Environmental Impact Assessments and Geological Repositories for Radioactive Waste

P. O'Sullivan, B. McKirdy, M. Askarieh
United Kingdom Nirex Limited
Curie Avenue, Harwell
Didcot, Oxfordshire OX11 0RH
United Kingdom

A. Bond, S. Russell[1]
Environmental Impact Assessment Unit
The University of Wales Aberystwyth
Ceredigion SY23 3DD
United Kingdom

Abstract

Since 1985 it has been obligatory that facilities in the European Union designed for the permanent storage or disposal of radioactive waste be assessed to determine their effects on the environment. This assessment must be undertaken in advance of any decision by national authorities to give consent for development work to proceed.

Member States are given wide discretion on how the above requirements are implemented in practice, e.g. the relevant European Council Directives call for the results of the environmental assessment to be made available to the public before development consent is granted but the detailed arrangements for dissemination of such information and procedures for public consultation are determined by individual Member States.

Although the Directives require an assessment of the *direct and indirect* effects of a project on human beings and on various elements of the natural environment, they are non-specific as to what particular *impacts* should be addressed, particularly as regards the effects of a project on human beings. Therefore, for example, each Member State may decide whether or not social, health and economic impacts should be included in the assessment.

This paper discusses the above issues. It proposes a model approach to environmental impact assessment in the context of geological repositories, including the role of the assessment on the overall decision processes for repository development, the scope and content of the assessment report, and approaches to public involvement.

[1] Sally Russell is now employed by The University of London (Imperial College) in the UK.

Acknowledgement

The ideas presented in this paper were developed as part of a study undertaken recently for Directorate DGXI (Environment and Nuclear Safety) the European Commission on the role, scope and definition of environmental impact assessment requirements for radioactive waste management facilities in Member States and in adjacent countries of East and Central Europe. The study was managed by UK Nirex Limited with participation by the Environmental Assessment Unit of the University of Wales, ENRESA (Spain), ONDRAF/NIRAS (Belgium) and SKB (Sweden). The Commission will publish the report of the study later this year. The authors wish to express their gratitude to DGXI for permission to produce this paper.

1. The Environmental Impact Assessment Directive

Directive 85/337/EEC, as amended by 97/11/EC of 3 March 1997, requires that facilities designed for the storage or disposal of radioactive waste be assessed to determine their effects on the environment. This assessment must be undertaken before development consent for such projects is granted.

The process of environmental impact assessment (EIA) is defined as the identification, description and assessment of the direct and indirect effects of a project on the following factors:

"- *human beings, fauna and flora;*

- *soil, water, air, climate and the landscape;*

- *material assets and the cultural heritage; and*

- *the interaction between these factors.".* (Article 3)

The information that the developer is expected to provide should include at least:

"- *a description of the project comprising information on the site, design and size of the project;*

- *a description of the measures envisaged in order to avoid, reduce and, if possible, remedy significant adverse effects;*

- *the data required to identify and assess the main effects which the project is likely to have on the environment;*

- *an outline of the main alternatives studied by the developer and an indication of the main reasons for his choice, taking into account the*

environmental effects; and

- *a non-technical summary of the above information".* (Article 5(3))

The Directive includes a requirement (in Article 6) that the request for development consent, together with the above information, be made available to the public in order that they are able to express an opinion before the development consent is granted. Detailed aspects of public participation are left to the discretion of individual Member States, which may, in particular:

"- *determine the public concerned;*

- *specify the places where the information can be consulted;*

- *specify the way in which the public may be informed, for example, by bill-posting within a certain radius, publication in local newspapers, organisation of exhibitions with plans, drawings, tables, graphs, models;*

- *determine the manner in which the public is to be consulted, for example, by written submissions, by public enquiry;*

- *fix appropriate time limits for the various stages of the procedure in order to ensure that a decision is taken within a reasonable* period." (Article 6(3))

A flow chart summarising the environmental impact assessment process as required by the amended Directive is given in Figure 1.

2. Scope of the Environmental Impact Assessment Process

2.1 Introduction

The application of the above requirements in practice will depend on the nature of the environmental hazards posed by the project. In the particular case of a geological facility for radioactive waste the hazards can be categorised as short-term (i.e. hazards that exist whilst the facility is being operated) and long-term (i.e. hazards that exist after the facility has finished operation and has been closed). Also, in comparison with many other projects for which an environmental assessment is required, facilities for long-term management of radioactive waste have specific characteristics due to the main inherent hazard being the presence of radioactivity.

