is estimated by scientists and engineers that it takes at least a year, depending on the moisture content, for the trash to begin decomposing and producing gas. It takes one truckload, 20 cubic yards (11.29 m³), of waste to produce 40,000,000 BTU's of methane gas. This is equivalent to 7 barrels of oil.

Recovery of the gas is done by sinking six-inch (15.24 cm) PCV pipes 80 to 100 feet (24.38 to 30.48 m) into the heart of the landfill. The pipes are connected to well head pipes at the surface level. The well heads are connected to a central point about a quarter-mile from the landfill where a 40-h.p. centrifugal blower draws the gas from the well heads at approximately 1,300 c.f. (36.81 m³) per minute. The gas is fed to the main plant where it is converted into energy.

Weber uses the landfill gas, as a substitute for natural gas, in a number of different applications in the plant: (1) seasonal heating of a commercial greenhouse operation with

six unit heaters, each using 350,000 BTU's per hour; (2) asphalt plant hot oil heater, using 6 million BTU/hr. burner, continuous usage; (3) asphalt plant aggregate dryer using a co-mix of LFG with natural gas, using 20 million BTU/hr. LFG and seasonal usage; (4) steam boiler for asphalt ready-mix plant, 100 hp. boiler using 6+ million BTU/hr., seasonal usage; (5) plans are being made for heating supply of LFG to an adjacent high school for use in two 165 hp. boilers - to be brought on line in the Fall of 1996.

Officials at Weber estimate that the company saves over \$100,000 per year in fuel costs for their asphalt business. Also, Mr. Ramsey states that the adjoining greenhouse operation saves "about \$2,000 to \$3,000 per month in fuel costs from November to May where the temperature is maintained between sixty-five to seventy degrees." Weber has been selling plants from their greenhouse since 1983. Its crop includes 15,000 geraniums, 5,000 marigolds, a few hundred hanging baskets, et al.

A-2.8.6 Miscellaneous Reported Examples of Quarries Used for Landfills

The Lemons Gravel pit at Dexter, Missouri is currently used as a MSW landfill.

The Greenwood County, Kansas, landfill uses a former limestone quarry.

The Allen County, Kansas, landfill uses a former limestone quarry.

Eleven derelict surface coal mines in Kansas, Kentucky, Illinois and Indiana are given as examples of mine-landfill operations at Appendix A-1 § 7.6, supra.

A former sand and gravel pit at San Gabriel Valley, California, is used as a landfill,

A-2.8.7 A Canadian Example of a Successful Combined Quarry-Landfill Operation

The Walker Industries, Quarry and Landfill, Thorold, Ontario

The following information on the Walker Inds.' operation was furnished by Mr. Ron Plewman, P.E., and Operational Manager for the company.

Walker Brothers' crushed stone quarry had its beginning in 1887 and has been in continuous operation since. The quarry is located at Thorold, in the southeastern part of Ontario Province near Niagara Falls, Canada, near the New York state border.

The quarry operates in the Gasport and Goat Island limestone member which is underlain by the Decew limestone and the Rochester shale. Stone production is about 800,000 tonnes per year. Landfilling began in November 1982 and has accepted a total of some 4,630,000 tonnes of waste since its beginning. It currently accepts between 300,000 to 600,000 tonnes of waste annually. (See Figures 16 through 20, pages 361-365, for views and explanations of the aerial photographs and quarrying-landfill progression from 1986 to 1995.)

The area of active quarrying in 1986 has been the active landfill in the past few years and was filled to capacity and capped in 1995. A new cell was started as an active disposal area in June 1995 and has a life expectancy of 12 years. Future cells will be created as quarrying produces new void space.



Aston University

Illustration removed for copyright restrictions

Photo credit - Walker Inds., Ontario, Canada

Figure 16 - 1986 Aerial View of Walker Inds. Quarry and Landfill,
Thorold, Ontario, Canada



Aston University

Illustration removed for copyright restrictions

Credit -Ploughman, Walker Inds., Ontario

Figure 17 - 1986 Explanatory Sketch of Figure 16 -Walker Inds. Quarry-Landfill



Aston University

Illustration removed for copyright restrictions

Credit -Ploughman, Walker Inds., Ontario

Figure 18 - July 1995 Explanatory Progress Sketch of Figure 16 -
Walker Inds. Quarry-Landfill



Photo credit - Walker Inds, Ontario, Canada
Figure 19 - May 1995 Aerial View of Walker Inds. Quarry and Landfill, Thorold, Ontario, Canada



Figure 20 - May 1995 Explanatory Sketch of Figure 19 - Walker Inds. Quarry-Landfill



Aston University

Illustration removed for copyright restrictions

**Figure 21 - Walker Inds, Canada - Land Restoration -
After-Use- Agricultural-Maple Sugar Production**

Photo credits - Walker Inds, Ontario, Canada



Aston University

Illustration removed for copyright restrictions

**Figure 22 - Walker Inds, Canada - Land Restoration
After-Use-Agricultural- Grape Vineyard**

The landfill design uses a compacted clay base and clay on the sidewalls. The “clay” “ is an impermeable type that is recovered from the fines of the mining operation. A liner is also placed on the sidewalls to direct leachate downward in the fill. This sideliner acts as a drainage medium and is of a geotechnic type, bonded on both sides to a geonet.

The site, although licenced for municipal waste, predominantly takes industrial and commercial waste. All waste must be pre-approved for disposal and is monitored on a continuous basis at the entrance. No re-cycling on the property is done before dumping of waste.

The leachate collection system is composed of 6-inch (15.24 cm) plastic pipe installed in a clean stone bed layed on top of the clay bed bottom liner. Leachate drains by gravity through the fill to the collecting system at the bottom and thence to a leachate sump pit with a pumping station. The leachate is pumped to the surface to holding ponds for testing to ensure discharge guidelines are met, treated on site if required, and then pumped through the company’s private sewer lines that connect to the regional system and treatment plant. There is no collection of landfill generated gas. LG is vented and flared.

