

# **GUIDANCE DOCUMENT**

FOR

**A RISK-BASED PRE-SELECTION PROTOCOL**

FOR THE

**INVENTORY OF CLOSED WASTE FACILITIES**

**AS REQUIRED BY ARTICLE 20**

**OF**

**DIRECTIVE 2006/21/EC**

**INVENTORY OF CLOSED WASTE FACILITIES AD-HOC GROUP**

**A SUB-COMMITTEE OF**

**THE TECHNICAL ADAPTATION COMMITTEE**

**FOR**

**DIRECTIVE 2006/21/EC**

Developed by

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**INVENTORY OF CLOSED WASTE FACILITIES AD-HOC GROUP**

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## 1. BACKGROUND

Directive 2006/21/EC on the Management of Waste from the Extractive Industries, often referred to as the "Mining Waste Directive" – MWD, requires in Article 20 that “Member States shall ensure that an inventory of closed waste facilities, including abandoned waste facilities, [...] which cause serious negative environmental impacts or have the potential of becoming in the medium or short term a serious threat to human health or the environment is drawn up and periodically updated. Such an inventory, to be made available to the public, shall be carried out by 01 May 2012 taking into account the methodologies as referred to in Article 21, if available.” According to Article 21 “[...] such methodologies shall allow for the establishment of the most appropriate risk assessment procedures [...].” Where the word Directive (without an attendant number) is used in this text it should be read to mean Directive 2006/21/EC.

The Directive therefore requires the application of risk assessment methods in the inventory for closed waste facilities that have either known environmental impacts or have the potential of impacting the environment or human health. The Directive does not require the development and application of a harmonised risk assessment methodology.

The European Commission and the Member States have established the Inventory of Closed Waste Facilities Ad-hoc Group (AHG) of the Technical Adaptation Committee of Directive 2006/21/EC in order to facilitate the implementation of Article 20 of the Directive by Member States by 2012.

At a meeting of the AHG in Ispra convened to develop a work programme for the AHG, following a suggestion from Lithuania, it was decided to develop a screening or pre-selection protocol. This was deemed desirable as an initial step so that small or non-hazardous closed waste facilities could be eliminated from further consideration and attention directed to those facilities which cause serious negative environmental impacts or have the potential of becoming a serious threat to human health or the environment in the short or medium term.

## 2. OBJECTIVE

The objective of the present document is to provide guidance to Member States on the use of the Pre-selection Methodology established during consultations of the AHG for the development of the inventory required by Article 20 of the MWD. It is not intended that the method provide either a rigid protocol or definitive advice on a Pre-selection methodology. The template presented offers an option on how the issue might be addressed, on how the protocol may be used by Member States if they believe that it is appropriate to their circumstances. Also some Member State may have already devised their own system or be advanced in the preparation of their inventory. The risk-based pre-selection protocol presented in this document should not replace the work already undertaken by Member States.

### 3. CONCEPTS AND PRINCIPLES

#### 3.1 Why a pre-selection protocol?

Many Member States have databases or lists or have knowledge of mine waste facilities showing that in some cases waste facilities amount to several tens of thousands. It would therefore be impractical to draw up an inventory especially since the vast majority of these waste facilities do not pose a serious threat to human health or the environment. It is clear therefore that a screening or pre-selection protocol is required. The Ad-hoc Group on the Nenagh Meeting in Ireland, April 2008, agreed to examine how such a protocol might be developed and what criteria would be used. A draft document was developed by Ireland and it was presented at the Budapest Meeting in Hungary, May 2009. This document served as the basis for the protocol presented here.

#### 3.2 What is a pre-selection protocol?

A pre-section protocol using simple criteria available in existing databases enables the preliminary screening of waste facilities. This screening should result in the elimination of those facilities which do not cause a serious threat to human health or have the potential to cause a serious threat to human health and the environment from the inventory of closed waste facilities. A pre-selection protocol should be carried out at an early stage in the entire inventory process and uses a few, simple parameters and is preferably based on "yes-or-no" criteria.

It is important to note that even if a waste facility 'passes' the pre-selection protocol, i.e. it is a site that is classified as EXAMINE FURTHER, it does not mean that the closed waste facility will necessarily be included in the final inventory. The pre-selection protocol is a process to select waste facilities from the many waste facilities for further study and eventual possible inclusion in the inventory.

#### 3.3 The precautionary principle

A pre-selection protocol should produce a selection of waste facilities that would be reasonably certain of capturing all relevant facilities (as candidate sites for inclusion in the inventory), i.e., it should be precautionary. In Annex III of the MWD, criteria for determining the classification of waste facilities, indents 2 and 3 specifically refer to hazardous substances and dangerous substances being above a certain threshold. These thresholds have been fixed by Commission Decision [2009/337/EC<sup>1</sup>](#). In many cases the actual levels of these substances will not be known for closed mine waste facilities. Since the pre-selection protocol is meant not to involve field sampling or laboratory analysis, as a precautionary measure any level will be sufficient to pass the test and select the facility for further investigation. Further investigation may lead to the elimination of a facility from the inventory.

In the case of a lack of knowledge or information, i.e. in the presence of uncertainty, a 'DON'T KNOW' response is entered for the particular parameter which is the same as a

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<sup>1</sup> [Commission Decision 2009/337/EC on the Criteria for the classification of waste facilities in accordance with Annex III](#), available from: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32009D0337:EN:NOT>

YES response and the site is selected for further examination – which is a precautionary position.

### 3.4 Pre-mining situation

Often where mineral deposits occur there is a geochemical signature in and around the deposit. This is a natural occurrence. The geochemical signature is often manifested by the occurrence of elevated levels of the metals that are to be exploited or by other associated metals (for example As in some Au deposits). Also depletions of certain elements may be the manifestation of the geochemical signature. Indeed, detecting these signatures is an exploration method commonly used by mining companies searching for mineral deposits. It is understood by most regulators that it is not appropriate to ‘clean up’ such naturally occurring signatures. To do so would create a considerable burden on local land owners. In most mining situations prior to the middle of the 20<sup>th</sup> Century the pre-mining situation is both unknown and unknowable. It is important to understand that elevated levels or certain metals at a now closed mine site may be due to entirely natural processes and not due to the processes of mining. However, differentiating between geogenic and anthropogenic elevated levels is almost impossible at our current level of scientific understanding. Therefore, on the basis that it is likely that some of the elevated levels of metals are due to entirely natural processes it is inappropriate to attempt to remediate a site to some form of either global mean or some safe value, howsoever determined. It is not proposed to use any sort of global mean or safe value to manipulate existing measured levels of metals in this protocol, because of the uncertainties involved.

## **4. UNDERSTANDING WHAT IS REQUIRED**

In order to understand what is required it is useful to review Article 20 of the Mining Waste Directive.

### 4.1 Article 20

Inventory of closed waste facilities

*“Member States shall ensure that an inventory of closed waste facilities, including abandoned waste facilities, located on their territory which cause serious negative environmental impacts or have the potential of becoming in the medium or short term a serious threat to human health or the environment is drawn up and periodically updated. Such an inventory, to be made available to the public, shall be carried out by 1 May 2012, taking into account the methodologies as referred to in Article 21, if available.”*

Throughout this document, based on Article 20, the expression **closed (mine) waste facilities** includes abandoned waste facilities.

#### 4.2 Some definition of terms in Article 20

**Waste:** According to Article 3 of the MWD - Definitions, "waste" means any substance or object which the holder discards or intends or is required to discard"<sup>2</sup>.

The scope of the MWD, and therefore the inventory required by Article 20, is defined in Article 2 and detailed in "Whereas" (6), (9) and (10) of the Directive. It is confined to "extractive waste" defined as "waste resulting from the prospecting, extraction, treatment and storage of mineral resources and the working of quarries".

This means that closed and abandoned waste facilities should be inventoried only if they contain waste directly resulting from the prospecting, extraction, treatment and storage at land-based mines.

As detailed in "Whereas 10" of the MWD, extractive waste which may be radioactive shall be included in the inventory but not for the aspects directly related to radioactivity which are a matter dealt with under the Treaty establishing the European Atomic Energy Community (Euratom).

**Waste facility:** According to Article 3 (15) - Definitions of the MWD, waste facility is defined as follows:

*waste facility means any area designated for the accumulation or deposit of extractive waste, whether in a solid or liquid state or in solution or suspension, for the following time-periods:*

- no time-period for Category A waste facilities and facilities for waste characterised as hazardous in the waste management plan;*
- a period of more than six months for facilities for hazardous waste generated unexpectedly;*
- a period of more than one year for facilities for non-hazardous non-inert waste;*
- a period of more than three years for facilities for unpolluted soil, non-hazardous prospecting waste, waste resulting from the extraction, treatment and storage of peat and inert waste.*

*Such facilities are deemed to include any dam or other structure serving to contain, retain, confine or otherwise support such a facility, and also to include, but not be limited to, heaps and ponds, but excluding excavation voids into which waste is replaced, after extraction of the mineral, for rehabilitation and construction purposes;*

Closed waste facilities do not have any time element to their definition and can be divided into two generic categories:

1. Heaps or tips, and
2. Lagoons or ponds, including tailings impoundments.

In the former case, waste is in a wholly solid state and not in solution or suspension (i.e., when not contained it is unlikely to move). In the latter case waste maybe in a fluid state or is material which is wholly, or mainly, in solution or suspension (i.e., likely to

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<sup>2</sup> In the MWD waste is defined in Article 3 which refers to Directive 75/442/EEC. Directive 75/442/EEC has been replaced by Directive 2008/96/EC on Waste

flow if not contained). Nevertheless, old tailings are usually thixotropic and do not flow easily.

