GOVERNMENT OF GEORGIA

MINISTRY OF ENVIRONMENT PROTECTION AND NATURAL RESOURCES OF GEORGIA

EIA GUIDELINES FOR WASTES

1. INTRODUCTION

Why this Guideline?

Essentially EIA is a process by which essential information about the environment is fed into the decision-making process. It is not a decision-making procedure in itself. It is strictly a tool to be used during the decision-making process.

The Ministry of Environment Protection and Natural Resources (from now on the "Ministry") has expressed its wish to develop sectoral guidelines for the purpose of clarifying procedures for certain types of EIAs. This Guideline provides details on an appropriate approach to the execution of a proper EIA for all kind of waste disposal facilities. It is hoped that the Guideline will aid in ensuring that EIA reports for these kinds of projects are complete, well-written and useful to decision-makers, and that the process is efficient and sound.

What are the target groups for this Guideline?

The Guideline is aimed for the Ministry experts and the public.

The Georgian legislation for EIA and how it applies to waste disposal facilities

The Georgian approach to EIA is described in Georgian Law on Environmental Permits where I category activity is required to have detailed Environmental Impact Assessment. Issues related to waste handling and disposal facilities are under the category I. Georgia still has not enacted the Law on Wastes and it creates many discrepancies in legislative system of Georgia. Still legislation is pending and needs constant updates. (The legislation is in constant updates and needs follow up)

Why is EIA important in the decision-making process for waste disposal facility?

Uncollected solid waste represents a public nuisance. Human and ecosystem health are at risk when exposed to all kind of wastes, which makes its proper treatment and disposal a priority.

These wastes may clog sewers and open drains, encroach on roadways, diminish landscape aesthetics, and cause unpleasant odors and irritating dusts. Generally, a waste project should include the improvement of waste collection, thus lessening the quantity of uncollected waste. If a project is not appropriately designed to fit in with the needs and behavioral patterns of local residents, it could result in increasing impacts related to uncollected waste.

Note to the Concerned Individual in the Public: what are my rights?

In the Georgian EIA law, the public had right to be informed about the proposed project and EIA procedure - and also had right to express its concerns at various intervals during the EIA process in a public hearing. If you are concerned about the impacts of a certain project, watch the newspapers at both local and national levels for announcements regarding information sessions and/or public meetings. Opinions about a given project may also be requested in writing by the officials overseeing the EIA process in your area. However these rights have been downsized to twenty days and public can express its rights within limited number of days.

What steps should be undertaken in the EIA process for waste disposal facility

The following approach should be taken before embarking on the EIA process:

- setting **clear targets** for the EIA report;
- setting up an **interdisciplinary team** with the necessary expertise to undertake the given project;
- ensuring that good **collaboration** exists between the involved authorities;
- enabling effective **feedback** to be made by setting up appropriate forums for this purpose;
- providing sufficient **time and resources** to carry out public participation, and
- ensuring that the results of the evaluation are taken into consideration in the **final decision**.

The members of an EIA team to conduct an EIA for a given hazardous waste landfill project should include at least the following general expertise:

- General EA experience;
- Environmental experience;

As well as the following more specific expertise:

- Solid and hazardous waste management specialists;
- landfill leachate and groundwater pollution control and management;
- land-use planners with experience in facility siting;
- biologists/ecologists with environmental assessment experience in facility siting;
- toxicologists and risk assessment specialists;
- air pollution control specialists;
- water quality analysis specialists;
- transportation planning/traffic control specialists;
- hydrologists/hydro geologists;
- noise specialists, and
- socio-economists, social assessment and public participation specialists.

Scoping and Screening

It should be noted that little may be said about screening in the case of waste disposal facility. Screening process will not be a main focus of this document it will be done in accordance of the pending new legislation of Georgia.

The new legislation has to be a reference for any scoping that is undertaken for the given hazardous waste disposal project. However, the scoping and final format for the associated EIA report must particularly take into account.

2. IMPACTS

Environmental damage from solid and hazardous waste disposal typically can include contamination of soil, groundwater, surface water and air quality with various chemical compounds. Adverse impacts result from improper siting, inadequate design and/or poor operation. For example, leaking from solid waste contains fine particulates and micro-organisms which can be filtered by soil matrices. Leaking also contains dissolved solids which can be attenuated by soil through precipitation, adsorption or ion exchange mechanisms. Under favorable hydrologic conditions, contaminated seepage (also called leachate) from solid waste can pass through the unsaturated soil beneath the solid waste deposit and enter groundwater. Hazardous substances may be released to soil, water or air – perhaps undergoing chemical hange along the way – and by entering the food chain or via the air expose various organisms including humans to the deleterious effects of these substances or chemical compounds resulting from environmental interactions. Various hazardous substances, such as certain heavy metals, are capable of biomagnifying in the environment, which may also lead to higher levels of exposure through various pathways – most commonly through food. It should be noted that public health risks and risks to waste handling workers are also present in terms of impacts, as further discussed below.

Surface water can be contaminated as polluted groundwater is discharged into it, or by surface runoff directly from the solid waste deposit. Sources of air quality degradation include smoke from open burning; dust from inadequate containment, collection, and open dumping; and gases generated by decomposition of wastes within an open dump or sanitary landfill.

Public Nuisance Impacts

Uncollected solid waste is a public nuisance. It clogs sewers and open drains, encroaches on roadways, diminishes landscape aesthetics, and causes unpleasant odours and irritating dusts. Generally, a solid waste project would include improving waste collection and would thus lessen the quantity of uncollected waste. However, if a project is not appropriately designed to fit in with the needs and behavioural patterns of local residents, it could result in increasing impacts related to uncollected waste. In the case of hazardous waste, which is usually disposed of in smaller amounts, especially as regards medical or clinical waste, public nuisance is less problematic than potential risks to public health.