A significant groundwater monitoring system exists and was begun approximately 15 years before landfilling began. The ground water table level is reported to be 7 to 8-feet (2.13 to 2.44 m) below the landfill’s bottom clay liner. Daily waste layers are placed in 8-foot (2.44 m) depths and a spent foundry sand is used as daily cover material. Clay is also used as the capping material.

As indicated in the two aerial photographs, Figures 16 and 19, taken 9 years apart, in 1986 and 1995, and the accompanying explanatory sketches, Figures 17, 18 and 20, completed areas of fill have been restored to beneficial agricultural land uses for stock grazing, tree growth (sugar maple and reforestation), and vineyards. (See Figures 21 and 22, page 366.) Overburden soil from the quarry area was saved, enriched and spread in restored surface areas for growth of grasses, grapes and trees. The spring maple sugaring activity is now a tourist attraction drawing some 12,000 visitors each year. (Plewman, 1996).

A-2.8.8 Miscellaneous Canada

A personal communication with the New Brunswick Department of Environment emphatically states, “Mined out open pits do not meet the stringent siting guidelines for sanitary landfills in the Province and would not be acceptable under the regulations.” (op.cit). This was the only negative-sounding report from any of the provinces.

A-2.9 Conclusions and Comments

Regarding the use of peat in landfills, intense investigation for the use of peat in landfill base liners and in a leachate filter beds before entry to the leachate collecting tank

is strongly recommended. With testing reports of such high potential for reducing contaminants in landfill leachate, the peat-treated effluent could be returned directly to surface waters without harm.

A problem for all landfills, whether without or within quarries, is the concern for the possible effects of differential settling. The amount of biodegradable matter present in the fill, the homogeneity of the waste materials, and the degree of compaction used, are all matters affecting the rate of settlement. Field loading tests of the fill may be appropriate. The degree or amount of liquids, particularly within containment-type fills, is of importance. Load-bearing structures on engineered containment landfills is inadvisable. With regard to quarry-landfills, numerous benches within the pit may be a concern causing differential settling, depending on the preceding factors of composition and compaction.

The problem of differential settling only becomes a major concern where load structures are intended to be placed on the completed surface. Where the intended surface is not load-bearing, as for agriculture or amenities, few problems of import would be anticipated. Unless the settlement rate appears to be uniform and stabilisation reached, the after-use of the landfilled surface should be limited to lightweight purposes, e.g., recreation, parks, parking lots and amenities with only lightweight structures.

The Omnipresent Critical Need for Waste Space: In spite of the current solution of waste deposition by landfilling a few of the surface mining operations in the U.K., until a far larger number of surface mines are designated as MSW depositories by law / regulation, as proposed herein, the waste space problem will remain unsolved. Surface mines easily create a sufficient amount of void space to accept all the waste generated in the U.K. Only a partial percentage of mining voids is being used. In spite of Greenways efficient handling of MSW in its 25 quarry-landfill operations, void reserves for waste disposal are reported to stand at a short 16 years of life at current input rates. (Harding, 1996).

APPENDIX A-3

A PROPOSED BEST PRACTICE MODEL LAW FOR LAND CONSERVATION AND RECLAMATION OF SURFACE MINED LAND BY SOLID WASTE IN-FILLING

A-3.1 Introduction

The model environmental and land conservation law for reclamation of non-fuel surface mines by back-filling with municipal solid wastes is proposed in the following general formats, whether enacted by the British Parliament, the U.S. Congress, or the Canadian Parliament.

The arguments for the law are summarised in the Findings and Purposes of the U.S. Congress under the U.S. format in A-3 § 3, *infra*. The introductory formats for U.K. and Canada are similarly proposed in following §2 and §4, respectively.

ELIZABETH II



**DERELICT MINED LANDS RESTORATION
AND WASTE CONSERVATION ACT 1996
1996 CHAPTER XX**

To establish regulatory reform, legal standards, a responsible agency and procedures for carrying out the complete reclamation of all non-fuel surface mines, including abandoned, active, and future mines, making mandatory that such reclamation of the mining voids created by surface mining shall be fully restored to the land's original surface elevations and contours ; that the reclamation operation shall be by a landfill procedure utilizing municipal solid waste as backfilling material, while simultaneously employing absolute, environmentally-safe technology measures for the protection of water resources quality with the ultimate and final purpose to restore the surface of the mined land to beneficial uses of the general public, thereby conserving land for the sustainability of present and future generations.

Be it enacted by the Queen's most Excellent majesty, by and with the advice and consent of the Lords Spiritual and Temporal, and Commons, in this present Parliament assembled, and by the authority of the same as follows: -

ARRANGEMENT OF SECTIONS

PART I

THE SURFACE MINED LAND RESTORATION AGENCY AND THE SCOTTISH SURFACE MINED LAND RESTORATION AGENCY

CHAPTER I

THE SURFACE MINED LAND RESTORATION AGENCY

Establishment of the Agency

Section

1 The Surface Mined Land Restoration Agency

Transfer of functions, property etc to the Agency

Etc.

[The detailed goals for establishment of a responsible governmental agency to carry out and fulfill the goals of the Act are given in the following section, A-3..3 - United States - under the Findings and Purposes by the U.S. Congress.]

A-3.3 The United States

The name of the proposed Act shall be -

Surface Mined Lands Restoration, Landfill Relief, and Conservation Act of 1996

or, alternatively

Landfill Relief and Mined Surface Lands Restoration and Conservation Act of 1996

AN ACT

To establish regulatory reform, legal standards, a responsible agency and procedures for carrying out the complete reclamation of all non-fuel surface mines, including abandoned, active, and future mines, making mandatory that such reclamation of the mining voids created by surface mining shall be fully restored to the land's original surface elevations and contours ; that the reclamation operation shall be by a landfill procedure utilizing municipal solid waste as backfilling material, while simultaneously employing absolute, environmentally-safe technology measures for the protection of water resources quality with the ultimate and final purpose to restore the surface of the mined land to beneficial uses of the general public, thereby conserving land for the sustainability of present and future generations.