Each waste facility must be treated individually and the assessment of heaps and lagoons on the same site cannot be treated together (for the definition of 'site' see below).

**Closed or abandoned waste facility:** These terms are not defined in the MWD. For this work a closed waste facility is a facility where mining activity has ceased. Closed waste facilities are facilities with an identified former owner or licensee and closed according to former licences or regulations. Abandoned waste facilities are facilities without an identified former owner/licensee and/or not having been closed in a regulated manner.

Often throughout this document, the word(s) **facility** or **waste facility** is used for brevity in place of **closed mine waste facility**.

**Site:** According to Article 3 (28) - Definitions of the MWD, waste facility is defined as follows:

*Site means all land at a distinct geographic location under the management control of an operator.*

**Environment, environmental impacts:** According to Article 1 of the MWD - Subject matter "This Directive provides for measures, procedures and guidance to prevent or reduce as far as possible any adverse effects on the environment, in particular water, air, soil, fauna and flora and landscape, and any resultant risks to human health, brought about as a result of the management of waste from the extractive industries."

Therefore, environment includes the (potentially) impacted living receptors: humans, on one hand, and ecosystems consisting of fauna and flora and landscape, on the other. Non-living receptors, such as water (both surface- and ground water), air and soil are also considered as (potentially) impacted receptors. Note that these media are both impacted receptors, as defined above, and pathways of material (contamination) transport at the same time.

**Serious:** Commission Decision 2009/337/EC explains the meaning of serious in the context of human health and the environment. However, it deals with each separately and differently. In the case of human health it states in Article 4.2:

*2. The potential for loss of life or danger to human health shall be considered to be negligible or not serious if people other than workers operating the facility that might be affected are not expected to be present permanently or for prolonged periods in the potentially affected area. Injuries leading to disability or prolonged states of ill-health shall count as serious dangers to human health.*

This is not a definition in the strict sense but rather an explanation of what the word **serious** is to include – disability or prolonged states of ill-health. Serious also comprehends loss of life as indicated in the first sentence of Article 4.2.

Commission Decision 2009/337/EC does not explain **serious** in the context of the environment. However, it does explain **not serious** (Article 4.3) thus:

*3. The potential danger for the environment shall be considered to be not serious if:*

- (a) *the intensity of the potential contaminant source strength is decreasing significantly within a short time;*  
 (b) *the failure does not lead to any permanent or long-lasting environmental damage;*  
 (c) *the affected environment can be restored through minor clean-up and restoration efforts. The words in bold, above, are the words changed from the original text of Article 4.3.*

Taking the wording in Article 4.3 and rewriting as the positive we get an explanation of serious thus:

- (a) *the intensity of the potential contaminant source strength is **not decreasing** significantly within a short time;*  
 (b) *the failure **leads to** any permanent or long-lasting environmental damage;*  
 (c) *the affected environment **cannot** be restored through minor clean-up and restoration efforts.*

The words in bold, above, are the words changed from the original text of Article 4.3.

**Short and medium term:** there are no commonly accepted definitions for short and medium term. However, in discussions with environmental scientists and engineers and reviewing some literature the following are often quoted:

Short term .....6 to 12 months

Medium term ..... 1 to 10 years

Long term..... greater than 10 years

#### 4.3 The scope: breaking Article 20 down

What follows is not a legal interpretation but may be useful from the point of view of understanding the Article and assisting with the development of a pre-selection protocol for creating an inventory. The Article has been broken down into eight sections as in the table below.

No.	Text of the Article broken down into clauses	Interpretation of the clause
1.	Member States shall ensure that an inventory of closed waste facilities, including abandoned waste facilities, located on their territory	This phrase requires that an inventory of closed waste facilities (facilities with an identified former owner or licensee and closed according to former licences or regulations) including abandoned facilities (facilities without an identified former owner/licensee and/or not having been closed in a regulated manner) in their jurisdictions be drawn up.
2.	which cause serious negative environmental impacts  <i>or</i>	This phrase addresses the <b>current</b> situation but only from an environmental viewpoint. Therefore the current situation needs to be addressed.
3.	have the potential of becoming in the medium or short term a serious threat to	This phrase addresses the <b>future</b> medium or short term threats. Therefore a prediction needs to be made.
4.	human health  <i>or</i> the environment	for both human receptors  <i>and</i> environmental (ecosystem) receptors.

5	serious	<p>In the foregoing three rows the word <b>serious</b> is used in conjunction with negative environmental impacts and with human health. Commission Decision 2009/337/EC explains the meaning of serious in the context of human health as “Injuries leading to disability or prolonged states of ill-health shall count as serious dangers to human health” (Article 4.2). Serious is also taken to mean loss of life – 1<sup>st</sup> sentence of Article 4.2. Unfortunately Commission Decision 2009/337/EC does not explain <b>serious</b> in the context of the environment. However, it does explain <b>not serious</b> (Article 4.3). Taking the wording Article 4.3 referring to not serious and rewriting as the positive we get the explanation of serious thus: The potential danger for the environment shall be considered to be <b>serious</b> if:</p> <ul style="list-style-type: none"> <li>(a) the intensity of the potential contaminant source strength is not decreasing significantly within a short time;</li> <li>(b) the failure <b>leads to</b> any permanent or long-lasting environmental damage;</li> <li>(c) the affected environment <b>cannot</b> be restored through minor clean-up and restoration efforts.</li> </ul> <p>The words in bold, above, are the words changed from the original text of Article 4.3.</p>
6.	<p>is drawn up</p> <p><b>and</b></p> <p>periodically updated.</p>	<p>This phrase says that the inventory must be developed for the existing situation.</p> <p><b>and</b></p> <p>This phrase says that the inventory must be updated on a regular basis.</p>
7.	<p>Such an inventory, to be made available to the public, shall be carried out by 01 May 2012,</p>	<p>This phrase says that the inventory must be carried out by the date specified and that it must be made public. It would be desirable to make the inventory available to the public on the internet.</p>
8.	<p>taking into account the methodologies as referred to in Article 21, if available.</p>	<p>This phrase states that the inventory must be carried out using a risk-based methodology (as mentioned in Article 21).</p>

Phrases 2, 3 4, and 5 set out the criteria by which the Inventory must be drawn up. The other phrases define:

- What** facilities have to be inventoried (closed and abandoned facilities);
- Where** (on Member States territories);
- When** (by 2012, and periodically updated); and
- How** the inventory has to be carried out (using a risk-based methodology – cited in Article 21).

#### 4.4 Radioactive waste

Recital 10 of the Directive states:

*“Moreover, while covering the management of waste from the extractive industries which may be radioactive, this Directive should not cover such aspects as are specific to radioactivity, which are a matter dealt with under the Treaty establishing the European Atomic Energy Community (Euratom).”*

This guidance document does not cover the radioactive aspects of wastes produced from the extractive industries but does cover toxicological and stability issues related to such wastes.

### **5. PRE-SELECTION REQUIREMENTS**

#### 5.1 Pre-selection characteristics

Based on Article 20, and Sections 3 and 4 above, a pre-selection protocol for screening closed waste facilities should possess the following characteristics:

1. Be risked-based, i.e. consider both the probability of an event occurring and the impact of such an occurrence;
2. Address the Source, Pathway and Receptor components;
3. Be simple and office-based;
4. Use readily available data;
5. Address data and information uncertainty;
6. Address serious damage to both human health and the environment (ecosystem) receptors;
7. Assess whether the closed waste facility contains either hazardous waste or dangerous substances;
8. Assess the physical stability of the closed waste facility;
9. Address serious damage occurring at the present and the potential for such damage to occur into the future (medium term, i.e., 1 to 10 years);
10. Provide a selection of waste facilities for further assessment;
11. Produce a selection of waste facilities that would be reasonably certain of capturing all relevant facilities, i.e., precautionary;
12. Be reasonable and proportionate for the task.