Public Health Impacts

Public health can be affected when solid and hazardous waste is not adequately contained at and collected from living and working environments. Furthermore, direct contact occurs when there is inadequate protection of collection and disposal workers (e.g., gloves, boots, uniforms and changing/washing facilities). As a result, the design of a solid or hazardous waste project needs to consider the economic costs of waste containment and worker protection relative to potential public health impacts in order to derive an appropriate level of design. Especially in the case of hazardous waste projects, the following information must be obtained:

- definition of all potential hazards (along with national exposure guidelines for each substance; if these do not exist, WHO or other internationally-accepted guideline should be used)
- health and safety implications of each hazard
- description of routine health and safety management techniques to be used on-site
- description of basis for development of emergency response procedures.

In an open dump, there is ready access to the waste by domestic animals and, subsequently, potential spread of disease and chemical contaminants through the food chain. From an open dump, windblown dusts may carry pathogens and hazardous materials. Gases generated during biodegradation within an open dump (and to a lesser extent, a sanitary landfill) may include toxic and potentially carcinogenic volatile organics (e.g., benzene and vinyl chloride), as well as typical biodegradation by-products (e.g., methane, hydrogen sulfide, and carbon dioxide). Smoke generated from burning wastes at open dumps is a significant respiratory irritant and can cause affected populations to have a much-increased susceptibility to respiratory illness.

Direct Impacts

Environmental damage from solid waste disposal typically can include contamination of soil, groundwater, surface water and air quality. Adverse impacts result from improper siting, inadequate design and/or poor operation. For example, leak from solid waste contains fine particulates and micro-organisms which can be filtered by soil matrices. Seepage also contains dissolved solids which can be attenuated by soil through precipitation, adsorption or ion exchange mechanisms. Under favourable hydrologic conditions, contaminated seepage (also called leachate) from solid waste can pass through the unsaturated soil beneath the solid waste deposit and enter groundwater.

Surface water can be contaminated as polluted groundwater is discharged into it, or by surface runoff directly from the solid waste deposit. Sources of air quality degradation include smoke from open burning; dust from inadequate containment, collection, and open dumping; and gases generated by decomposition of wastes within an open dump or sanitary landfill.

3. .NATURAL RESOURCE ISSUES

Land Issues

The most obvious contamination of land is caused by windblown litter and clandestine dumping in open areas and along roadways. This contamination causes an aesthetic impact, which can result in diminished civic pride and loss of property value.

Soil underlying solid and hazardous waste deposited within an open dump or sanitary landfill is typically contaminated by pathogenic micro-organisms, heavy metals, salts and chlorinated hydrocarbons contained in seepage from the waste. The extent to which the soil attenuates such contaminants will depend on its porosity, ion exchange capacity, and ability to adsorb and precipitate dissolved solids. Furthermore, not all contaminants can be attenuated by soil. For example, anions, such as chloride and nitrate, pass readily through most soils without attenuation. Soils consisting of clay and organic matter are more likely to attenuate contaminants than soils consisting of sand, silt and gravel. If seepage continues after underlying soils have reached their full capacity to attenuate contaminants, contaminants may be released to groundwater.

When solid waste is processed by composting, the resulting compost product may be applied to agricultural land, wooded areas, and/or home gardens. Depending on the concentration of potentially hazardous chemicals within the compost and the land application rate used, soil can be contaminated and plants can subsequently uptake toxic chemicals. Some chemicals stay within the soil matrix and build up to phytotoxic levels after repeated applications of composting.

Water Issues

Through biodegradation and chemical oxidation/reduction mechanisms on deposited solid wastes, dissolved by-products of decomposition are added to the interstitial waters within the solid waste mass. Over time, the solid waste decomposes into smaller particles and the waste consolidates under its own weight, releasing the polluted interstitial waters.

Both the initial interstitial waters and any infiltration waters contaminated by decomposition by-products can seep into groundwater under certain hydrologic conditions (i.e., saturation of the waste to the point of field capacity and permeable conditions in soils underlying the wastes, as well as other hydrologic connections such as fractures in rock and inadequate casing and seals on wells).

Surface water can be polluted when it receives groundwater or surface runoff which has been contaminated with leachate from landfill areas. In the event that solid waste is placed in a sanitary landfill designed to enable leachate collection and leachate treatment, there may be a water quality impact attributable to the discharge of treated leachate into receiving surface waters.

Air Issues

The most obvious air quality problems associated with solid and hazardous waste collection and disposal are dust, odors and smoke. Less obvious air quality problems may arise when the biodegradation of hazardous materials in the solid waste leads to release of potentially toxic volatile organics. For the most part, following good design and operating practices can minimize these impacts.

The air quality problem most associated with solid waste collection is dust created during loading operations. The level of dust created depends largely on the method of collection selected. Dust is primarily a nuisance and an eye irritant; however, it may also carry pathogenic micro-organisms which could be inhaled when airborne.

There is typically a putrid smell from hydrogen sulfide gas and other gases created by anaerobic biodegradation of wastes within an open dump or sanitary landfill. By contrast, at a compost facility where biodegradation is designed to occur by aerobic mechanisms, the odor is typically an inoffensive earthy smell. If the compost facility is not properly operated and anaerobic conditions develop, however, a foul odor could result.

At a disposal site may occur underground and on the surface. Once an open dump begins to burn underground, it can last for decades, or until sanitary landfill methods (including gas collection and venting) are implemented.

In the case of facilities that are not properly controlled, explosions and fires associated with hazardous waste disposal may release toxic fumes into the atmosphere and cause air pollution, again risking public health.

4. SOCIAL AND CULTURAL ISSUES

Public Cooperation

In designing a solid waste collection system, social and cultural issues should be considered in order to maximize public cooperation and thus minimize costs.