BE IT ENACTED by the Senate and House of Representatives of the United States in Congress assembled,

SECTION 1. SHORT TITLE AND TABLE OF CONTENTS.

(a) **SHORT TITLE** : This Act may be cited as the "Landfill Relief and Mined Surface Lands Restoration and Conservation Act of 1996".

(b) **TABLE OF CONTENTS** : The Table of Contents is as follows:

Sec. 1 Short title and table of contents.

Sec. 2 Findings and purposes.

TITLE 1 - MINED SURFACE LANDS RECLAMATION

Sec. 101. Need and Justification

Sec. 102. Restoration of Surface Mined Lands

TITLE II - NATIONAL RELIEF FOR URGENTLY NEEDED LANDFILL DEPOSITORIES

Sec. 201. Need and Justification

Sec. 202. Environmental Security for Landfilling

TITLE III - COMBINED ENVIRONMENTAL CONTROLS

- Sec. 301. Mandated Combined Operational Planning and Permission; After-use planning
- Sec. 302. Mandated, Automatic Landfill Licensing for Abandoned and Current Surface Mines
- Sec. 303. Mandated, Automatic Licensing for Future Surface Mines as Landfills
- Sec. 304. Regulation of Combined Works by State Environmental Agencies

TITLE IV - LAND CONSERVATION

- Sec. 401. Restored Land Environmental Protection
- Sec. 402. Restored Land After-use Options (parks and recreation, agriculture, wildlife habitat, residential)
- Sec. 403. After-use Controls

Sec. 2. FINDINGS AND PURPOSES.

(a) FINDINGS: The Congress finds that -

(1) there are a great number of abandoned surface mines from former years left unreclaimed in the U.S.;

(2) there is virtually no current federal or state regulation for full reclamation of hardrock surface mining; present reclamation of non-coal quarries is near-impossible due to the nature of the mining. Hardrock surface mining requires the removal of a very high percentage of the minerals during open-pit mining, thereby leaving virtually no earth material left to be backfilled in the mined void.

Thus, current hardrock surface mine reclamation only requires sloping of the top bench of the quarry, removal of all debris, equipment and buildings from the surface, contouring and planting of vegetation of the disturbed, but intact surface, allowing the mined pit to fill with water. Full restoration of the land to surface use once more is infeasible and very unlikely.

(3) similarly, there can be no expectation that future hardrock surface mines can be restored to beneficial surface uses under the imposed physical and economic conditions ;

(4) non-coal surface mined land is virtually useless as left with only water-related amenity-use possible;

(5) full restoration of the surface of open pit mined land is economically infeasible for lack of fill material;

(6) a simultaneous, critical national need exists for municipal solid waste landfill space. One study reports that all but one state is running out of suitable locations for landfills.

(7) the two problems can be solved as one by landfilling the surface mining voids, thereby solving the national urgent need for MSW depositories, while there is more than ample mining voids available from abandoned sites to accommodate the nation's volume of MSW, plus new mining void space made each year;

(8) land filling of mine voids with MSW is entirely feasible, logical, appropriate and environmentally safe with current containment technology without endangering groundwater sources;

(9) MSW landfills have the distinct possibility of supplying a fuel-saving source of energy by capturing the landfill gas that is generated within the fill ;

(10) aggregate quarries generally have large volumes of space within them which would provide landfill space for many years at each location; metropolitan areas generally have several aggregate quarries nearby to solve the critical MSW space for many years in the future for each high density waste generating area;

(11) mandating by law the complete restoration of surface mines by landfilling of all abandoned and active mines will eliminate the public inquiry process and its inherent "nimbyism", consequently , the law will expedite the restoration of surface mined land to beneficial after-uses

(12) licensing of future surface mines as landfills will be compulsory and accomplished in a one-step approval and permitting process which is not to be denied licensing by "nimbyism" when located in a proper zoning area ;

- (13) there is a critical shortage of landfill space in the U.S. which must be met by this two-fold process;
- (14) that other methods of waste reduction are not meeting sufficient reduction in volumes of waste necessary to relieve the shortage of space for disposal ;
- (15) that burial of waste is the most satisfactory method of disposal; and, there is always residue for burial from other waste reduction methods;
- (16) landfilling at sites other than in mining voids requires additional earth disturbance at other locations to obtain daily and final cover material, impermeable bottom lining clays and unnecessarily leads to duplicity of earth-disturbed land, while filling of mining voids would reduce new earth-disturbed locations by at least 50% thereby greatly conserving land uses;
- (17) since many surface mines, particularly those of the aggregates and construction minerals industry, have removed nearly all of the void volume space in mineral extraction, there is little material left to replace in the mined out pit. Filling and full restoration of the surface is impossible without obtaining earth materials from new locations, thus compounding earth disturbance. Surface mines do have adequate material remaining to supply daily covers, lining and capping earth materials;
- (18) due to the past and present economic requirements of the aggregate industry requiring proximity to the construction sites of growing metropolitan areas, and additionally, since the same growing metropolitan and urban areas are the volume generators of MSW, the near-city aggregate quarries are logical, appropriate, convenient and well-located sites for landfilling of the metropolitan generated MSW; finally, that the surface mined voids and the need for landfilling space are mutually made for each other;
- (19) the process of landfilling surface mined voids enables formerly derelict mined lands to be salvaged and re-cycled, to have their surfaces restored, and the land returned to beneficial after-uses for private and public good. This process for total restoration of used land is pure land conservation

(b) PURPOSES: Based on the environmental regime already established in the United States under the National Environmental Protection Act 1969, and the many other resultant environmental acts that have flowed from NEPA's creation, the purposes of this Act are to further promote environmental security, the restoration of derelict and potentially contaminating surface mined lands in keeping with the conservation of the land -

- (1) by establishing the legal process for requiring derelict surface mined lands to be restored to further beneficial surface uses in pursuit of land conservation, and
- (2) to concurrently relieve the national critical urgency for MSW depositories, and
- (3) to establish the legal process for requiring the use of non-fuel surface mines as MSW landfill sites, and
- 4) to reduce the national dependency of foreign gas and oil supplies by utilizing landfill-generated gas as a domestic energy source; and
- (5) to establish the primacy of state authorities to implement the successful attainment of the goals of this Act

Then, the general form of statutory enactment to be followed by the U.S. House of Representatives.