#### 5.2 Data requirements

Data that is or is assumed to be readily available in each Member State includes:

(1) Basic spatial and census data:

1. Topographic data including;
  - a. location of settlements (single houses, communities, villages etc.),
  - b. surface waters (rivers, streams and lakes), and
  - c. terrain (slope) data from contour lines or digital elevation model (DEM);
2. Census data;
3. Data on location of areas protected by legislation (National Parks, Natura 2000, etc.);

4. Location, status classification, monitoring data and river basin management plans of surface and ground water bodies according to the Water Framework Directive (WFD); and
  5. Land use/land cover data.
- (2) Basic waste facility data ('site data'):
1. Location of waste facilities;
  2. Contents of waste facility:
    - a. sulphides,
    - b. toxic metals; and
    - c. dangerous substances.
  3. Knowledge of chemicals used during mineral processing (dangerous substances);
  4. Knowledge of the geometry of the waste heap or pond:
    - a. volume,
    - b. area,
    - c. height, and
    - d. foundation gradient (topographic slope) for accident/failure potential; and
  5. Other data:
    - a. Geology - permeability and thickness of layer under waste facility, and
    - b. Existence of cover on top of waste facility – what kind of cover and what thickness?

1:100,000 scale Ordnance maps should suffice for most data requirements – digital for preference. Topographic maps of this or larger scales either in paper or in digital format are assumed to be readily available in Member States. The spatial boundaries of protected areas are also assumed to be readily accessible. There is also free topographic and remotely sensed images available on the internet.

Location, status classification, monitoring data and management plans of surface and ground water bodies ('good' or 'poor' status) should be available in Member States as a requirement of the Water Framework Directive and could be useful to identify possible water pollution originating from closed mine waste facilities.

Digital elevation model (DEM) at the 1:100,000 scale is globally available from NASA through the Shuttle Radar Topographic Mission (SRTM). The data is available from <http://srtm.csi.cgiar.org/>. Higher resolution DTMs are commonly available in Member States. However, topographic slope below waste facilities may be derived from paper contours, or might be available from mine archives. Digital land use/land cover (LULC) maps at the 1:100,000 scale are available in Europe (CORINE <http://www.eea.europa.eu/publications/COR0-landcover>). Higher resolution land use maps are commonly available in Member States. However, land use information may be derived from remotely sensed images.

Location of closed mine waste facilities can be obtained from archive mineral resources or mineral production databases, previous inventories (inventory of contamination sources, e.g.) or from remotely sensed images.

Census data is assumed to be readily available in Member States.

Basic **waste facility data** is assumed to be available from archive mineral resources or mineral production databases, previous inventories (inventory of contamination sources, e.g.) or from remotely sensed images. Size and extent of the closed waste facility might be obtained from remotely sensed images. The scientific literature (scientific journals, theses, government documents) may also contain important information about waste facilities.

Geological information can be obtained from geological maps (printed or digital) and reports and data on permeability can be obtained from hydrogeological maps and reports.

Note that the lack of any of the required data or information does not prevent the pre-selection evaluation of a waste facility. It does lead to uncertainty but the facility is classified as 'EXAMINE FURTHER' on the basis of the precautionary principle.

## **6. THE PROPOSED PRE-SELECTION PROTOCOL**

This part of the guidance presents a summary of the Pre-selection protocol. A more detailed description of the questions and possible answers is given in Appendix 1 – Detailed Guide to the Pre-selection Protocol. The person carrying out the pre-selection exercise will be described as the assessor in this text.

### 6.1 The Pre-selection Protocol Questionnaire

The Pre-selection Protocol is presented in the form of a Questionnaire and as a Flowchart (Figure 1). There are four sections or compartments to the questionnaire:

1. Any known serious impacts;
2. Source;
3. Pathways; and
4. Receptors.

The first compartment seeks to determine whether a site is known to have had an incident which has had a serious impact on human health or the environment. As an example, the Aznacollar tailings facility is known to have failed and to have had a serious impact on humans and the environment and the site would therefore immediately be assigned to the POTENTIAL CANDIDATE category. If there are no known serious impacts then the facility under examination is led to the next section of the questionnaire.

The second section addresses the contents and stability of the facility, in other words the **Source** of potential contamination. There are **three** questions which address the content of the facility. Following this there are questions which address the stability of the facility. There is one question at the commencement of this section which seeks to determine if the facility is either a tailings lagoon or a waste heap. If the facility is a tailings lagoon there are **two** questions or if the facility is a heap there are **three** questions.

The third section considers the potential pathways by which receptors could be impacted by the source, i.e., the pathways. There are **four** pathway questions, one covering each of the four potential pathways – surface water, groundwater, air / atmosphere, and direct contact.

The fourth section considers the types of receptor that could be impacted. There are **four** questions which seek to identify whether a particular receptor is impacted or not.

For the first question in Section 1 there are two possible answers – either YES or NO. If YES then the waste facility under question is immediately assigned to the EXAMINE FURTHER endpoint while if NO the assessor is directed to Sections 2, 3 and 4 of the protocol.

For most questions in Sections 2, 3 and 4 there are three possible responses but only two routes from the question. The possible responses are YES, NO, UNKNOWN. The YES and UNKNOWN responses follow the same route while the NO response follows its own direction. If the answers to all the questions in a Section are NO then the assessor is directed to NO NEED TO EXAMINE FURTHER endpoint. If there is at least one YES or UNKNOWN response in each of the three Sections then the assessor is directed to the EXAMINE FURTHER endpoint. This case means that there possibly exists a contamination source, at least one possible pathway and a sensitive receptor.

## 6.2 Assumptions

The following assumptions are made with respect to the Questionnaire:

1. The process will be carried out in a digital environment. Minerals databases, digital topographic maps, digital elevation models, digital land use/land cover maps, digital map of protected areas and remotely sensed images are available to the assessor.
2. Access to suitable GIS software packages.
3. Minerals databases differ from Member State to Member State. In this work it is assumed that some form of minerals database exists and that it contains information on the minerals and metals mined. Such databases may also contain information on the nature of the mineral processing, waste facilities at the site including their dimensions and other relevant information.
4. Census information (population and location of population) information is readily available to the assessor. These should preferably be available digitally.

## 6.3 Thresholds

Many of the questions in the questionnaire involve the choice of a particular distance, height or other parameter. As far as possible the number chosen has a particular scientific basis. In some cases however, the choice of a threshold number is somewhat arbitrary but is considered reasonable. For example, the choice of a specific distance in the questions relating to receptors has been chosen as 1km. This does not have a scientific basis and can be considered arbitrary. Each Member State could choose a different threshold which they believe is appropriate to their particular circumstances or experience. It may be possible to consider different distances for different topographic situations, for example:

Mountainous with elevation differences >500m.....5km

Undulating with elevation differences <500m.....3km

Flat with small hills <100m elevation difference.....1km

The rationale behind this added complication is that contamination escaping from a waste facility in more mountainous terrain would spread further and faster than in more subdued terrain. The application of such varying thresholds would require additional information, in this instance a Digital Elevation Model (DEM).

Table 2 illustrates those questions which require the selection of a threshold figure, the threshold figure chosen and the rationale, if any for the selection of that figure. Individual Member States may wish to vary the suggested thresholds to meet their own circumstances and experience.

Question number	Issue	Threshold(s) or Parameter(s)	Basis
3	Did the mine produce specified <b>substances</b> ?	Ag, As, Ba, Be, Cd, Co, Cr, Cu, Hg, Ni, Pb, Sb, Se, Sn, Te, Tl, U, V, Zn or asbestos.	Listed as hazardous under Directive 91/689/EEC and its amendments.
6	Is the lagoon > specified <b>area</b> ?	10,000m <sup>2</sup>	Arbitrary
7	Is the lagoon > a specified <b>height</b> at a specified <b>distance</b> from the facility?	Height – 4m Distance – 50m	In Irish Quarry regulations <sup>3</sup>
8	Is the heap > specified <b>area</b> ?	10,000m <sup>2</sup>	Arbitrary
9	Is the heap > specified <b>height</b> ?	20m	Arbitrary
10	Is the heap foundation > specified <b>slope</b> ?	1:12	Arbitrary
11	Is there a water body within a specified <b>distance</b> of the facility?	1km	Arbitrary
15	Is there a human settlement with more than a specified <b>number of people</b> within a specified <b>distance</b> of the facility?	People – 100 Distance – 1km	Arbitrary Arbitrary
16	Is the facility < specified <b>distance</b> from a water body which is at least at a specified <b>quality status</b> ?	1km Good status	Arbitrary This is the standard the Groundwater Directive specifies.
17	Is the facility within a specified <b>distance</b> of a Natura 2000 site?	1km	Arbitrary
18	Is the facility within a	1km	Arbitrary

<sup>3</sup> Safe Quarry: Guidelines to the Safety, Health and Welfare at Work (Quarries) Regulations 2008. (S.I. No. 28 of 2008). Published by the Irish Health and Safety Authority.

	specified <b>distance</b> of agricultural activity?		
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Table 2. Questions requiring the choice of a particular threshold, value or parameter. The type of parameter is indicated in **bold** typeface in the Issue column.

#### 6.4 The Output from the Pre-selection Protocol

The end result from the protocol is the division of waste facilities into two classes, namely:

1. NO NEED TO EXAMINE FURTHER
2. EXAMINE FURTHER

In the first class the waste facility is excluded from any further consideration. In the second class the waste facility should be examined further to determine if it meets the criteria for inclusion in the inventory (not discussed here).