For example, curb-side collection can be used only in neighborhoods where residents can afford appropriate containers to be left along the curb (e.g., plastic bags or metal dustbins). When communal containers are used for collection, the distance and direction in which residents may have to walk to discharge their solid waste into a communal container should be designed to fit in with their normal routine. Collection for certain types of hazardous waste may be set up by implementing special containers around the neighborhood to collect batteries, solvents and other chemical wastes, for example.

Littering and Clandestine Dumping

Most solid waste service organizations place a high priority on providing collection service. On the other hand, they place a low priority on education and enforcement of public behaviors regarding environmental regulations. The result is that the service organization unnecessarily wastes time and money trying to compensate for the uncooperative behavior of some residents by providing extra service.

It clearly takes more time and money (three to ten times more, is a common estimate) to pick up wastes which have been illegally discharged by littering along roadways or clandestine dumping on vacant lands. Furthermore, when the illegally discharged wastes are potentially hazardous materials (e.g., pumped sewage or industrial processing wastes), environmental impacts could be significant. Therefore, increased budgetary allocation to education, vigilance and enforcement is money well spent.

Marginal Zones

In the marginal zones of cities, where rural immigration and illegal settlement onto open land has occurred, providing refuse collection service is difficult. Road access for refuse collection vehicles is poor and residents may not know how to cooperate with a refuse collection system. Furthermore, where residents are settled illegally and not paying property taxes, there may be less political commitment to providing refuse collection service.

Based on these conditions common to marginal zones, it is typical to see clandestine dumping of wastes around the periphery of these zones, as well as on open lands between homes. As the piles of refuse accumulate, residents are likely to set fire to them at night. An understanding of the community's current practices should be sought, and grass roots efforts made to educate residents in the need for adequate refuse disposal and, to the extent possible, to help them set up relatively self-reliant refuse management systems.

Siting Facilities

In designing a solid waste disposal system, social and cultural issues arise during the siting of facilities especially. Facility siting needs to conform to land-use plans. Siting should provide for enough land area for a buffer zone to minimize aesthetic impacts. Consideration should be given to proximity to residential developments (because of noise and truck traffic impacts, as well as gas migration), prevailing wind direction (because of dust, odour, and smoke), and groundwater flow (because of water supply wells and receiving surface waters). This topic is taken up further in section 3.1.5.

5. OTHER SPECIAL ISSUES

Landfill Gas Migration

Landfill gas develops from anaerobic decomposition of wastes within a land disposal site. Unless there are competent gas control systems installed and operating at the disposal site, landfill gas can migrate underground along the paths of least resistance in the unsaturated zone (in either up-gradient or down-gradient directions).

Landfill gas can accumulate in basements of buildings along its migration pathway. Because landfill gas contains high concentrations of methane, it is potentially explosive. Landfill gas can also contain potentially toxic organic gases. Risks in terms of fires and explosions – including release of toxic materials into the atmosphere – are also present.

Leachate Control

Ideally, a solid waste landfill is located in an area where the permeability of underlying soils is very low, the nature of the soils is attenuate of dissolved chemical constituents, and uses of the receiving ground or surface waters would not be significantly affected by contamination. When less than ideal siting conditions prevail, design could include placement and compaction of a layer of relatively impermeable clay soils between the base of the landfill and the first layer of solid waste.

When either the nature of the waste or the site necessitates leachate collection, the issue of treatment and control must be considered. If possible, the collected leachate should be discharged to the nearest sewer to be handled as part of the area's wastewater treatment system. If no sewers are located in proximity to the landfill, on-site treatment by biological and sedimentation mechanisms should be undertaken. Recycling of the treated leachate back into the landfill system should be considered.

Medical and Toxic Wastes

Medical wastes are often discharged with other wastes at municipal disposal sites with no special means of protecting disposal site workers or pickers. Furthermore, at disposal sites where domestic animals are allowed to graze, there is the risk of reintroducing pathogenic micro-organisms into the food chain.

To a limited extent, toxic wastes are similarly collected inadvertently as refuse collection workers service their normal routes. More commonly, however, toxic wastes are brought to municipal disposal sites by industries in their own trucks. Most disposal sites in developing countries do not have restricted access, nor do the disposal site supervisors keep any record of the nature and volume of wastes received. The wastes are dumped in the same work place as incoming refuse. Because there is no supervision of dumping, disposal workers or pickers have no forewarning of potential hazards to enable them to protect themselves. Also, there are no special safeguards at the disposal site to control the hazards that toxic wastes pose to the natural environment.

6. MANAGEMENT AND TRAINING

Solid waste management consumes a significant portion of municipal revenues. To have efficient and effective collection and disposal service, the system needs to be continuously monitored and adjusted where necessary. The managing institution, therefore, needs the appropriate authority and competence to meet these responsibilities. For example, the managing institution should be at the department level in a municipality or be set up as a public enterprise so that it could be staffed with the appropriate grade level of professional engineers and planners. To the extent possible, the institution also needs to be empowered to generate revenues adequate to cover costs. As part of its mandate, the institution needs to be authorized to provide public education, perform inspections on public cleanliness, and enforce solid waste regulations.

Program support from the central government is necessary to allow local authorities to function properly, i.e., laws, regulations and policies at the central level are needed to support local ordinances, enforcement, operations and plans. Technical support from the central level may be necessary as well. Development of the country-specific state of knowledge on waste management and guidance on appropriate technology requires expertise and finance; not only are the necessary resources usually unavailable at the local level, but to develop them at other than the central level would lead to duplication of effort. For example, it is preferable for waste quantity and composition data, operational norms, service costs, available technologies, and environmental impact issues to be comparatively analyzed at the central government level, with assistance from local officials.