A-3.4 Canada

The format for the proposed law to be enacted would be as follows:

THE HOUSE OF COMMONS OF CANADA	CHAMBRE DES COMMUNES DU CANADA
BILL NO.	PROJET DE LOI NO.
An Act to establish complete reclamation of non-coal surface mines, to provide for municipal solid waste depositories and conserve land use	Loi de mise en oeuvre , etc.
<hr/>	
AS PASSED BY THE HOUSE OF COMMONS	ADOPTE PAR LA CHAMBRE DES COMMUNES
(DATE)	
Preamble WHEREAS the Government of Canada seeks to achieve sustainable development by conserving and enhancing environmental quality and by encouraging and promoting economic development that conserves and enhances environmental quality;	Preamble ATTENDU : que le gouvernement federal vise au developpement durable par des actions de conservation et d'amelioration de la qualite de l'environnement ainsi que de promotion d'une croisaance economique de nature a contribuer a la realisation de ces fins;
ETC	
NOW, THEREFORE, Her majesty, by and with the advice and consent of the Senate and House of Commons of Canada, enacts as follows:	Sa Majeste, sur l'avis et avec le consentement du Senat et de la Chambre des communes du Canada, edicte:
SHORT TITLE	TITRE ABREGE
Short title 1. This Act may be cited as the Canadian <i>Surface Mine Restoration, Waste Relief and Conservation Act 1996</i>	etc.

A-3.5 Closing Statement to the Honourable Members of H.M Parliaments in the U.K. and Canada, and to the Honourable Members of the U.S. Congress

Seldom does a better opportunity present itself to accomplish multiple goals for the betterment of the environment than this present one. By one legislative act, derelict surface mined lands of the past will be fully reclaimed; complete restoration of current and future surface mined lands will be provided for to the beneficial use of society ; potential water contamination from the sites will be greatly reduced; land-use will be conserved and sustained for future generations; present and future relief given for the critical space deficiency for disposal of municipal solid wastes, whilst providing a new source of energy and conservation of natural fuels ; and the contentiousness and high costs of the public hearing process greatly reduced.

It remains only for the legislative bodies of the Anglo-nations to adopt the best practice model law as proposed herein to make it an accomplished fact for the improvement of the environment by surface mining and municipal solid waste industries. We submit the issue has been proven and rest our case.

APPENDIX B-1

TABLE OF U.K. CASES Reported and Mentioned

Case name and citation	Page
<i>A.-G. v. Logan</i> , [1891] 2 Q.B. 100.....	73
<i>Alexandra Transport v. Sec. of State for Scotland</i> , [1973] 27 P & CR 352.....	108
<i>Bagot v. Bagot</i> , [1863] 2 Agric.....	45
<i>Ballard v. Tomlinson</i> , [1885] 29 Ch D 115.....	93
<i>Bartlett v. Phillips</i> , [1859] 19 Eccl.....	45
<i>Bilboe v. Sec. of State for Environment</i> [1978] 39 P.& C.R. 495, Q.B. Division- Divisional Court, July 1978; Court of Appeal decision, February 1980.....	111
<i>Bishop of London v. Web</i> , [1718] 31(2) L & T.....	44
<i>Boileau v. Heath</i> , [1899] 34 Mines.....	44
<i>Brooks and Burton Ltd v. Sec. State for the Environment</i> [1978] 1 All E.R. 1294..	107, 214
<i>Calder Gravel Ltd v. Kirklees Metropolitan Borough Council</i> , [1989] 60 P.&C.R.322.....	113
<i>Carlyon v. Lovering</i> , [1857] 1 H.& N. 784.....	73
<i>Case of Mines</i> , [1567] 1 Plowden 310, 75 E.R. 472 (Exch.); 11 Const L.....	36
<i>Case of Saltpetre</i> , [1607] 12 Rep. 1.....	37
<i>Durham County Council v. Sec. State for Environment and Tarmac Roadstone Holdings Ltd</i> , [1989] T. & C.P. [1990] C.O.D. 209.....	114, 164
<i>Hilliard v. Sec. of State for the Environment</i> [1978] 37 P & CR 129.....	108
<i>Hodgkinson v. Ennor</i> , [1863] 4 B & S.229.....	73,74
<i>John Young & Co. v. Bankier Distillery Co.</i> , (Lord Watson) [1893] A.C.691, 439 A.E.R.....	74
<i>Leigh Land Reclamation Ltd. v. Walsall Metropolitan Borough Council</i> [1991] 3 JEL 281.....	162
<i>Lopinot Limestone Ltd v. Atty-Gen of Trinidad & Tobago</i> , (P.C.) [1987] 3 WLR 797..	113
<i>Luscombe v Steer</i> , [1867] 15 W.R. 1193; 36(2) Nuis.....	72
<i>Lyddal v. Weston</i> , [1739] 2 Atk. 20.....	36
<i>Mouchell Superannuated Fund Trustees and East Midlands Quarries Ltd. v. Oxfordshire County Council</i> , CA[1991] 1 PLR 97.....	114
<i>Patterson v. Chamber Coll. Co.</i> , [1892] 8 T.L.R. 278	73
<i>Parkes v. Sec of State for the Environment</i> [1979] 1 WLR 1308, 1 All ER 211.....	107, 214
<i>Re. Dudley</i> , [1881] 8 Q.B.D. 86.....	73
<i>Regina v. Derbyshire County Council, ex parte North East Derbyshire District Council</i> [1979], 77 L.G.R. 389.....	110
<i>Roberts and Another v. Vale Royal District Council and Another</i> , [1977] 39 P & CR 514.....	109
<i>Rosse (Earl) v. Wainman</i> , [1845] 11 Comns.....	44
<i>Shotts Iron Co. v. Inglis</i> , [1882] 7 A.C. 518.....	73, 83
<i>St. Helen's Smelting Co. v. Tipping</i> , [1863-4] 35 L.J.Q.B. 66 (H.L.).....	72
<i>Stoughton v. Leigh</i> , [1808] 34 Mines.....	45
<i>Tipping v. St. Helen's Smelting Co.</i> , [1865] 1 Ch. 66.....	73
<i>Umfreville v. Johnson</i> , [1875] 10 Ch. 580.....	73
<i>Walter v. Selfe</i> , [1851] 4 DeG. & S. 315.....	72
<i>Weeks v. Heward</i> , [1862] 10 W.R. 557.....	73
<i>William Aldred's Case</i> , 9 Coke 57B, 77 Eng. Rep. 816 (K.B. 1611).....	71
<i>Wright v. Williams</i> , [1836] 1 M & W 77; 19 Easmt; 45 Stats.....	72, 74, 83

