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Aspects of geo-legal mitigation of environmental impact from mining and associated waste in the UK

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Abstract

Mining can have significant environmental impacts involving visual intrusions, dust, noise, blasting, traffic and hydrology. The processes of mineral extraction, processing, smelting and refining can never approximate to becoming environmentally neutral, but the areas of impact can be ameliorated, sometimes to a major degree, by long-term monitoring from the initiation of a project to the phases of a restored or remedial mine and/or refinery. Before an authority will grant a 'licence' to proceed, the evaluation and codification of all environmental impacts likely to arise from mining must be incorporated into an independent Environmental Assessment. Such assessments were given legal effect in the UK planning system through the Town and Country Planning (Assessment of Environmental Effects) Regulations 1988. The regulations were amended in 1994, and the Schedule I and II Projects are discussed. Aspects of environmental impacts from non-ferrous mining and open-cast and deep coal mining are outlined involving the three well-known principles of (i) Polluter Pays; (ii) Precautionary, and (iii) BATNEEC. The geo-legal implications of environmental impact mitigation are discussed and cover interalia the potential impact of mine water and associated civil and criminal liability in English law. The problem of abandoned mines is also addressed and the legal mitigation that may be required to ameliorate the expensive effects for industry. This paper also considers the application of English common law to geo-legal mitigation of these impacts and referral is made to the important Cambridge Water Co. case which incorporates aspects of trespass, the rule of Rylands v Fletcher, and nuisance, as well as principles involving smoke, dust, noise and vibration and fumes. The effects of colliery spoil disposal, tip combustion and the rarer structural failure, together with subsidence, and the effect of PHEs and methane emissions are reviewed. One of the paper's conclusions is that in the UK, increasing environmental legislation and associated liabilities will require ever increasing vigilance and involvement of environmental professionals, including geo-lawyers, in the mineral industry. This paper presents an overview of the concepts of geo-legal mitigation in Great Britain, and is not meant for use in specific cases of environmental problems.

Keywords: geo-legal mitigation; mining; environmental impact; Great Britain

1. Introduction

In the United Kingdom, the term 'mine' is not a definitive term, but is susceptible to interpretation according to the intention for which it is used. In legislation, it may be used in a special sense and expressly defined, e.g., the Mines and Quarries Act 1954 and the Town and Country Planning General Development Order 1988. For the purpose of this paper, 'quarry' is synonymous with 'mine'. Minerals in their original position are part and parcel of the land and as a consequence the owner is entitled

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prima facie to everything beneath or within it subject to exception by statute. In common law, gold and silver belong to the Crown.

The legislation referred to in this paper relates principally to England and Wales and to a lesser extent Scotland. Northern Ireland is often excluded from statutory controls but the Environment Act 1995 has modified much existing legislation in the UK, and in particular has introduced the Environment Agency (England and Wales) and the Scottish Environment Protection Agency. Integrated Pollution Control (IPC) and Air Pollution Control (APC) introduced in the Environmental Protection Act 1990 cater for England, Wales and Scotland, with provisional plans of introduction in N. Ireland. Also the Clean Air Act 1993, for the purposes of this paper, does not apply to N. Ireland, and the Water Resources Act 1991 applies to England and Wales only.

2. Environmental impact assessment

The 1985 EEC directive on the 'Assessment of the Effects of Certain Public and Private Projects on the Environment' obliges member states of the European Union (EU) to ensure that the effect of certain proposed projects on human beings, fauna, flora and other aspects of the environment is assessed before permission is given (EEC Directive 85/337/EEC). This was given legal effect in the UK planning system through the Town and Country Planning (Assessment of Environmental Effects) Regulations 1988 and the Environmental Assessment (Scotland) Regulations 1988, as amended by the Town and Country (Assessment of Environmental Effect) Regulations 1994.

For Schedule I Projects in the 1985 directive, which include construction of steelworks (integrated works for the initial smelting of cast iron and steel), power stations and chemical works, environmental assessment is *compulsory*. Projects listed in Schedule II must involve an environmental impact assessment 'where member states so consider that the characteristics so require', i.e., *discretionary.* These projects include: (a) the extractive industry (non-metalliferous minerals, energy producing minerals); (b) mineral processing (iron and steelworks; non-ferrous metals — excluding precious metals; surface treatment and coating of metals).