Waste management skills are not taught in a single curriculum in universities and adequate training seminars are often not available. Waste managers benefit greatly by attending conferences which enable them to compare experiences and would further benefit from training packages which specifically address the following: selection of appropriate collection equipment; development of collection equipment specifications; planning efficient route designs; special handling of medical wastes; design and operation of sanitary landfill, optimization of workshop maintenance and repair operations, and use of management information systems to facilitate accountability and performance monitoring.

Workers in solid and hazardous waste systems also need training. In particular, drivers need training on the operation of the specific equipment to which they are assigned. Refuse collection workers, inspectors and supervisors need training on the public health aspects of solid and hazardous waste management and on how to relate courteously and effectively with the people served. Workshop personnel need training in the repair and maintenance of each type of equipment serviced. When resource recovery systems are part of the solid waste management system specialized training for the operations and maintenance staff is needed. Everyone in the system needs training in occupational health and safety.

Occupational health and safety training is essential to ensure that personnel adhere to appropriate operating practices which minimize adverse health and safety impacts. The following areas of knowledge and experience are considered essential:

(a) Appreciation of the properties (e.g., flammability, corrosiveness, toxicity, reactivity) of hazardous substances, as well as the levels at which they pose a significant danger requiring protective measures.
(b) Awareness of early-warning indicators of hazard/risk identification, and ability to recognize potentially hazardous situations.
(c) Familiarity with engineering controls to avoid occurrence of hazardous situations.
(d) Familiarity with capabilities and limitations of the facility to response to hazardous emergencies: ventilation systems, plumbing systems, shut-off systems, containment devices, and emergency response procedures as outlined in the appropriate health and safety plans.
(e) Knowledge of the use and maintenance of emergency response equipment, as well as routine equipment for health and safety monitoring and protection.
(f) Knowledge of methods and procedures for decontaminating personnel, equipment, and facility, following potential chemical contamination.
(g) Refresher training and regular drills simulating emergencies and appropriate emergency response procedures.
(h) Familiarity with and acceptance of the need for continuous reliance on the "Buddy" system. In the Buddy system, work groups are organized so that each employee exposed to hazard is designated for observation by at least one other employee who would be ready and able to provide immediate emergency assistance as needed.
(i) Empowerment to act decisively in accordance with health and safety plans during potentially hazardous situations or actual emergencies, especially in situations where supervisors are unavailable or have become victims of the emergency.

7. MONITORING

In solid waste systems, monitoring of collection and disposal operations should be developed to:

- measure quantities of wastes collected under the auspices of the public cleansing institution;
- measure quantities of wastes brought to official disposal sites by others;
- supervise efforts of refuse collection workers and disposal site attendants;
- provide inspection regarding overall public cleanliness and adequacy/effectiveness of cleansing service delivery;
- provide inspection regarding violations of littering and clandestine dumping regulations;
- assess cost-effectiveness of collection systems;
- evaluate efficiency of collection route designs;
- maintain appropriate stock of spare parts and consumable supplies;
- monitor quality and migration of landfill gas;
- monitor quality and movement of leachate and leachate contaminated groundwater;
- monitor quality of receiving waters or land application site;
- ensure that sanitary landfill operating procedures are being followed.

8. ALTERNATIVE DEVELOPMENT AND MITIGATION MEASURES

Alternative Technologies and Operating Methods

For various aspects of a solid waste management project, there are appropriate alternative technologies or operating methods, as listed below.

Collection Systems:

- source reduction of wastes,
- self-reliant systems of on-site waste management, equipment includes: pushcart, animal cart, tractor, and truck
- communal stationary container systems
- communal portable container systems
- curb-side collection systems from liftable containers
- block collection systems with resident cooperation
- separate collection for potentially hazardous materials

Disposal Systems:

- source reduction of wastes
- sanitary landfill (i.e., designed refuse cell construction)
- sanitary landfill with gas and leachate control
- landfill gas recovery and use
- incineration with air pollution control
- mass burn with energy recovery and air pollution control
- refuse-derived fuel production
- composting
- separate disposal zone in sanitary landfill or separate disposal site for construction/demolition debris, bulky wastes and tires
- separate disposal for potentially hazardous materials
- hold and bleed pumped sewage into wastewater treatment facilities, where available, or provide separate disposal
- separate incineration for medical wastes

Recycling Systems:

- increase product durability
- source segregation of recyclables
- manual or mechanized sorting of recyclables at transfer stations and disposal facilities
- financial incentives to private sector recycling initiatives
- refurbishing and remanufacturing of durable products
- modify procurement specifications to increase opportunities for products made from recycled materials

The main aspects of alternative development and mitigation regarding hazardous waste facilities are as follows:

Siting

Facilities with risk of structural collapse, rupture, fire, or explosion will need to be located in geotechnical stable locations (e.g., minimal risk of seismic activity or subsidence). Siting is taken up in following sections.

Buffer Zones

Based on the nature of the potential hazard (e.g. fireball, toxic gas release, spill), facilities will need to have an appropriately sized buffer zone.

Layout Design

Within an installation with industrial hazards, unit operations will need to be laid out so that incompatible substances are not located within proximity of each other (e.g. substances which would react upon mixing to generate heat, fire, gas, explosion, or violent polymerization). Also, incompatible operations are not to be located within proximity of each other (e.g. welding operations are not to be located near storage of ignitable materials).

Box 1 Reduction in hazardous materials use in products and processes

It is also possible to reduce the use of hazardous materials in products and processes before disposal becomes an issue. Here are some methods for consideration in this respect.

Resource Substitution

Within processing or other operations, substitute a hazardous material with a non-hazardous material. Change the form of the material (e.g., to a gas or a liquid) if the resulting form would be less hazardous (e.g., store toxic gases in a suitable solvent form).

Resource Minimization

Minimize the quantities of hazardous materials used by recovering and recycling them within the process operation. Reduce the inventory of hazardous materials in storage. Use more efficient processing techniques.