TABLE OF U.K. - E.C. CASES, continued
Reported and Mentioned

<u>EC Cases</u>	<u>Page</u>
<u>Case name and citation</u>	
<i>Algemene Transport - en Expeditie Onderneming Van Gend en Loos v. Nederlandse Tarief Commissie</i> [1963] ECR 1.....	186
<i>Amministrazione delle Finanze dello Stato v. Simmenthal SpA</i> (No.2), [1978] ECR 629.....	186
<i>Becker v. Finanzamt Muster-Innenstadt</i> [1982] ECR 53.....	187
<i>Costa v. ENEL</i> [1964] ECR 58.....	187
<i>Roquette Freres SA v. EC Council</i> 1980] ECR 3333.....	186

APPENDIX B - 2

TABLE OF U.S. CASES
Reported and Mentioned

Case name	Page
<i>Agins v. City of Tiburon</i> , 447 U.S. 255 (1980).....	103,122,140
<i>Appeal of Eureka Stone Quarry, Inc.</i> , 539 A.2d 1375 (Pa.Cmwlt. 1988)	135
<i>Arizona Copper Co. v. Gillespie</i> , 230 US 46 (1913).....	81
<i>Atlantic Cement Co. v. N.Y.</i> , 516 NYS. 2d 523 (AD3 DEPT. 1987).....	144
<i>Baltzeger v. Carolina Midland R. Co.</i> , 32 S.E. 358 (S.C. 1899).....	69
<i>Barnes v. Graham Virginia Quarries, Inc.</i> , 204 Va. 414 (1963).....	76
<i>Barrett v. Vreeland</i> , 182 SW 605 (Ky.App. 1937).....	77
<i>Barrett Paving Materials, Inc. v. Board of Zoning Appeals of Union Township</i> , 1991 WL116344 (Miami County Court of Appeals, Ohio App.Dist. 2) (unpublished)...	135
<i>Barton v. Gifford-Hill & Co., Inc.</i> , 760 F.Supp. 98 (W.D. La. 1991).....	149
<i>Bayer v. Nello Teer Co.</i> , 256 NC 509 (N.C.1962).....	80, 86
<i>Benton v. Kernan</i> , 21 A.2d 755 (N.J. Ct.App.1941).....	78
<i>Bernardsville Quarry v. Bernardsville Borough</i> , 608 A.2d 1377 (N.J. 1992).....	138, 225
<i>Blackford v. Herman Construction Co.</i> , 112 SW 287 (Mo.App. 1908).....	76, 77
<i>Bob Marshall Alliance v. Lujan (U.S.)</i> , 804 F.Supp.1292 (D. Mont. 1992).....	257
<i>Borough of Ridgefield v. U.S. Army C.O.E.</i> , No.89-3180, slip op. (D.N.J. July 2, 1990)	127
<i>Brede v. Minnesota Crushed Stone Co.</i> , 143 Minn. 374 (1919).....	76
<i>Burnham v. Hotchkiss</i> , 14 Conn. 317 (1841).....	69
<i>C & A Carbone v. Town of Clarkstown, N.Y.</i> , 114 S.Ct. 1677 (1994).....	171
<i>California Coastal Commission v. Granite Rock Co.</i> , 107 S.Ct. 1419 (1987).....	192
<i>Carlson Mining Company v. Department of Environmental Resources (DER)</i> (Pennsylvania), 639 A.2d 1332 (Pa.Cmwlt. 1994).....	215
<i>Cass Co. Contractors v. Colton</i> , 139 Colo. 593	79
<i>Charbonneau v. MacRury</i> , 153 A. 457 (N.H. 1931).....	71
<i>Cioffoletti v. Planning & Zoning Commission</i> , 552 A.2d 796 (Ct. 1989).....	104, 127
<i>City of Alma v. Loehr</i> , 22 P. 2d 424	71
<i>City of Philadelphia v. New Jersey</i> , 437 U.S. 617 (1978).....	171
<i>City of Phoenix v. Johnson</i> , 75 P.2d 30 (Ariz. 1938).....	69
<i>City of St. Peters v. Dept. of Natural Resources</i> , 797 S.W. 2d 514 (Mo. App., W.Dist., 1990)].....	272, 320, 322
<i>City of Ukia v. County of Mendocino & Ford Gravel Co.</i> , 238 Cal. Rptr. 139 (Cal.App.1987).....	148
<i>Commission to Save the Mokelumne River v. East Bay Municipal Utility District</i> , Env't.Rep. Cas.(BNA) 1159 (E.D. Calif. 1993).....	196
<i>Concerned Citizens v. Rhodes</i> , 394 S.E.2d 462 (N.C.App. 1990).....	148
<i>Conoco v. Arkeketa</i> , No.92-C-014-B, 19 Indian L. Rep. (Am.Indian Law) Training Program) 3085 (N.D. Okla.1992).....	265
<i>Connolly v. Pension Benefit Guaranty Corp.</i> , 475 U.S. 211(1986).....	140
<i>County of Cook v. John Sexton Contractors, Inc.</i> , 389 N.E.2d 553 (1979).....	318
<i>Crewes v. Plainsman Trading Co.</i> , 827 S.W.2d 455 (Tex.App.-San Antonio 1992)]..	60
<i>Crowell Constructors v. State</i> , 393 S.E. 2d 312 (N.C. App. 1990).....	147
<i>Davidson Mineral Properties v. Monroe County (Ga.)</i> , 257 Ga. 215 (1987).....	137
<i>Davis v. Palmetto Quarries Co.</i> , 212 SC 496 (1948).....	80
<i>East St. John's Shingle Co. v. Portland</i> , 246 P.2d 554 (Or. 1952).....	120
<i>Empire Sanitary Landfill v. Comm. Dept. Environmental Resources</i> , 645 A.2d413 (Pa. Cmwlt. 1994).....	169
<i>Environmental Defense Fund v. Tennessee Valley Authority (TVA)</i> , 371 F.Supp.1004 (E.D. Tenn, 1973); aff'd.492 466 (6th Cir.1974).....	209
<i>Fagan v. Silver</i> , 188 P. 900 (Mont.1932).....	77
<i>File et al v. D & L Landfill, Inc.</i> , 579 N.E.2d 1228 (Ill.App. 5 Dist. 1991).....	166, 272, 318