The environmental assessment must therefore address radiological impacts on people and on the natural environment, together with environmental impacts from other aspects of any proposed facility. The Directive does not mention social and economic

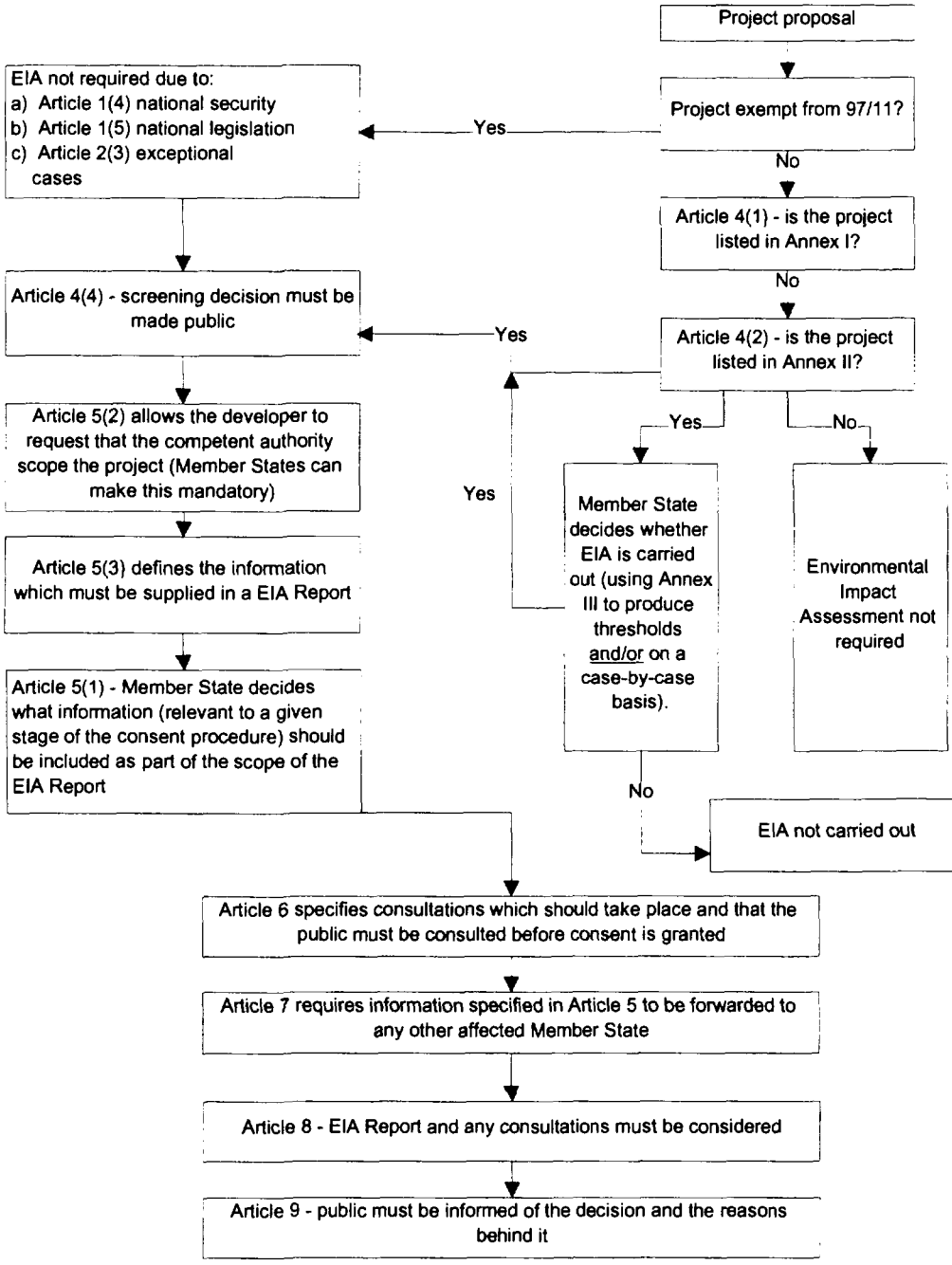

Figure 1. Environmental Impact Assessment Process in the European Union

impacts specifically, though most Member States include these in the assessment, in line with best practice internationally. The EIA Report (or Environmental Impact Statement) presents the assessment of these impacts and describes the measures intended to be taken to reduce, avoid or mitigate the adverse effects of the project. It must discuss also the reasons for the choices made, in the context of the alternatives considered in the course of the project. These aspects are discussed in more detail below.

2.2 Radiological Impact

The assessment of radiological impact has a number of different dimensions including:

- the impact on the workforce and the public during the period of operation of the facility, including hazards arising during waste transport,

- the long-term potential impact on future generations for both the normal evolution of the repository system and for less likely variant scenarios (see below); and

- the potential impact of radioactivity on the natural environment.

The radiological impact during the period of operation of the facility is determined by means of a systematic assessment of radiation exposures:

(1) from normal operation of the facility including from controlled releases of effluents to the natural environment; and

(2) resulting from abnormal events which can reasonably be foreseen.

The assessment involves calculations of doses to workers and to people representative of the most exposed groups of the general public. In general the acceptability of the calculated doses is determined by comparison with criteria established by Member States taking account of recommendations from international bodies such as the International Commission for Radiological Protection and the International Atomic Energy Agency.

As regards impact over the longer term, the criteria for acceptability of assessed impact on human beings may be expressed in terms of dose or in terms of risk to human health, taking account of the probability that the dose will occur. In order to calculate potential doses it is necessary to consider the relevant features, events and processes that could determine the future evolution of the repository system. This process, termed 'performance assessment' considers a range of alternative evolutions of the repository system because of uncertainty regarding future events.