Process or Storage Modifications

Store hazardous gas as a refrigerated liquid rather than under pressure. Reduce process temperatures and pressures. Change process methods (e.g., change from spray painting to dip or brush painting)

Dust Control

Dust control measures include spraying water (or water with a wetting agent) at the source of dust dispersion, to minimize the generation of dust. Ventilation, collection and filtration are also effective for dust control. Dusty operations should be isolated and/or contained to the extent possible, especially when the dusts could lead to lung diseases such as silicosis, one the most common occupational diseases in the world and most prevalent at mines, brickyards, glassmaking plants, and sand blasting operations. Occupational asthma is caused by a broad array of chemicals and natural substances, including isocyanides, acid anhydrides, grain dust, cotton dust and wood dust.

Fire Control

In order to reduce fire risk, proper landfill gas collection facilities must be put into place. As well, safety measures such as the presence of water sources and hoses, as well as foams, should be available on-site.

Access Control

Limitation of personnel to those specifically trained in the work conditions present within a potentially hazardous area, including use of personnel identification, double locks, security services, barriers.

Secondary Containment

Provide, as appropriate, systems to contain releases, such as: water curtains to restrict gas release, dikes and portable booms to contain spills, emergency response equipment to collect spilled material, bunkers or blast walls to confine explosions, fire-proofing to limit the spread of fire, absorbents to absorb or adsorb hazardous substance, and buffer zones.

Administrative controls are used when it is not possible to reduce exposure to acceptable levels through engineering controls. Administrative controls may include rearranging work schedules to minimize the duration of exposure to hazards and transfer or rotation of personnel who have reached a maximum allowable exposure limit over time.

9. SITING

One of the most important aspects of alternative development regarding hazardous waste management is siting. Facility siting is one of the areas in which EA can be most effective, but only if the assessment process begins before siting options are foreclosed. Complex industrial development projects and similar facilities with the potential for significant environmental impact cannot be handled with the simple application of siting criteria. Such projects need a full EA. The EA should be initiated well before the siting decision has been made, so that real alternatives can be considered. Identifying the potential impacts associated with each site and comparing sites on that basis causes environmental issues to come to light early and permits project planners and designers to take maximum advantage of all possible ways to avoid impacts. For those impacts that cannot be avoided and are accepted as part of the costs of the development, the opportunity to select an alternative site may lead to a project in which the efficiency of measures to mitigate impacts is higher and the costs of the measures are lower than would otherwise be the case. A timely EA also prevents the disruption, delay, and extra expense involved when a site must be changed because of environmental or public acceptance issues that come to light during final design.

Sites for hazardous waste disposal in general are selected on the basis of economic and technical factors, including favourable terrain, energy sources, transportation and labor, location and size of service areas, taxes and duties, and availability of utilities and other support services essential for successful plant operation. More recently, the siting of industry has evolved to include considerations of the natural and socio-cultural environment and of acceptance by the communities that could be affected, either positively or negatively.

Increased public health effects and experience with the degradation of air, water, and land that can occur in the absence of sound planning in industrial areas, and community unwillingness to tolerate disturbance in forms such as noise, traffic, odours and physical presence of large facilities has increased in recent years.

Although there are different methodologies employed for comparative siting, seven basic elements are common to all of them:

- A short list of potential sites (may include both preferred and alternative sites).
- Description of each site in terms of ecological and socio-cultural sensitivities.
- Analysis of capacity to assimilate impacts at each site in terms of a common set of criteria for prevention of natural and socio-cultural resource degradation.
- Elimination of sites with serious environmental limitations.
- For remaining sites, description of measures to avoid or mitigate impacts and comply with environmental standards, including consideration of technical and institutional feasibility, reliability and life-cycle cost.
- Consultation with affected communities.
- Ranking of alternatives and selection of proposed site. Depending on the regulations of the country and the nature of the industry, the site selection process may be carried out in the context of an EA or as a more specific analysis under a licensing or permit application procedure.

Sites may be "pre-selected" as well, either as part of a planning and zoning process which narrows the range of alternatives to areas designated for industry, or under development policies which seek to localize industrial development in industrial estates. If planning and zoning and industrial estate siting are based on environmental criteria, there may be no need for additional siting analysis, or the studies required may be limited to particular issues, such as the need to pre-treat a proposed plant's wastewater. However, it is often true that only economic and engineering feasibility criteria are used as the basis for identifying areas for industrial development. There is then no guarantee that environmental objectives will be met. An environmental analysis of possible sites should be conducted.

In the case of a proposed expansion of production facilities at their present site, it is important to evaluate the site on the basis of the combined effects of the existing and new operations. Some unique feature of the new process may make the site undesirable, or the measures needed to manage the overall impact may be so costly that a new site is preferable. The same concept applies to location of a new plant in an already industrialized area. The incremental increase in cumulative air emissions, for example, may make the site unacceptable for the proposed facility.

Sites should be compared and selected on the basis of a comprehensive set of siting criteria. Sometimes industrial siting criteria may already exist in the form of government regulation or guidelines. Where they do not exist in this form, they can be derived for the project from various sources. Siting criteria may be implicit in planning and zoning, as the basis for determining suitability for industrial land uses. Laws or regulations for protection of certain sensitive areas or resources act as restrictions on and should be incorporated in the criteria used in site selection. There are criteria considered to represent good practices for particular industries. Finally, there are the general principles of environmentally sensitive land-use planning that should be considered.