TABLE OF U.S. CASES, continued
Reported and Mentioned

Case name	Page
<i>Fjetland v. Pierce County</i> , Wash.App.No. 12448-3-II, Div.Two, (unpublished)(1990)...	224
<i>Fletcher Gravel Co. v. Jorling (DEC)</i> , 179 A. 2d 286 (N.Y.1992).....	143
<i>Flores v. Texas Dept. of Health</i> , 835 S.W.2d 807 (Tex.App.-Austin 1992).....	168
<i>Florida Dept. of Environ. Reg.(DER) v. Goldring</i> , 477So.2d532(1985).....	128,192
<i>Florida Rock Inds. v. U.S.</i> , 21 Cl.Ct. 161 (1990).....	87,119,124 125, 318
<i>Foote Mineral Co. v. U.S.</i> , 654 F.2d 81 (Cl.Ct. 1981).....	53
<i>Freel v. Ozark Mahoning Co.</i> , 208 F. Supp. 93 (1962).....	80
<i>Gainsburg v. Dodge</i> , 101 S.W. 2d 178 (Ark. 1937).....	71
<i>Gardner v. Com., DER (Penn. Dept. of Environmental Resources)</i> 603 A.2d 279 (Pa.Cmnwlth.1992).....	258
<i>Gilliam County, Oregon, Oregon Waste Systems, Inc., and Columbia Resource Co. v. Dept. Of Env. Quality</i> , 837 P.2d 965 (Or.App.1992).....	168
<i>Gilmore v. Royal Salt Co.</i> , 84 Kan. 729 (1911).....	80
<i>Goldblatt v. Hempstead</i> , 369 U.S. 590 (1961).....	104, 134
<i>Grove v. Winter</i> , 554 N.E. 2d 722 (Ill.App. 5 Dist. 1990).....	148
<i>H. Hitt Lbr. Co. v. Cullman Property Co.</i> , 66 So. 720 (Ala. 1914).....	69
<i>Hadacheck v. Sebastian</i> , 260 U.S. 393 (1922).....	117
<i>Hakkila v. Old Colony Broken Stone & Concrete Co.</i> , 162 N.E. 895 (Mass. 1928).....	76
<i>Hanson Brothers Enterprises v. Nevada Co. Bd. of Supervisors</i> (No. S044011).....	143
<i>Hartung v. Milwaukee County</i> , 86 NW 2d 475, rehearing 87 NW 2d 799 (Wis.1958)..	76
<i>Heatherbrook v. Mo. DNR and City of St. Peters; CV191 Cir. Ct. Cole Co.</i> (1991) (unpublished).....	320
<i>Hill v. TVA</i> , 549 F.2d 1064 (6 Cir. 1976).....	209
<i>Holton v. Northwestern Oil Co.</i> , 161 S.E. 391 (N.C. 1931).....	69
<i>Hughes v. Oklahoma</i> , 441 U.S. 332 (1979).....	171
<i>Hunt Bros. v. Glennon, Park Dir.</i> , 585 N.Y.S. 2d 228 (1992).....	225
<i>In Re. Meaker</i> , 588 A.2d 1362 (Vt. 1991).....	224
<i>Johnson v. Grand Trunk Western R. Co.</i> , 224 N.W. 448 (Mich. 1929).....	71
<i>Kaiser Aetna v. U.S.</i> , 444 U.S. 164 (1979).....	119
<i>Keystone Bituminous Coal Association v. DeBenedictis</i> , 107 S.Ct. 1232 (1987).....	119, 120
<i>Kibblehouse v. Marlborough Twnshp.</i> , 630 A.2d 937(Pa. Cmnwlth. 1993).....	36, 135
<i>Lademan v. Lamb Constr. Co.</i> , 297 SW 184 (Mo.App. 1927).....	76, 77
<i>Ledbetter Bros., Inc. v. Holcomb</i> , 108 Ga. App. 282 (1963).....	76
<i>Lily Lake Road Defenders, et al v. The County of McHenry, et al</i> , 619 N.E.2d 137 (Ill. 1993).....	143
<i>Loveladies Harbor, Inc. v. U.S.</i> , 15 Cl.Ct. 391(1990).....	119
<i>McCaslin v. Monterey Park</i> , 329 P.2d 522 (Cal.App., 2 Dist., Div. 3, 1958).....	76
<i>McGeorge v. Henry</i> , 101 SW 2d 440 (Ark.1937).....	80
<i>Meridian Minerals v. King County</i> , 810 P.2d 31 (Wash.App.1991).....	224
<i>Merrion v. Jacarilla Apache Tribe</i> , 455 U.S. 130 (1982).....	265
<i>Montgomery Limestone Co. v. Bearden</i> , 256 Ala 269 (1951).....	81
<i>Morgan V. Ga. Vitriified Brick & Clay Co.</i> , 397 S.E.2d 49 (Ga.App. 1990).....	149
<i>Moubray v. G & M Improvement Co.</i> , 178 A.D.737, 165 N.Y.S.842, (1917)].....	121
<i>Mugler v. Kansas</i> , 123 U.S. 623 (1887).....	117, 121, 122, 125
<i>National Indian Youth Council v. Andrus</i> , 501 F.Supp. 649 (D.N.M. 1980), aff'd. 664 F.2d 220 (10th Cir. 1981).....	193
<i>National Wildlife Federation v. Lujan</i> , 733 F.Supp.419 (D.D.C. 1990)	149
<i>New Jersey v. City of New York</i> , 290 U.S. 237 (1933).....	96
<i>New York Coastal Fishermen's Association v. New York City Department of Sanitation, N.Y.C. Dept. of Environmental Protection, et al</i> , 772 F. Supp. 162 (S.D.N.Y. 1991).....	167
<i>NLRB v. Jones & Laughlin Steel Corp.</i> , 301 U.S. 1 (1936).....	45, 75, 82