Of necessity the pre-selection protocol is a conservative one which aims to include waste facilities which meet the criteria of the Directive. However, some sites which are classified as needing FURTHER EXAMINATION, upon further examination, may not meet the criteria for inclusion in the inventory.

### 7. SUGGESTIONS FOR APPLICATION

The Pre-selection Protocol is not mandatory and has been developed to assist member States achieve the requirements of Article 20 of the Directive in an efficient manner. In order to determine if the Pre-selection Protocol is a useful aid the following approach to using the protocol is recommended:

1. First test the protocol on a number of facilities with well known attributes. Select facilities which in the opinion of the assessor will definitely be in the final inventory that will be presented to the Commission and some that will definitely not be in the inventory. The outcome from applying the questionnaire to these well known facilities should accord with the original expert judgement of the assessor. Perhaps this could be developed as an EXCEL spreadsheet with facilities with rows of facilities and columns for the questions or a simple database. Run the pre-selection protocol and register the number and proportion of sites classified for each of the two possible outcomes.
2. Register how many UNKNOWN responses were given for each facility. The proportion of these uncertain responses to the certain responses for a facility and for your whole database may give an insight of specific and overall uncertainty in the data you use.
3. If you have your own protocol, or you use another pre-selection protocol, it may be worth comparing the results of the two protocols. Differences between the results may give insight into the parameter selection and the logic of the methods used. One other possible comparison would be to compare the results of this exercise with that of the European Commission PECOMINES Project (<http://viso.jrc.ec.europa.eu/>) and the European Environmental Agency PRAMS Preliminary Risk Assessment (<http://etc-lusi.eionet.europa.eu/activities/reportste/>)

4. You may wish to change the threshold values according to your own expert knowledge or experience or national standards. It may still be worth running the protocol with both the original thresholds and your own suggested thresholds to compare the results.
5. You may wish to add or remove questions. It may still be worth running the protocol with both the original questions and the added or deleted questions, to compare the results.
6. It can be efficient to link the Pre-selection questions to a GIS system as database inquiries and use digital spatial data to directly generate answers such as distance to the nearest water bodies or protected areas.

**APPENDIX 1**

**DETAILED GUIDE**

TO THE

**QUESTIONNAIRE**

**FOR**

**THE RISK-BASED PRE-SELECTION PROTOCOL**

FOR THE

**INVENTORY OF CLOSED WASTE FACILITIES**

**AS REQUIRED BY ARTICLE 20**

**OF**

**DIRECTIVE 2006/21/EC**

This Appendix provides a detailed analysis of all the questions in the questionnaire, their rationale, possible sources of information, possible responses and the consequence of a particular response.

### **SECTION 1 – PREVIOUS INCIDENTS**

This section is preliminary to the main body of the questionnaire.

#### **Question 1**

*Is the closed mine waste facility known to have had an incident which has had a serious impact on human health or the environment?*

#### **Rationale**

The rationale for this question is to ensure that facilities which had serious incidents are included in the inventory. Note that a serious incident can be either an instantaneous accident or long-term pollution. It may be the case that such an incident has been addressed and the damage from the incident cleaned up so that it is unlikely that such an event will occur again. However, the AHG recommend that such facilities be included in the inventory being compiled on the basis of a known serious impact.

#### **Possible sources of information**

The information to answer this question may be in official reports available from the former operator of the mine, the mine regulator's office or the geological survey, or media reports, or knowledge of the assessor.

#### **Possible responses**

YES

NO

#### **Outcome of response**

If the response is YES then the assessor is immediately directed to the EXAMINE FURTHER endpoint.

If the response is NO then the assessor is directed to Section 2 of the questionnaire to examine the content and physical stability of the facility, i.e., the facility as a potential source of contamination in the first instance and also its stability.

### **SECTION 2 - SOURCE**

This section seeks to determine the classes of substances contained in the waste facility and its physical stability. In doing this the AHG was mindful of the classes of substances mentioned throughout the Directive such as sulphide minerals, hazardous substances and dangerous substances.

There are two principal sets of questions. The first addresses the contents ('chemical stability') of the facility while the second addresses the physical stability of the facility. The latter is divided into two – one to address tailings lagoons (being or having the potential to flow) and the other to address waste heaps (solid wastes).

It was argued at AHG meetings, and ultimately accepted, that with regard to the source that we should be guided by the 'spirit' of Annex III of the Directive. Annex III,

reproduced below, list three criteria which would lead to the classification of a waste facility as Category A.

### ANNEX III

#### *Criteria for determining the classification of waste facilities*

*A waste facility shall be classified under category A if:*

- a failure or incorrect operation, e.g. the collapse of a heap or the bursting of a dam, could give rise to a major accident, on the basis of a risk assessment taking into account factors such as the present or future size, the location and the environmental impact of the waste facility; or*
- it contains waste classified as hazardous under Directive 91/689/EEC above a certain threshold; or*
- it contains substances or preparations classified as dangerous under Directives 67/548/EEC or 1999/45/EC above a certain threshold.*

The first indent refers to the physical stability of the facility while the latter two indents refer to the contents of the facility.

## 2A Contents

### Question 2

*Did the mine work sulphide minerals or produce a waste containing sulphide minerals?*

#### **Rationale**

One of the principal contaminants from mining derives from the working of sulphide minerals. Sulphide minerals have the potential to produce acid mine drainage with attendant leaching and transport of heavy metals many of which can be harmful to humans and the environment. This is often an easier question to answer than the other questions in this section.

#### **Possible sources of information**

The most likely source for this information is in official records from the former mine operator, or at the mine regulator's office, or at a geological survey or within a research institute or it may be within the knowledge of the assessor.

#### **Possible responses**

YES

UNKNOWN

NO

#### **Outcome of response**

If the answer to the question is YES then the assessor is directed out of the current section and to the next section – pathway. The other questions (numbers 3 and 4) in this section are not necessary as the facility contains material which is known to be harmful to humans or the environment.

If the answer to the question is UNKNOWN then the assessor is directed out of the current section and to the next section – pathway. The other questions (numbers 3 and

4) in this section are not necessary as the facility contains material which may be harmful to humans or the environment.

If the answer to the question is NO then the assessor is directed to the next question (number 3) to determine if there are other classes of material in the facility which may be harmful to humans or the environment.

### Question 3

*Were any of the following produced from the mined mineral - Ag, As, Ba, Be, Cd, Co, Cr, Cu, Hg, Ni, Pb, Sb, Se, Sn, Te, Tl, U, V, Zn or asbestos?*

### Rationale

Indent 2 of Annex III of the Directive refers to “waste classified as hazardous under Directive 91/689/EEC above a certain threshold” when speaking about the classification of a Category A facility. The list in the question was generated from Annex II of Directive 91/689/EEC and its amendments. Two issues arise in framing this question. Firstly, there is the question of ‘above a certain threshold’ as in Annex III. In framing the question no thresholds are mentioned. This is because if such thresholds were to be specified then an analysis would be required of the waste to determine whether the threshold was exceeded or not. This would defeat the purpose of having a **simple, desk based** pre-selection protocol. Secondly, the question is framed to ask ‘were any of the following produced from the ore’. As all ores and indeed rock contain some trace content of a large number of elements it would not be appropriate to ask ‘does the ore contain ...’. Instead, the question asks if the particular substances were produced. The product may be the actual concentrate produced at the mine or an element produced at a smelter – which may or may not be at the site of the facility. It is understood that smelter waste is not included in the Directive. However, if an element is recovered at the smelter then it must exist in some quantity in the concentrate and is more than likely to be in the ore and hence in waste from the mine.

### Possible sources of information

The most likely source for this information is in official records from the mine or smelter which processed the ore, or at the office of the authorities responsible for mining, at a mine regulator’s office, at a geological survey or within a research institute or it may be within the knowledge of the assessor.

### Possible responses

YES

UNKNOWN

NO

### Outcome of response

If the answer to the question is YES then the assessor is directed out of the current section and to the next section – pathway. The other question (number 4) in this section is not necessary as the facility contains material which is known to be hazardous to humans or the environment.

If the answer to the question is UNKNOWN then the assessor is directed out of the current section and to the next section – pathway. The other question (number 4) in this section is not necessary as the facility contains material which may be hazardous to humans or the environment.

If the answer to the question is NO then the assessor is directed to the next question (number 4) to determine if there are other classes of material in the facility which may be harmful to humans or the environment.