The description of the project in Article 5 must refer to the likely *significant* effects resulting from the use of natural resources, the emission of pollutants, the creation of nuisances, and the elimination of waste. Thus, in England, Wales and Scotland, for certain types of development, planning permission may be acquired only after consideration of an environmental statement accompanied by statements from bodies such as the Health and Safety Executive. In deciding to grant or refuse such permission or 'licence', Mineral Planning Authorities (MPA) pay great attention to Mineral Planning Guidance Notes (MPGs)

3. Non-ferrous metal mining

These include Sn, Pb, Cu, Zn, Au, Ag, and W. In 1995 the UK produced 1600 t of Pb and 2000 t Sn. The mining and concentration of such ores can lead to several environmental impacts. Thus mining results in waste rock and leachates (into local rivers), milling (grinding, concentration/flotation) yields tailings and environmentally damaging liquids, and processing (smelting and refining) results in slag and chemical precipitates. In the UK, the MPA provides guidance ('Development Plans') for criteria applied to mining proposals to ensure there is no 'unacceptable adverse impact' on the environment. MPG2, in particular, deals with dust suppression, waste disposal, blasting controls, prevention of water supplies pollution, and site security.

Because non-ferrous metal ores are extracted from both open pit and underground mines, environmental impact assessments when considered by local MPA, include the locus in quo of the site controlled by the geology and the nature of the deposit. Careful consideration of plant location, storage facilities and stage products, waste facilities and minimising dust veil from exposed piles and conveyor belts is required. In particular, positioning of waste dumps is important in view of the potential risk of contamination of local streams or rivers, and 'potential slips' of material onto neighbouring land (with possible nuisance legal actions). Tailings will require similar consideration.

Dust, both above and below ground, creates multifaceted problems at several points in the mining cycle including drilling, blasting, transport and storage. In one sense, local mineral planning authorities can control the situation by attaching planning conditions imposing recognised methods of suppressing dust including water spraying, dust extractors, road watering, labour intensive respiratory protection and air filters.

Emissions from mineral workings are controlled by statute in the UK under the Health and Safety at Work (etc.) Act 1974 (employing Best Possible Means), as well as the Clean Air Act 1993 (emissions of smoke, grit, and dust from furnaces and emission of smoke and fumes from colliery spoil banks), and Part I of the Environmental Protection Act 1990. If none of these Acts apply, a nuisance from a mineral working may be dealt with under the Public Health Act 1936, or even action at common law. Albeit noise can be controlled under Part III of the Environmental Protection Act 1990, when it amounts to a statutory nuisance, it is perhaps more prudent to rely on breach of planning condition. It is recommended that noise conditions be imposed stipulating noise levels at site boundaries and outside key buildings.

Acid generation impact (e.g., $2\ Fe\ S_2 + 2H_2O + 7O_2 \rightarrow 2Fe\ SO_4 + 2H_2SO_4$) requires impact assessment including siting of waste rock and tailings disposal areas. These must not affect the livelihood of local inhabitants or encroach on areas of special interest. At the planning stage consideration should be given to potential run off water routes into streams or recycled areas as well as managing adverse effects. The Best Practical Environmental Option (BPEO) can be employed for tailings disposal and slurry transportation.

Upon closure, local authorities may approve waste and tailing disposal into the mine or pit, but if left open to the elements further environmental risks arise from trespassers, invitees and visitors, leaving mines and quarries vulnerable to claims. Furthermore, if a site is dismantled, there is a likelihood of contamination with heavy metals or chemical reagents resulting in unacceptable stream pollution.

In relation to smelting and refining, UK and European legislation has been declared on the basis of BAT or BATNEEC (Best Available Technique Not Entailing Excessive Cost) during this decade. The Environmental Protection Act 1990 in the UK introduced IPC and APC, which applies to all processes judged to be of major pollution potential (process emissions). IPC requires all wastes and emissions to be reduced to the practical level by the use of BATNEEC. Unavoidable emissions and wastes should be disposed of by processes involving the minimum adverse environmental impact.

4. Open-cast and deep coal mining

The necessity of environmental assessment for a particular coal mining development proposal depends on several factors such as the duration of proposed workings, sensitivity of location, waste disposal, product transportation, etc. A government department called the Coal Authority was set up to licence the mining of coal in the UK by the now privatised industry. Coal Industry Acts impose an environmental duty, and all coal extraction, colliery spoil disposal and related processes are potentially subject to pollution control under the statutory nuisance provisions of Part III of the Environmental Protection Act 1990. The principal impacts for surface and underground are basically the same as for non-ferrous metal mining. Of particular interest are problems related to dust in underground coal mines — respiratory disease control is still a priority. Its effects can be controlled by water sprays, filters and extractive drums. Methane is environmentally hazardous as well as being a wasted resource. Emissions depend on factors such as depth, pressure and coal rank, but surface and abandoned mines as a rule, have relatively small emissions. To mitigate these and other environmental impacts, operators have employed a number of different methods including automated coal extraction.