Siting Criteria

Georgia should develop its own recommended guidelines (sensitivity) addressing areas to be avoided and environmental requirements for industrial sites. For example:

- An industrial site shall be at least the following distances from the features listed:
  - 25 km from ecologically or otherwise sensitive areas (examples include religious and historic places and archaeological monuments, scenic areas, beach resorts, coastal areas and estuaries which are important breeding grounds, national parks and sanctuaries, natural lakes and swamps, and tribal settlements)
  - 0.5 km from high tide line in coastal areas
  - 0.5 km from natural or modified flood plain boundary
  - 25 km from projected growth boundary of major settlements (population of 3 million or larger).
- The following are examples of environmental requirements associated with industrial use of particular sites:
  - no conversion of forest land to non-forest activity to sustain the industry
  - no conversion of prime agricultural land to industrial use
  - sufficient space on-site to provide for storage of solid waste and appropriate treatment and reuse of wastewater
  - provision for a 0.5-km wide "greenbelt" around the site perimeter
  - adaptability of the proposed facilities to the landscape, so that scenic features are not altered by the development.

Examples of other factors that might be placed in a list of characteristics precluding selection of a particular site for use by industry with high potential for pollution include (depending on the nature of the industry):

- Recharge area for aquifer of present or possible water supply use, or catchment area of public water supply reservoir.
- Receiving waters unable to assimilate wastewater without water quality degradation despite appropriate treatment.
- Air shed prone to episodes of poor air quality.
- Habitat of endangered species.
- Proximity of site (or access roads) to incompatible land uses -e.g., health care institutions, schools, residential areas.

- No local or regional capability for disposal of hazardous waste (if industry produces any).

There are other factors which ordinarily do not exclude a site from consideration, but which are potential areas of impact and should be taken into account in ranking alternative sites:

- number of residents that would be displaced;
- number of properties that would be affected or expropriated;
- distance to nearest non-industrial land use;
- compatibility of wastewater with local collection and treatment system, if any.

10. SPECIAL CONSIDERATIONS IN WASTE FACILITY SITING

Assimilative Capacity of the Environment

In the case of hazardous waste disposal facilities, an example of a site where the assimilative capacity of the surrounding environment is one where the underlying soil's attenuate capacity is insufficient for what is disposed of in that location. The environment should also be able to assimilate the results of non-routine operations, such as process upsets, failure of pollution control systems, and accidental releases. Proximity to sensitive natural areas or human settlements may necessitate extraordinary measures to prevent or respond to such events.

Area of Influence

Depending on the type of facility and the medium being considered (air, water, plant, animal or human communities), the area that might be influenced by a project can extend well beyond the site and its immediate environs. The characteristics of the natural resources and land uses in the air shed for long distances downwind are relevant and so are environmental impacts along transportation corridors. If the project would result in ancillary developments that would differ depending on site selection (e.g., asphalt plants at quarry sites, new rail or roadways, new port facilities or pipelines, workers dwellings, resettlement sites), their water catchments and air sheds should be considered in the siting decision.

Capacity for Emergency Response

It is irresponsible to locate a hazardous waste facility which poses a significant risk to neighbouring communities or sensitive natural systems in surroundings where an emergency cannot be managed in such a way that damage or disaster can be averted. If it is not possible to develop a response plan which can reasonably be expected to be effective (including provisions for emergency evacuation, if warranted by the type of installation), another site should be selected. The absence of institutions for communication and accident response makes hazard management impossible. Unsafe roads or railways and unsafe trucks or trains lead to unacceptable risk, if they are used to transport hazardous substances through residential areas. Lack of a buffer zone between hazardous material storage or processing facilities and communities or sensitive natural systems (fish breeding areas, for example) create a situation in which neither warning nor containment can be timely enough to prevent injury.

Some of these limitations can be overcome by adding hazard management components to a project. Local government's response capacity can be strengthened by providing equipment and training. Transportation facilities can be improved, or alternate routes to the site can be developed. However, some dimensions of the emergency response problem can only be resolved through sound site selection.

Induced Development

Employment opportunities are magnets to immigration of workers and thus to the growth of local communities. Especially where industrial development is newly occurring, the community may experience induced land development and may be ill-prepared to manage its impacts. They range from overloading of municipal infrastructure and services to cultural conflicts between long-time residents and immigrant workers. Particular care is needed to prevent unplanned settlements just outside the factory gates. Institutional strengthening of local government and involvement of local communities in project preparation can be effective ways of minimizing these adverse impacts.

Community Involvement in Industrial Plant Siting

Community participation in siting decisions is of great importance. Businesses that have involved local residents early in decisions that may affect them, even on controversial projects, have more often than not found the experience to be worthwhile. Conducted well, community involvement leads to better mutual understanding and can be the basis of productive community relations instead of protest. This topic is revisited in more detail in Chapter 5.

11. WRITING THE REPORT

What follows is a suggested format, or Terms of Reference, for the EIA report for a project addressing construction of a hazardous waste disposal facility (compiled from World Bank, 1999).

Introduction

This section should state the purpose of the terms of reference, identify the hazardous waste project to be assessed, and explain the executing arrangements for the environmental assessment.

Background Information

Pertinent background for potential parties who may conduct the environmental assessment, whether they are consultants or government agencies, would include a brief description of the major components of the proposed project, a statement of the need for it and the objectives it is intended to meet, the implementing agency, a brief history of the project, (including alternatives considered), its current status and timetable, and the identities of any associated projects. If there are other projects in progress or planned within the region that may compete for the same resources, they should also be identified here.

Major components of an industrial project to be described herein include, as appropriate: local and foreign raw material sources include transport systems (e.g., roads, rail); pollution control systems (e.g., source reduction and recycling to minimize wastes, stack gas emission control, non-point source emission control, wastewater treatment and discharge, solid waste disposal, spill prevention); supplies (e.g. location of stocks of parts and chemicals, transport routes); staffing (e.g. numbers of workers, skill requirements); services (e.g. fire protection, security, transportation, medical); and community involvement (e.g. worker housing during construction).