#### **Question 4**

*Did the mine use dangerous chemicals to process the mined minerals?*

#### **Rationale**

Indent 3 of Annex III of the Directive refers to “substances or preparations classified as dangerous under Directives 67/548/EEC or 1999/45/EC above a certain threshold when speaking about the classification of a Category A facility. The question asks whether dangerous chemicals were used to process the ore. There are many chemical used to process ore – some of which are classified as dangerous by Directive 67/548/EEC or Directive 1999/45/EEC (such as cyanide) but many of which are not dangerous. Many, if not most, mines which operated prior to the 20<sup>th</sup> Century did not use chemicals to process ore. The use of chemicals, dangerous or not, is largely a 20<sup>th</sup> and 21<sup>st</sup> Century phenomenon. It will be difficult or impossible to know what chemicals were used at some mines which will result in the response – UNKNOWN. As in the previous question the issue of ‘above a certain threshold’ arises. In framing the question no thresholds are mentioned. This is because if such thresholds were to be specified then an analysis would be required of the waste to determine whether the threshold was exceeded or not. This would defeat the purpose of having a **simple, desk based** pre-selection protocol.

#### **Possible sources of information**

The most likely source for this information is in official records from the mine which processed the ore, or at the office of the authorities responsible for mining, at a mine regulator’s office, at a geological survey or within a research institute or it may be within the knowledge of the assessor.

#### **Possible responses**

YES

UNKNOWN

NO

#### **Outcome of response**

If the answer to the question is YES then the assessor is directed out of the current section and to the next section – pathway.

If the answer to the question is UNKNOWN then the assessor is directed out of the current section and to the next section – pathway.

If the answer to the question is NO then the assessor is directed to the next question (number 5) to assess the potential for physical instability of the facility.

## **2B Source - stability**

### **Question 5**

*Is the waste facility a tailings lagoon or a waste heap?*

#### **Rationale**

This question is to determine what kind of waste facility is being assessed. Depending on the answer the assessor is directed to one of two routes.

#### **Possible sources of information**

The most likely source for this information is in official records from the mine, or at the office of the authorities responsible for mining, at a mine regulator's office, at a geological survey or within a research institute or it may be within the knowledge of the assessor. It may also be possible to determine which type of facility it is from aerial photographs.

#### **Possible responses**

TAILINGS LAGOON

WASTE HEAP

#### **Outcome of response**

If the response is TAILINGS LAGOON then the assessor is directed to question 6 and possibly question 7 depending on the response to question 6.

If the response is WASTE HEAP then the assessor is directed to question 8 and possibly onto questions 9 and 10 depending on the response to question 8.

### **Question 6**

*Is the area of the tailings lagoon greater than 10,000m<sup>2</sup>?*

#### **Rationale**

The larger a tailings lagoon the more likely it is to cause damage to humans or the environment should it fail. Some threshold needs to be selected below which if a failure were to occur that the consequences would not likely be serious. This figure is somewhat arbitrary but it is up to Member States to select their own threshold.

#### **Possible sources of information**

Sources of data for this question would be mine plans which might be available in official records from the mine, or at the office of the authorities responsible for mining, at a mine regulator's office, at a geological survey of the Member State. The information could also be generated from aerial photographs.

#### **Possible responses**

YES

UNKNOWN

NO

**Outcome of response**

If the answer to the question is YES then the assessor is directed out of the current section and to the next section – pathway. The other question (number 7) in this section is not necessary as the facility is greater than the threshold value and may pose a threat to humans or the environment.

If the answer to the question is UNKNOWN then the assessor is directed out of the current section and to the next section – pathway. The other question (number 7) in this section is not necessary as the facility may be greater than the threshold value and may pose a threat to humans or the environment.

If the answer to the question is NO then the assessor is directed to the next question (number 7) to determine if the facility is higher than a certain threshold height which may pose a threat to humans or the environment.

**Question 7**

*Is the height of the tailings lagoon >4m within 50m of the facility?*

**Rationale**

The greater the height of the tailings lagoon the more likely it is to cause damage to humans or the environment should it fail. The question seeks to determine the height of the facility some 50m from the facility. If the natural (or man-made) terrain around the facility is lower than the lagoon then in the event of a failure of the lagoon and the escape of the material contained within the facility has the potential to move some distance from the facility and potentially cause serious negative environmental impacts. If on the other hand the terrain surrounding a tailings lagoon is higher than the lagoon walls then there is the possibility for any escaped contents to be captured naturally by the topography of the area. Some threshold needs to be selected below which if a failure were to occur that the consequences would not likely be serious. These figures are used in Ireland with respect to lagoons associated with sand and gravel operations<sup>4</sup>. However, it is up to Member States to select their own thresholds.

**Possible sources of information**

This may be a difficult piece of information to obtain. The data might be available from mine plans which might be available in official records from the mine, or at the office of the authorities responsible for mining (mine regulator's office) or at a geological survey of the Member State. The information could also be generated from aerial photographs. There may be drawings available from the former operators or in the mining regulator's offices or in geological surveys. It may be possible to obtain the data from digital elevation surface models. With respect to the latter most Member States will have these or there is the freely available Shuttle Radar Topographic Mission (SRTM) data<sup>5</sup>.

**Possible responses**

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<sup>4</sup> Safe Quarry: Guidelines to the Safety, Health and Welfare at Work (Quarries) Regulations 2008. (S.I. No. 28 of 2008). Published by the Health and Safety Authority.

<sup>5</sup> SRTM website: <http://srtm.csi.cgiar.org/>

YES

UNKNOWN

NO

**Outcome of response**

If the answer to the question is YES then the assessor is directed out of the current section and to the next section – pathway.

If the answer to the question is UNKNOWN then the assessor is directed out of the current section and to the next section – pathway.

If the answer to the question is NO then the assessor is directed to the NO NEED TO EXAMINE FURTHER endpoint of the questionnaire as the source element of the questionnaire has been found to not pose a threat to humans or the environment, i.e., without a source there is no threat and the facility need not be examined further.

**Question 8**

*Is the area of the waste heap greater than 10,000m<sup>2</sup>?*

**Rationale**

The larger a waste heap the more likely it is to cause damage to humans or the environment should it fail. Some threshold needs to be selected below which if a failure were to occur that the consequences would not likely be serious. This figure is used in Ireland for waste tips in quarries<sup>6</sup> but it would be up to Member States to select their own threshold.

**Possible sources of information**

The data might be available from mine plans which might be available in official records from the mine, or at the office of the authorities responsible for mining (mine regulator's office) or at a geological survey of the Member State. The information could also be obtained from aerial photographs.

**Possible responses**

YES

UNKNOWN

NO

**Outcome of response**

If the answer to the question is YES then the assessor is directed out of the current section and to the next section – pathway. The other questions (numbers 9 and 10) in this section are not necessary as the facility is greater than the threshold value and may pose a threat to humans or the environment.

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<sup>6</sup> Safe Quarry: Guidelines to the Safety, Health and Welfare at Work (Quarries) Regulations 2008. (S.I. No. 28 of 2008). Published by the Irish Health and Safety Authority.

If the answer to the question is UNKNOWN then the assessor is directed out of the current section and to the next section – pathway. The other questions (numbers 9 and 10) in this section are not necessary as the facility may be greater than the threshold value and may pose a threat to humans or the environment.

If the answer to the question is NO then the assessor is directed to the next question (number 9) to determine if the facility is higher than a certain threshold height which may pose a threat to humans or the environment.

**Question 9**

*Is the height of the waste heap >20m?*

**Rationale**

The higher a waste heap the greater the risk it poses to humans or the environment. In selecting a threshold value the AHG was mindful that waste heaps do not flow in the same way as tailings lagoons. This figure is used in Ireland for waste tips in quarries<sup>7</sup> but it would be up to Member States to select their own threshold.

**Possible sources of information**

The data might be available from mine plans which might be available in official records from the mine, or at the office of the authorities responsible for mining (mine regulator's office) or at a geological survey of the Member State. The information could also be obtained from aerial photographs.

**Possible responses**

YES

UNKNOWN

NO

**Outcome of response**

If the answer to the question is YES then the assessor is directed out of the current section and to the next section – pathway. The other question (number 10) in this section is not necessary as the facility is greater than the threshold value and may pose a threat to humans or the environment.

If the answer to the question is UNKNOWN then the assessor is directed out of the current section and to the next section – pathway. The other question (number 10) in this section is not necessary as the facility may be greater than the threshold value and may pose a threat to humans or the environment.

If the answer to the question is NO then the assessor is directed to the next question (number 10) to determine if the facility foundation is greater than a certain threshold which may increase the likelihood of failure of the facility and cause a threat to humans or the environment.

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<sup>7</sup> Safe Quarry: Guidelines to the Safety, Health and Welfare at Work (Quarries) Regulations 2008. (S.I. No. 28 of 2008). Published by the Health and Safety Authority.

**Question 10**

*Is the slope of the foundation >1:12?*

**Rationale**

The slope of the foundation upon which the waste heap rests is also of concern with respect to stability. The greater the slope angle the greater the risk of the waste heap failing. The threshold chosen is 1:12 which equates to 8.3% or a slope angle of almost 5°. This figure is used in Ireland for waste tips in quarries<sup>8</sup> but it would be up to Member States to select their own threshold.