TABLE OF U.S. CASES, continued
Reported and Mentioned

Case name	Page
<i>Northern Alaska Environmental Center (Sierra Club, et al) v. Lujan (U.S.) (and Alaska Miners Assoc.)</i> 961 F.2d 886 (9th Cir.1992).....	256
<i>Northern Cheyenne Tribe v. Lujan (Sec. Interior)</i> , 804 F. Supp. 1281 (D.Mont.1991)..	265
<i>Pennsylvania Coal v. Mahon</i> , 260 U.S. 393, 415-416 (1922).....	119, 120
<i>Pennsylvania Coal Co. v. Sanderson</i> , 56 Am. Rep.89 (1866).....	75
<i>People v. Martin</i> , 211 Cal. App. 3d 699 (1990).....	234
<i>People v. New Penn Mines, Inc.</i> , 28 Cal. Rptr. 337 (Cal.App.1963).....	81, 195
<i>Pike v. Bruce Church, Inc.</i> , 397 U.S. 137 (1970)	171
<i>Plainsman Trading Co. v. Crewes</i> , 875 S.W.2d 416 (Tex.App.-San Antonio 1994).....	130
<i>Roberts et al v. Permanente Corporation</i> , 10 Cal. Rptr. 519. (Cal.App. 1961).....	79
<i>Rogers v. Gibson</i> , 101 S.W. 2d 200 (Ky.App. 1937).....	77
<i>Russell v. Island Creek Coal Co.</i> , 389 S.E.2d 194 (W.Va.1990).....	216
<i>Rybachek v. U.S. EPA</i> , 904 F.2d 1276 (9th Cir. 1990).....	193
<i>St. Charles v. St. Peters & Mo. DNR.</i> , No.CV190-7257CC (unpublished).....	320
<i>Schneider v. C.H. Little Co.</i> , 151 N.W. 587 (Mich. 1915).....	71
<i>Shannon v. Missouri Valley Limestone Co.</i> , 122 N.W. 2d 278 (Iowa 1963).....	76,78
<i>Sierra Club v. County of Sonoma</i> , 8 Cal. Rptr. 2d 473 (Cal. App. 1 Dist. 1992)....	132, 133
<i>Sierra Club v. EPA</i> , 992 F.2d 337 (D.C. Cir. 1993).....	196
<i>Southern Ry. Co. v. Harden</i> , 28 S.E. 847 (Ga. 1897).....	69
<i>Spur Inds. v. Del E. Webb Development Co.</i> , 494 P.2d 700 (1972).....	120
<i>State v. Turner</i> , 198 SC 487 (1942), 18 S.E. 2d 372.....	125
<i>Sunray DX Oil Co. v. Thurman</i> , 384 S.W. 2d 482 (Ark.1964).....	80
<i>Swin Resource Systems v. Lycoming County</i> , 883 F.2d 245 (3rd Cir. 1989).....	170
<i>The Application for Conditional Use of Fulton Farms, Inc.</i> , Ct. of Appeals for Miami County, 2d Appell. Dist., Ohio; C.A.Case No.93 CA 62 (unpublished) (1992).....	129
<i>The Town of Wolfeboro v. Smith</i> , 556 A.2d 755, (N.H. 1989).....	143, 146
<i>Turner et al v. City of Spokane</i> , 235 P. 2d 300 (Wash. 1951).....	78
<i>Universal Equipment v. Wyoming</i> , 839 P.2d 967 (Wyo. 1992).....	150
<i>U.S. v. Dee</i> , 912 F.2d 741 (4th Cir. 1990).....	234
<i>U.S. v. Jos. Fahey Co.</i> , 769 F.2d 829 (1985).....	385
<i>U.S. v. Michael R. Ware</i> , 113 IBLA 1, GFS (MIN) 14(1990); RMMLN Vol.7, No.2, p.1384;.....	386
<i>Valentine v. Kittitas County</i> , 753 P.2d 988 (1988).....	224
<i>Village of Pleasant City v. Div. of Reclamation, Ohio, Dept. of Natural Resources</i> , 617 N.E.2d 1103 (Ohio 1993).....	194
<i>Village of Wilsonville v. SCA Services, Inc.</i> , 426 N.E.2d 824 (1981).....	275, 317
<i>Waco Cotton Oil Mill of Waco v. Walker</i> , 103 S.W. 2d 1071(1937).....	69
<i>W.C.M. Window Co. v. Bernardi</i> , 730 F.2d 486 (7th Cir. 1984).....	170
<i>Waste Recycling v. S.E. Alabama Solid Waste Disposal</i> , 814 F.Supp. 1566 (M.D. Ala.1993).....	170
<i>Western Geophysical Co. v. Mason</i> , 402 S.W.2d 657 (Ark. 1966).....	80
<i>White v. Mass.Council Constr. Employers</i> , 460 U.S.204 (1983).....	170
<i>Whitney Benefits, Inc. and Peter Kiewit Son's Co. v. U.S.</i> , 18 Cl. Ct. 394 (1989)..	119, 122
<i>Yaffe v. City of Ft. Smith</i> , 10 S.W. 2d 886 (Ark.1928).....	69