Objectives

This section should summarise the general scope of the environmental assessment and discuss its timing in relation to the processes of project preparation, design, and execution. This section should also identify constraints, if any, regarding the adequacy of existing environmental assessment baseline data and needs to phase additional data collection (e.g., over several seasons) and assessment efforts so as not to hinder the rest of the project development schedule.

Environmental Assessment Requirements

This paragraph should identify any regulations and guidelines which will govern the conduct of the assessment or specify the content of its report. They may include national laws and/or regulations on environmental reviews and impact assessments; regional, regional or communal environmental assessment regulations; environmental assessment regulations of any other financing organizations involved in the project. This section should identify design or operating standards which project components must address to be environmentally acceptable including air emission standards, receiving water quality standards, and occupational health and safety requirements.

Study Area

This section will specify the boundaries of the study area for the assessment. (e.g., water catchments, air shed). Where appropriate, specify the right-of-way (ROW) width and alignment for transportation corridors for raw material and product shipments. If there are adjacent or remote areas which should be considered with respect to impacts of particular aspects of the project, identify them. For example, where intermediate supplies for a processing operation will be generated at remote facilities, identify the remote facilities (e.g., identify the sources of intermediate chemical supplies to be used at a pharmaceutical plant), because an added demand for supplies from this remote facility may cause an environmental impact to the remote area.

Scope of Work

In some cases, the tasks to be carried out by a consultant will be known with sufficient certainty to be specified completely in the terms of reference. In other cases, information deficiencies need to be alleviated or specialized field studies or modeling activities performed to assess impacts, and the consultant will be asked to define particular tasks in more detail for contracting agency review and approval.

Description of the Proposed Project

(a) For project improvements to solid or hazardous waste collection, include: physical layout of the neighborhoods to receive improved collection; social, cultural and economic conditions of the neighborhoods to receive improved collection; and description of the project elements, including method of collection proposed, pilot tests to confirm the proposed collection method as appropriate, pre-implementation activities of public education and involvement, cost recovery systems, equipment specifications and procurement plans, implementation plans, operation and maintenance procedures, responsible parties for each aspect of the system.

(b) For project improvements to solid waste transfer and disposal, include: location of all project-related development sites and ROW's; general layout of facilities at project-related development sites; physical layout of the overall urban area to be served by transfer and/or disposal facilities, including mapping of all major roads; strategic siting of the facilities, including economic justification for the overall strategic plan of collection service areas, direct haul routes, transfer stations, transfer routes and disposal locations; physical, ecological and demographic setting of facilities, including surrounding land use characteristics, proximity to residential neighborhoods, location of public water supply sources and private wells, direction of ground water flow, uses of surface waters, prevailing wind direction; and description of the project elements, including layout of proposed facilities (e.g., fencing, buildings, weighbridges, roads, ramps, drainage, gas and leachate control systems, monitoring wells); construction schedule, operating plans, closure plans, long-term monitoring plans, and responsible parties. Provide flow diagrams of facilities/operations; design basis, size, capacity, flow-through of unit operations; pre-construction activities; construction activities, schedule, staffing and support, facilities and services; operation and maintenance activities, staffing and support, facilities and services; reclamation activities, such as in mining projects; required off-site investments; life expectancy for major components.

Provide maps at appropriate scales to illustrate the general setting of project-related development sites and ROW's, as well as surrounding areas likely to be environmentally affected. These maps shall include topographic contours, as available, as well as locations of major surface waters, roads, railways, town centers, parks and preserves, and political boundaries. Also provide, as available, maps to illustrate existing land uses.

Description of the Environment

(a) For project improvements to collection systems:

Physical environment: neighborhood layout, showing locations for communal containers, stops for truck during block collection, or streets served by curb-side collection; conditions of road or walkway access for collection equipment; and climate and meteorology, as it affects refuse containment and frequency of collection.

***Socio-cultural environment*:** population density and demographic level by neighborhood; community structure of local leaders and traditional public involvement process; employment and other activities indicating patterns of movement to and from neighborhood; education level with regard to sanitation and public health; and customs and attitudes relative to cooperation with collection system.

(**b) For project improvements to transfer and disposal facilities:**

***Physical environment*: location** of proposed facilities with regard to nature of surrounding land uses and proximity to homes and other establishments; existing road and traffic conditions in the area of proposed facilities, versus proposed road and traffic conditions; existing topography and proposed changes, including area which will be affected by any visible aesthetic impacts; soils and geology; surface and ground water hydrology, and hydraulic connections between the proposed sites and receiving waters down-gradient of the sites; existing and proposed uses of receiving waters, including location of private and public water supply wells and intakes; climate and meteorology, including prevailing wind direction.

***Biological environment*:** flora and fauna; sensitive habitats (e.g., wetlands delineation); and rare, endangered, or commercially important species.

***Socio-cultural environment*:** past uses of sites and consideration of any historic significance; land use and demographic character of surrounding neighbourhoods; planned development activities; education, awareness, and sensitivity of public to proposed siting of facilities; and public concerns over traffic, insects, noise, dust, odour, smoke, or aesthetic issues.

c) For waste facilities:

***Physical environment*:** geology (e.g. stratigraphy and structure of well fields, seismic history of storage tank areas, integrity of geological layers protecting potable groundwater supplies); topography (e.g. drainage patterns around construction areas, view-sheds around facilities); soils (e.g. agricultural value, potential use for lining or soil cover in residue disposal); climate and meteorology (e.g. prevailing wind patterns around stacks, precipitation patterns at residue disposal sites); ambient air quality (e.g. ability to assimilate emissions and maintain air quality standards); (note input from other major pollutant generators in the area, if any); surface water hydrology (e.g. downstream water resources from reservoirs, soil erosion and sedimentation potential, flood hazard potential); water resources (e.g. adequacy of water supplies); coastal and oceanic parameters (e.g. currents in docking areas, dispersion potential at effluent discharge locations); receiving water quality (e.g. ability to assimilate effluent discharges and maintain water quality standards for desired uses); (note input from major pollutant generators in the area, if any); significant pollutant sources in the area and prospect for their mitigation.