**Possible sources of information**

The data might be available from mine plans which might be available in official records from the mine, or at the office of the authorities responsible for mining (mine regulator's office) or at a geological survey of the Member State. The data could also be generated from digital elevations. It may be possible to generate the data from digital elevation models. With respect to the latter most Member States will have these or there is the freely available Shuttle Radar Topographic Mission (SRTM) data<sup>9</sup>.

**Possible responses**

YES

UNKNOWN

NO

**Outcome of response**

If the answer to the question is YES then the assessor is directed out of the current section and to the next section – pathway.

If the answer to the question is UNKNOWN then the assessor is directed out of the current section and to the next section – pathway.

If the answer to the question is NO then the assessor is directed to the NO NEED TO EXAMINE FURTHER endpoint of the questionnaire as the source element of the questionnaire has been found to not pose a threat to humans or the environment, i.e., without a source there is no threat and the facility need not be examined further.

**SECTION 3 - PATHWAY**

This section seeks to determine which pathways may be operating in bringing the source into contact with humans or the environment. In doing this the AHG was mindful of the four principal pathway normally investigated in evaluating risk, namely, surface water, groundwater, the air pathway and direct contact.

There is one set of questions comprising four questions – one for each of the four pathways.

**Question 11**

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<sup>8</sup> Safe Quarry: Guidelines to the Safety, Health and Welfare at Work (Quarries) Regulations 2008. (S.I. No. 28 of 2008). Published by the Health and Safety Authority.

<sup>9</sup> SRTM website: <http://srtm.csi.cgiar.org/>

*Is there a water course within 1km of the mine waste facility?*

**Rationale**

Surface water is one of the pathways by which the source material may come into contact with humans or the environment. Surface waters are a source of drinking water for humans and some animal while they are also ecosystems in their own right and support aqueous habitats. The question seeks to determine if there is a water course within the specified distance from the waste facility. A water course is any stream, river, canal, lake or reservoir. The threshold distance of 1km is to a certain extent arbitrary but the AHG considers it to be reasonable.

**Possible sources of information**

Digital topographic maps at a scale of 1:50,000 or 1:100,000 are readily available in all Member States. Once the location of the facility is located it is an easy matter to use a Geographic Information System (GIS) to place a (1km) buffer around the facility and determine if a water course exists within the specified distance.

**Possible responses**

YES

UNKNOWN

NO

**Outcome of response**

If the answer to the question is YES then the assessor is directed out of the current section and to the next section – receptor. The other questions (numbers 12, 13 and 14) in this section are not necessary as the facility is within the threshold distance and may pose a threat to humans or the environment.

If the answer to the question is UNKNOWN (although this will be an uncommon response) then the assessor is directed out of the current section and to the next section – receptor. The other questions (numbers 12, 13 and 14) in this section are not necessary as the facility may be within the threshold distance and may pose a threat to humans or the environment.

If the answer to the question is NO then the assessor is directed to the next question (number 12 – groundwater) to determine if the facility might be using the groundwater pathway to bring the source into contact with humans or the environment.

**Question 12**

*Is there a high permeability layer<sup>10</sup> beneath the mine waste facility?*

**Rationale**

It is possible that a leachate will develop in a mine waste facility which may be polluting and which if this comes into contact with groundwater could be polluting to the groundwater. Therefore if the leachate can be kept within the waste facility it will not pollute the groundwater. This is best achieved if there is an engineered base and sidewalls to the facility. The question seeks to determine if there is such an engineered or natural barrier to the movement of any such leachate generated within the facility. Note the question does not address the efficacy of any potential barrier.

**Possible sources of information**

The information for engineered barriers might be available from mine plans which might be available in official records from the mine, or at the office of the authorities responsible for mining (mine regulator's office) or at a geological survey of the Member State or from the knowledge of the assessor. In the case of natural barriers the information might be available from geological maps (Quaternary or Surface Geology) which a geological survey or academic institution may have drawn.

**Possible responses**

YES

UNKNOWN

NO

**Outcome of response**

If the answer to the question is YES then the assessor is directed out of the current section and to the next section – receptor. The other questions (numbers 13 and 14) in this section are not necessary as the facility may leak leachate to groundwater thus posing a threat to humans or the environment.

If the answer to the question is UNKNOWN then the assessor is directed out of the current section and to the next section – receptor. The other questions (numbers 13 and 14) in this section are not necessary as the facility may leak leachate to groundwater thus posing a threat to humans or the environment.

If the answer to the question is NO then the assessor is directed to the next question (number 13 – air contact) to determine if the facility might be allowing the escape of pollutants *via* the air pathway to bring the source into contact with humans or the environment.

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<sup>10</sup> A low permeability layer could be an artificial liner, an engineered clay supplement or a natural barrier to the percolation of leachate from the facility. The latter is interpreted as a 10m thick low permeability natural material such as a till.

**Question 13**

*Is the material within the mine waste facility exposed to the wind?*

**Rationale**

Wind may lift up and transport material (dust) and bring mine waste into contact with humans and animals through inhalation. Transport by wind also enlarges the area that could be affected by waste from a mining operation. Wind will transport fine grained material. If a waste facility is permanently covered by water it is not exposed to the wind. Also if a waste facility has been revegetated (whether by design or invading local species) then it will not be exposed to the wind. It is only in those cases where the mine waste material itself is exposed to the wind that there is a potential threat to humans and other animals through inhalation. From a practical point of view a waste facility can be said to not be exposed to the wind if it is 90% or greater covered by vegetation or some other covering material.

**Possible sources of information**

Information for this question may be obtained from recent aerial photography (say less than 5 years old). It may easily be determined that the facility is covered by water or vegetation. If the facility is covered by some other material it may not be as easy to determine if the facility is covered or not depending on the nature and colour of that covering material.

**Possible responses**

YES

UNKNOWN

NO

**Outcome of response**

If the answer to the question is YES then the assessor is directed out of the current section and to the next section – receptor. The other question (number 14) in this section is not necessary as the facility may expose humans or other animals to airborne dust from the facility.

If the answer to the question is UNKNOWN then the assessor is directed out of the current section and to the next section – receptor. The other question (number 14) in this section is not necessary as the facility may expose humans or other animals to airborne dust from the facility.

If the answer to the question is NO then the assessor is directed to the next question (number 14 – direct contact) to determine if the facility might be humans or other animals into direct contact with the waste ion the facility.

**Question 14**

*Is the mine waste facility uncovered?*

**Rationale**

Humans or animals may come into contact with waste within the facility if it is not covered, for example by water, by vegetation or by some other material. The difference

between this and the previous question is that fine grained material is picked up by wind and may be inhaled whereas in this case humans or animals may come into contact with the mine waste – regardless of the size of the individual particles within the material. Direct contact may lead to ingestion or absorption through the skin. If a waste facility is permanently covered by water then humans and animals will not come into contact with the mine waste material and the facility is considered to be covered. Also if a waste facility has been revegetated (whether by design or invading local species) then it will not be exposed to humans or other animals. It is only in those cases where the mine waste material itself is exposed is it a potential threat to humans or other animals through direct contact. From a practical point of view a waste facility can be said to be exposed if it is 10% or less covered by vegetation or some other covering material.

**Possible sources of information**

Information for this question may be obtained from recent aerial photography (say less than 5 years old). It may easily be determined that the facility is covered by water or vegetation. If the facility is covered by some other material it may not be as easy to determine if the facility is covered or not depending on the nature and colour of that covering material.

**Possible responses**

YES

UNKNOWN

NO

**Outcome of response**

If the answer to the question is YES then the assessor is directed out of the current section and to the next section – receptor.

If the answer to the question is UNKNOWN then the assessor is directed out of the current section and to the next section – receptor.

If the answer to the question is NO then the assessor is directed to the NO NEED TO EXAMINE FURTHER endpoint of the questionnaire as the pathway element of the questionnaire has been found not to be present, i.e., without a pathway there is no threat and the facility need not be examined further.

**SECTION 4 - RECEPTORS**

This section seeks to determine what, if any, receptors are in the vicinity of the waste facility. In doing this the AHG was mindful of both humans and ecosystems.

There is one set of questions comprising four questions – one question addresses humans as potential receptors, two questions address ecosystems only as potential receptors and one questions addresses both humans and ecosystems as potential receptors.

**Question 15**

*Is there a human settlement with >100 people within 1km of the waste facility?*

**Rationale**

Human habitations are a clear sign of the presence of people within an area. The more people that are in an area the more likely it is that someone will come in contact with the waste with potentially harmful effects *via* one of the four pathways. The number of 100 is arbitrary but is considered to be reasonable as is the choice of buffer of 1km.

**Possible sources of information**

Population statistics are the source of such information. All Member States have census statistics and the most recent data should be used. In some Member States there may not be census information for small villages in which case it may be possible to count the number of houses on aerial photographs and assume a number of persons per house (in Ireland the average number of persons per house is 2.8, say 3) and multiply the number of house by this average number. There may be regional variations and this could be taken into account also. The procedure is facilitated by the use of a GIS package.