APPENDIX B - 3

**TABLE OF CANADA CASES
Reported and Mentioned**

Case name	Page
<i>Aikman v. Mills & Co.</i> , Ontario Supreme Ct. [1934] 4 D.L.R. 264.....	85
<i>B.C. Peagrowers Ltd. v City of Portage La Prarie</i> [1963], 45 WWR 513, Man. 1963, [1965] affrmd. Supreme Court of Canada, 54 WWR 477	176
<i>Burgess v. City of Woodstock</i> [1955] O.R. 1955, 814.....	176
<i>Casamiro Resources Corp. v. British Columbia</i> , [1991] B.C.L.R.(2d) 346; 80 D.L.R. (4th).....	56, 151,152
<i>Cream Silver Mines Ltd v. British Columbia (B.C.C.A.)</i> [1993], B.C.J. No.304, B.C.J. NO. 304, Victoria Registry VO 1563.....	152
<i>Etobicoke v. Ontario Brick Paving Co.</i> , [1913], 25 O.W.R. 327, 5 O.W.N. 356.....	84
<i>Friends of Oldman River Society v. Canada</i> (Minister of Transport) [1992] 2 W.W. R 193 (S.C.C.).....	199
<i>Fuller v. Thames Quarry Co.</i> , [1921] (1st Div. Ct. App.) 20 O.W.N. 374.....	84
<i>Joint Board v. Municipality of Metropolitan Toronto et al</i> , [1989] 4 C.E.L.R. 4 (N.S.), O.S.C. (Divisional Court).....	179
<i>Kent v. Dominion Steel & Coal Corp. Ltd.</i> , Newfoundland Supreme Ct., [1964] 49 D.L.R. (2d) 241.....	85
<i>Landreville v. Ville de Boucherville</i> , [1978], 7CELR 12.....	160
<i>Manicom et al v. County of Oxford et al</i> [1985] (the High Court of Justice, Ontario, Divisional Court), 52 O.R.(2d) 137.....	175
<i>McNiven et al v. Crawford</i> , High Ct. Justice [1939] O.W.N. 414, affirmed, Ont. Ct. App. [1940] No. 27 O.W.N. 323.....	85
<i>Millar v. Minister of Natural Resources & Preston Sand and Gravel</i> , the Supreme Court of Ontario (Divisional Ct.), [1978] 7 CELR 156.....	153
<i>Nepisiquit Real Estate & Fishing Co. Ltd. v. Canadian Iron Corp. Ltd.</i> , [1913] Vol. 42, 26 N.B. 387.....	84
<i>New Brunswick (Minister of Natural Resources and Energy) v. Elmtree Resources Ltd.</i> , [1989] 101 N.B.R.(2d) 255 (Q.B.).....	263
<i>Ontario v. Hale/Hale Sand and Gravel</i> , [1983] 13 C.E.L.R.19.....	178
<i>Pillitteri V. Northern Construction Co.</i> , [1930] 4 D.L.R. 731.....	85
<i>Plater v. Town of Collingwood et al</i> , Ontario High Court of Justice [1968], 1OR.81..	173
<i>R. v. Sioui</i> [1990] 1S.C.R.1025.....	266
<i>Re. Allied Chemical of Canada Ltd. and Township of Anderdon</i> (Ontario Municipal Board) [1979], 8 CELR 48,.....	53, 154
<i>Regina v. Aberdeen Paving Ltd.</i> [1981] 11 CELR 25.....	153
<i>Regina v. City of Saulte Ste. Marie</i> , [1978], 7 CELR 53	155
<i>Regina v. Consolidated Mayburn Mines Ltd.</i> , [1992]73 C.C.C.(3d) 268 (Ont.Prov.Div.).....	235
<i>Regina v. Enso Forest Products Ltd.</i> [1992], 70 B.C.L.R. (2d) 145 (S.C.).....	180
<i>Regina v. Jack Crewe Ltd.</i> [1981], 10 CELR 120.....	155, 235
<i>Regina v. St Lawrence Fluorspar Ltd.</i> [1989] 80 Nfld. & P.E.I.R. 171(Nfld.Prov.Ct.)..	235
<i>Regina v. United Keno Hill Mines Ltd.</i> [1980], 10 CELR 43.....	156, 182, 235
<i>Salvas v. Bell</i> , [1927] 4 D.L.R. 1099.....	85
<i>Steetley Inds. Ltd. v. A-G Ontario</i> [1978] 7 CELR 2.....	153
<i>Stephens v. Village of Richmond Hill</i> , [1950] O.R. 806, 4 D.L.R. 572.....	176
<i>Still v. Rural Municipality of St. Vital</i> , [1925] 2 W.W.R. 780 (Man. K.B.).....	173
<i>Suttles v. Cantin</i> , [1914] Vol. 21 B.C.R. 139.....	84
<i>The Columbia River Lumber Co v. Yuill</i> , et al, [1892] Vol. II B.C.R. 237.....	83
<i>The Queen in Right of British Columbia v. Tener</i> [1985] 1 S.C.R. 533 (B.C.), 3 W.W.R. 673	151
<i>The Queen v. Tener</i> (1985) 17 D.L.R. (4th).....	152
<i>Walker v. CFTO Ltd.</i> , 59 O.R. (2d) 104.....	247
<i>Wiebe v. Rural Municipality of De Salaberry</i> [1979], 11 C.C.L.T. 82 (Man. Q.B.).....	174

APPENDIX C

MINING MAGAZINE - INDUSTRY VIEWS

October 1994, pp.217-218

THE U.S. GENERAL MINING LAW 1872 -An Overview



Aston University

Illustration removed for copyright restrictions

Page removed for copyright restrictions.