5. Impact of mine water

Water pollution occurs in a number of ways, including seepage from abandoned mines and other contaminated land. Discharge may be intentional or otherwise and the law relating to such pollution in England and Wales is contained in a number of

Parliamentary Acts, but principally in the Water Resources Act 1991. Discharges into controlled water are a *criminal offence* in the absence of a legal defence; one of the more important geo-legal defences is consent by an authorised body such as the Environmental Agency. Furthermore a new system for the classification of water quality and the establishing of water quality objectives for the condition of controlled water, is being gradually introduced. Eventually consent (with conditions) will be replaced by a national regulatory authority who will work to national water quality standards.

Abandoned mines do not have consent controls in the UK, and as a consequence there is poor water quality in certain areas. The principal problem with such water is the leachate of metals. Certain abandoned mines can have their shafts capped. However, cessation of pumping can affect flow regimes, create flooding or render slopes unstable leading to landslides and/or subsidence. In addition, methane may be forced to the surface. All can create potential nuisance claims at common law.

To prevent serious damage, mine operators can attempt to neutralise acid water, remove suspended solids and treat effluent which is discharged by consent. At present, the lack of proper controls and absence of consent can lead to both civil and criminal liability in the UK.

In 1994 there was an estimated 100 discharges effecting about 200 km of rivers from abandoned mines. Aggravating factors to the problem include incomplete or inaccurate maps of the underground workings and a lack of knowledge of contamination.

A classic case is the Wheal Jane mine in Cornwall, which had long-term environmental impacts on closure. Although the mine ceased in March 1991 it was allowed to flood by stopping pumping. The Carnon River showed indications of leaking by November 1991, and concerns grew over pollution of ground water. The principal problem was acidity and high concentrations Cd, Zn, Cu, Pb, As, and Fe. To prevent the risk of water in the shafts, pumping was ordered and water treated by liming to raise the pH thereby precipitating metals such as Zn and Cd. Stormy conditions caused pumping to cease in January 1992 but the build-up of water in the mine caused a concrete plug in an adit to breach, resulting in a major pollution plume into the estuary with associated discolouration and deposition of metals. Public outcry caused resumption of pumping which continues. However, under UK law, as the mine was abandoned, the mining company was *not liable*, and the entire budgeted cost of £8M has been borne by the UK Government.

Various EEC Directives recently adopted in the UK provide classification of polluting substances from waters and include levels of Cd and its compounds, Hg, Zn, Cu, Cr, Pb, As, Sn, Ba, Be, B, U, Ag, and fluorides.

6. Common law disputes

If mine operators escape or evade statutory controls, they may still be subjected to claims at common law in the UK, which is non-statutory and evolved in England and Wales. The law of Torts (a civil wrong whose remedy lies in unliquidated damages) incorporates the principal civil wrongs which apply to mines and quarries involving nuisance, the rule of Rylands v Fletcher, negligence and trespass.

(a) Nuisance — *unlawful interference* with a person's use or enjoyment of land or some right over or in connection with it. The general principles of the law of nuisance apply to the use of land as a mine, to the use of premises as part of it, and the operations arising. Examples include pollution by running surface waters and percolating underground waters, emissions from dust, noxious fumes, discharge of effluents to cause river pollution, creation of noise and vibration so as to interfere with comfort, projection of debris by blasting, emission of smoke and fumes, escape of dangerous matter (if non-natural use of the land).

(b) The Rule in 'Rylands v Fletcher' — this famous English legal court case has the effect of imposing strict liability upon for example a mine operator who, for his own purposes, brings onto his land, collects and keeps there, anything likely to do mischief, and he will be liable for all damage which is the natural and anticipated consequence of its escape. Liability affects those in control or possession of the mine.

(c) Negligence — a *fault*-based tort as the effected landowner must prove that the mine operator was not only the *cause* of the relevant damage, but that

he was blameworthy. In addition he must prove that the operator owed him a duty of care, was in breach of that duty and as a result suffered loss. Reasonable care and reasonable foreseeability are appropriate, e.g., could a mine operator who causes a toxic spillage (no discharge licence) into a river have reasonably foreseen it as causing damage to a drinking water borehole some miles away? To succeed, the injured party need not have an interest in neighbouring land.

(d) Trespass — this arises from the direct interference with another person or his property without lawful excuse, when that interference is intentional or negligent. It is actionable without proof of fault. Hence a mine operator who places a substance on another persons land without consent, licence, statutory authority, permission or excuse can be liable for trespass. Trespass, however, is severely restricted by the requirement of directness, and the burden of proof on a landowner is sometimes a difficult one particularly when the pollution is borne by way of underground waters.