**Possible responses**

YES

UNKNOWN

NO

**Outcome of response**

If the answer to the question is YES then the assessor is directed out of the current section and to one of the final outcomes EXAMINE FURTHER. The response to the question is that there is a settlement of >100 within a kilometre of the facility. The other questions (numbers 16, 17 and 18) in this section are not necessary as the facility has been shown to have a potential source – pathway – receptor linkage.

If the answer to the question is UNKNOWN then the assessor is directed out of the current section and to one of the final outcomes EXAMINE FURTHER. The response to the question is that there may be a settlement of >100 within a kilometre of the facility. The other questions (numbers 16, 17 and 18) in this section are not necessary as the facility has been shown to have a potential source – pathway – receptor linkage.

If the answer to the question is NO then the assessor is directed to the next question (number 16) to determine if the facility is within 1km of a water body which is not in a good quality condition.

**Question 16**

*Is the waste facility within 1km of a water body which is of less than good status?*

**Rationale**

This question is to address the quality of water in water bodies in the proximity of a waste facility. The quality status of the water body must be known to address the question. If a water body is not of good (or better) status and is within 1km of a waste facility then the reason for that status must also be checked. If the status is not good (or

better) for reasons other than the mine then the status of the waterbody is deemed to be good (or better) and not due to the waste facility. Water bodies are assumed to be beneficial to both humans and ecosystems. The choice of a 1km buffer is arbitrary but is considered to be reasonable.

**Possible sources of information**

Information for this question will come from studies related to the Water Framework Directive. The assessment will benefit from the use of GIS software.

**Possible responses**

YES

UNKNOWN

NO

**Outcome of response**

If the answer to the question is YES then the assessor is directed out of the current section and to one of the final outcomes EXAMINE FURTHER. The response to the question is that there is a water body of less than good status within a kilometre of the facility. The other questions (numbers 17 and 18) in this section are not necessary as the facility has been shown to have a potential source – pathway – receptor linkage.

If the answer to the question is UNKNOWN then the assessor is directed out of the current section and to one of the final outcomes EXAMINE FURTHER. The response to the question is that there is a water body of less than good status within a kilometre of the facility. The other questions (numbers 17 and 18) in this section are not necessary as the facility has been shown to have a potential source – pathway – receptor linkage.

If the answer to the question is NO then the assessor is directed to the next question (number 17) to determine if the facility is within 1km of a protected site.

**Question 17**

*Is there a Natura 2000 within 1km of the waste facility?*

**Rationale**

Natura 2000 sites are protected by legislation and regulations. The Natura 2000 Network is a network of important ecological sites across the European Union. It is comprised of areas known as Special Protection Areas (SPAs) and Special Areas of Conservations (SACs). SPAs are a consequence of the EU Habitats Directive (92/43/EEC) while SACs are a consequence of the EU Birds Directive (79/409/EEC). This question seeks to determine if a Natura 2000 site is within 1km of a waste facility. The choice of a 1km buffer is arbitrary but is considered to be reasonable.

**Possible sources of information**

All Member States are required to have designated Natura 2000 sites within their jurisdictions. These should be available from individual Member States relevant authority with responsibility for the implementation of the aforementioned Directives.

**Possible responses**

YES

UNKNOWN

NO

**Outcome of response**

If the answer to the question is YES then the assessor is directed out of the current section and to one of the final outcomes EXAMINE FURTHER. The response to the question is that there is a Natura 2000 site within a kilometre of the facility. The other question (number 18) in this section is not necessary as the facility has been shown to have a potential source – pathway – receptor linkage.

If the answer to the question is UNKNOWN then the assessor is directed out of the current section and to one of the final outcomes EXAMINE FURTHER. The response to the question is that there may be a Natura 2000 site within a kilometre of the facility. The other question (number 18) in this section is not necessary as the facility has been shown to have a potential source – pathway – receptor linkage.

If the answer to the question is NO then the assessor is directed to the next question (number 18) to determine if the facility is within 1km of agricultural activity.

**Question 18**

*Is the waste facility within 1km of agricultural land or livestock?*

**Rationale**

Agricultural activity is an important occupation in many Member States. Agriculture as used here refers to both the growing of plants and the rearing of animals. Agricultural activities may be affected by pollution emanating from waste facilities and it is therefore important to determine if agricultural activity is practiced in the vicinity. The choice of a 1km buffer is arbitrary but is considered to be reasonable.

**Possible sources of information**

The information required to answer this question may be available within the Ministry of Agriculture within Member States. Alternatively CORINE land cover data may be available. Alternatively, aerial photographs could be used to view areas within 1km of the waste facility. The process would be facilitated by the use of GIS software.

**Possible responses**

YES

UNKNOWN

NO

**Outcome of response**

If the answer to the question is YES then the assessor is directed out of the current section and to one of the final outcomes EXAMINE FURTHER. The response to the

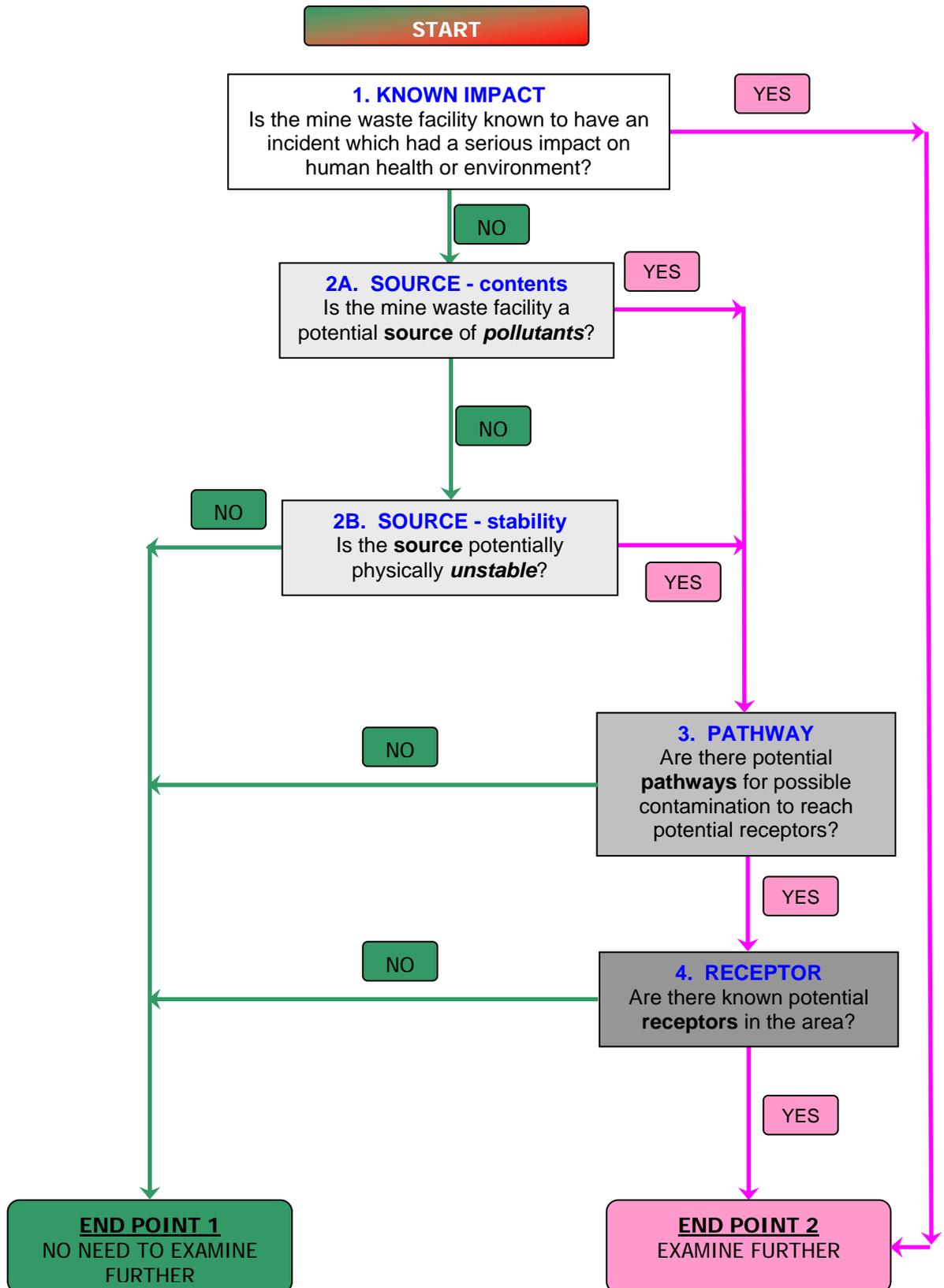
question is that there is agricultural activity within a kilometre of the facility. The facility has been shown to have a potential source – pathway – receptor linkage.

If the answer to the question is UNKNOWN then the assessor is directed out of the current section and to one of the final outcomes EXAMINE FURTHER. The response to the question is that there may be agricultural activity within a kilometre of the facility. The facility has been shown to have a potential source – pathway – receptor linkage.