7. Geo-legal mitigation

The environmental impacts from mining and associated waste referred to in this paper will benefit from a geo-legal approach from the formative stages of a project to the phases of a restored mine. The mitigation is to protect the interests of the mine operator who may be a sole trader, a partnership (liability usually joint and several), or a company. Directors of many small- or medium-sized companies are exposed to a real risk of claims relating to the environment, and the Environment Act 1995 is likely to increase this exposure. Directors can be liable in criminal and civil law, and also in relation to bodily injury suffered by employees in a mine. As directors are agents of the company, they are at risk of being held jointly and severally liable for torts committed by it.

The major aspects to be considered in geo-legal mitigation of mining activity include (1) planning the mine, (2) waste, (3) statutory nuisance, (4) health and safety, (5) water pollution, and (6) specific impacts (e.g., gaseous and dust emanations to the atmosphere, subsidence). In relation to the planning aspect (1), although permissions and authorities protect the operator, compliance does not provide a defence against a civil action for nuisance.

8. Concluding remarks

(1) Mining development in the UK and elsewhere can result in significant environmental impacts, but planning and legal restraints can ameliorate these effects, particularly with regard to monitoring during the ‘mining cycle’. The geo-legal mitigation of the impact of waste is still evolving, and it is this legislative development which requires constant consideration, appraisal, and application to mining and associated waste problems.

(2) A person who deposits or knowingly causes or permits the deposit in or on land of controlled or non-controlled waste (including mines and quarries) is subject to Section 63 of the Environmental Protection Act 1990, but this is not yet in force. It is proposed that waste would be treated as if placed without a licence, and hence a criminal offence. When in force, geo-legal mitigation and defence will include ‘the taking of all reasonable precautions and exercising all due diligence to avoid the commission of an offence’.

(3) When amended and implemented, a part of the Environmental Protection Act 1990 will exclude contaminated land from the definitions of Statutory Nuisance. A study currently being prepared by the British Geological Survey may prove to be significant for interpreting pollution from mines and associated waste.

(4) For non-ferrous and coal mining in the UK, there can be local environmental impacts which are inevitable but can be controlled with rationale planning and vision. Although the UK imports most of its metalliferous minerals, indigenous resources are not insignificant, and authorities should carefully balance the economic needs for these minerals against the environmental implications.

(5) If the owner or mine operator is successful in defending or mitigating a statutory criminal action, common law remedies may still be pursued. In the past, procedures have proven to be sometimes time consuming and expensive for such operators. However, major reforms in the civil court in the UK may effectively reduce both litigation costs and time involved.

(6) Increasing UK and EEC legislation will exert tighter controls over mining and associated waste in the UK, and will require the involvement of vigilant environmental professionals in the mineral industry. In September 1996, the EU Directive 'integrated Pollution Prevention and Control' was adopted and will initially apply to new installations in the UK. The latest Environment Act 1995 is one piece of legislation not influenced by the EEC, but the EU has had under consideration since 1989 a draft directive on 'Civil Liability for Environmental Damage', and in 1993 prepared a Consultation Document on the subject. These EC proposals, have been modified with time, but would tighten up the present law.

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- Mines and Quarries Act 1954.
- Mines and Quarries (Tips) Act 1969.
- Mines and Quarries (Tips) Regulations 1971.
- Powers of Criminal Courts Act 1973.
- Mines (Working Facilities and Support) Act 1974.
- Health and Safety at Work (etc.) Act 1974.
- Control of Pollution Act 1974.
- Towns and Country Planning (Assessment of Environmental Effect) Regulations 1988.
- Environmental Assessment (Scotland) Regulations 1988.
- Town and Country Planning General Development Order (as amended) 1988.
- Surface Waters (Dangerous Substances) (Classification) Regulations 1989.
- Town and Country Planning Act 1990.
- Environmental Protection Act 1990.
- Water Resources Act 1991.
- Environmental Protection (Prescribed Processes and Substances) Regulations 1991 (as amended).
- Coal Mining Subsidence Act 1991.
- Clean Air Act 1993.
- Health and Safety Regulations 1993.
- Noise at Work Regulations 1993.
- Coal Industry Act 1994.
- Town and County Planning (Assessment of Environmental Effects) (Amended) Regulations 1994.
- Waste Management Licensing Regulations 1994.
- Environment Act 1995.

Mineral Planning Guidance Notes:

MPG 1: General Considerations and the Development Plan System (DOE).

MPG 2: Applications, Permissions and Conditions (DOE).

MPG 3: Coal Mining and Colliery Spoil Disposal (DOE).

MPG 4: Minerals Planning and the General Development Order (DOE).

MPG 11: The Control of Noise at Surface Mineral Workings (DOE).