If the answer to the question is NO then the assessor is directed to the other final outcome NO NEED TO EXAMINE FURTHER.

ANNEX I

PRE-SELECTION PROTOCOL FLOWCHART



Q 1. Is the mine waste facility known to have had an incident which has had a serious impact on human health or the environment?

YES

NO

**2A. SOURCE - contents**

Is the mine waste facility a potential **source** of **pollutants**?

Q 2. Did the mine work sulphide minerals or produce a waste containing sulphide minerals?

YES or UNKNOWN

NO

Q 3. Were any of the following produced from the mined mineral - Ag, As, Ba, Be, Cd, Co, Cr, Cu, Hg, Ni, Pb, Sb, Se, Sn, Te, Tl, U, V, Zn or asbestos?

YES or UNKNOWN

NO

Q 4. Did the mine use dangerous chemicals to process the mined minerals?

YES or UNKNOWN

NO

**2B. SOURCE - stability**

Is the **source** physically **stable**?

Q 5. Is the waste facility a tailings lagoon or a waste heap?

Tailings Lagoon

Waste Heap

Q 6. Is the area of the tailings lagoon >10,000m<sup>2</sup>?

NO

YES or UNKNOWN

Q 7. Is the height of the tailings lagoon >4m within 50m of the facility?

NO

YES or UNKNOWN

Q 8. Is the area of the waste heap >10,000m<sup>2</sup>?

NO

YES or UNKNOWN

Q 9. Is the height of the waste heap >20m?

NO

YES or UNKNOWN

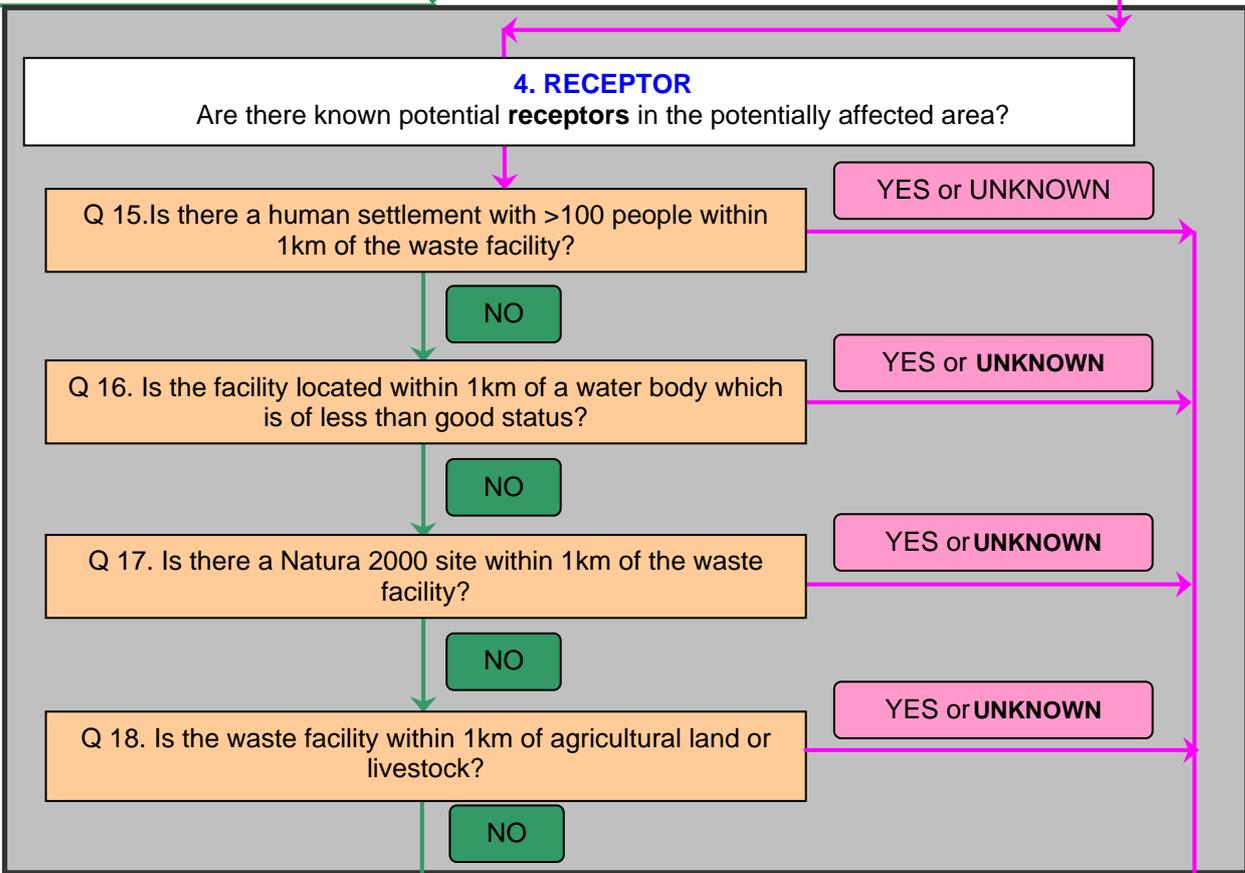
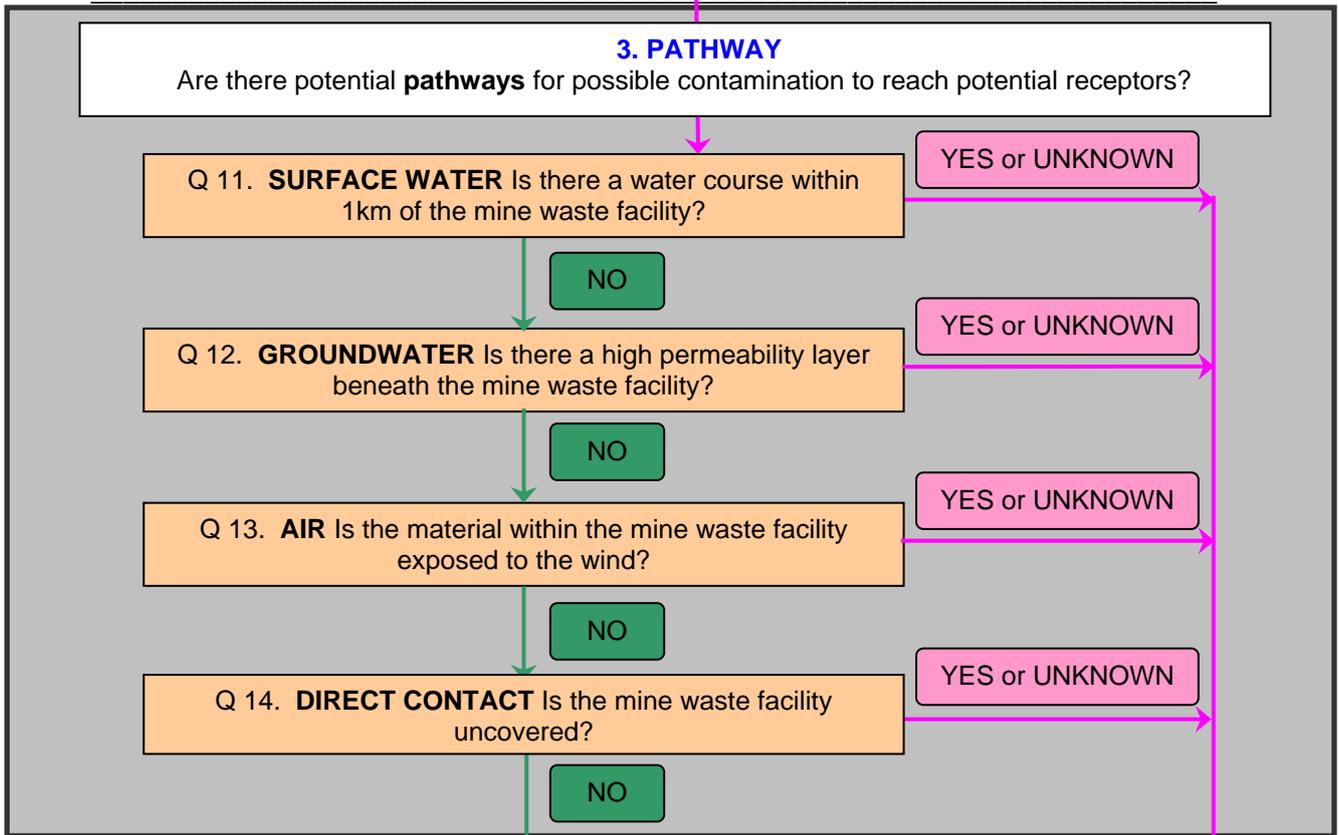
Question 10. Is the slope of the foundation >1:12?

NO

YES or UNKNOWN

TO FLOWCHART 2.

EXAMINE FURTHER



**NO NEED TO EXAMINE FURTHER**

**EXAMINE FURTHER**