Biological environment: flora and fauna; rare or endangered species within or in areas adjacent to project-related development sites or ROW's; sensitive habitats, including wetlands, parks or preserves, significant wildlands within or in areas downstream/down-gradient of project-related development areas or ROW's; species of commercial importance in areas affected by the project, including coastal areas at docking facilities.

Socio-cultural environment (include both present and projected where appropriate): population (i.e., full time and seasonal); land use (i.e., year-round and seasonal); planned development activities; community structure; employment and labor market; distribution of income, goods and services; recreation; public health; education; cultural properties (e.g., archaeological and historically significant sites); indigenous peoples and traditional tribal lands; customs, aspirations and attitudes.

Legislative and Regulatory Considerations:

Describe national laws and local ordinances which delineate the solid waste management responsibility and authority delegated to local government. Describe national laws and guidelines which define the design and operating standards which local governments are to meet in the conduct of their responsibilities. Include description of any environmental standards which are to be met, including any requirements for submission of environmental monitoring data or environmental impact assessment statements by local governments to the national government. Describe local ordinances which govern citizen responsibility to participate in and cooperate with the solid waste system. Discuss the extent to which the local government uses education, inspection and enforcement to assure compliance with the available regulations. Describe the technical assistance, environmental monitoring, and regulatory enforcement activities provided by national and provisional government as a support to local government operations and actions.

Describe the pertinent regulations and standards governing environmental quality, health and safety, protection of sensitive areas, protection of endangered species, siting, land use control, etc., at international, national, regional and local levels. (The TOR should specify those that are known and require the consultant to investigate for others.)

Determination of the Potential Impacts of the Proposed Project

For solid waste projects, there are numerous potential impacts to be reviewed as a part of design. For the most part, well-conceived designs will minimize adverse impacts. Also, many potential impacts can be minimized by altering operating practices. There are some potential impact issues whose consequences would be environmentally significant over the long term. With regard to these impact issues, special studies conducted as a part of environmental impact assessment are recommended. Specifically, prior to design of a land disposal site, borings need to be drilled both on-site and off-site to assess the character of soils and geology and confirm the flow of ground water. Data from these borings coupled with information on rainfall and infiltration should be used to make a simple determination of the quantity of leachate which could be generated and released from the land disposal site and its potential effect on the nearest receiving water.

For hazardous waste projects, all significant changes which the project would incur should be identified. These would include, but not be limited to, changes in the following: employment opportunities, wastewater effluents, air emissions, solid wastes, land use, infrastructure, exposure to disease, risk of industrial hazard, noise, traffic, socio-cultural behavior. The impacts from changes brought about by the project on baseline environmental conditions as described above should be evaluated. In this analysis, distinguish between significant positive and negative impacts, direct and indirect impacts, and immediate and long-term impacts. Identify impacts which are unavoidable or irreversible. Wherever possible, describe impacts quantitatively, in terms of environmental costs and benefits. Assign economic values when feasible. Impact analysis for industrial projects should be divided between construction impacts and operation impacts (e.g. stack emissions, effluent discharges, noises, industrial hazards). Assess the risk of occurrence of potential industrial hazards (e.g. accidental spills, fires, explosions, impoundment structural failure, gaseous releases). Consider the ability of the community to provide emergency response services for potential industrial hazards. Consider the ability of the community to provide medical services to respond to emergencies. Based on the above, assess the potential impacts. Characterize the extent and quality of available data, explaining significant information deficiencies and any uncertainties associated with predictions of impact. If possible, give the TOR for studies to obtain the missing information. For information which could not be obtained until after project execution commences, provide TOR for studies to monitor operations over a given time period and to modify designs and/or operational parameters based upon updated impact analysis.

Analysis of Alternatives to the Proposed Project

Describe alternatives that were examined in the course of developing the proposed project and identify other alternatives which would achieve the same objectives. The concept of alternatives extends to siting, design, technology selection, construction techniques and phasing, and operating and maintenance procedures. Compare alternatives in terms of potential environmental impacts; capital and operating costs; suitability under local conditions; and institutional, training, and monitoring requirements. When describing the impacts, indicate which are irreversible or unavoidable and which can be mitigated.

The analysis may lead to designs that are more sound from an environmental, socio-cultural or economic point of view than the original project proposal. The concept of alternatives extends to siting, design, fuels, raw materials and technology selection, construction techniques and phasing, and operating and maintenance procedures. Include the "no action" alternative -not constructing the project -in order to demonstrate environmental conditions without it. Alternatives should include the following: the "no action" alternative (as discussed above); alternative means of meeting industrial product requirements; the alternative of upgrading existing facilities; alternative routes and sites; alternative design; and alternative methods of construction, including costs and reliability. Describe how the alternatives compare in terms of potential environmental impacts; capital and operating costs; suitability under local conditions (e.g., skill requirements, political acceptability, public cooperation, availability of parts, level of technology); and institutional, training, and monitoring requirements. To the extent possible, quantify the costs and benefits of each alternative, incorporating the estimated costs of any associated mitigating measures. Describe the reasons for selecting the proposed project over the other alternatives.

Development of Management Plan to Mitigate Negative Impacts

For the proposed project, recommend feasible and cost-effective measures to prevent or reduce significant negative impacts to acceptable levels. Estimate the impacts and costs of those measures, and of the institutional and training requirements to implement them. Consider compensation to affected parties for impacts which cannot be mitigated. Include measures for emergency response to accidental events (e.g., ruptures, leaks, tanker truck accidents, fires, explosions), as appropriate. Estimate the impacts and costs of those measures, and of the institutional and training requirements to implement them. Consider compensation to affected parties for impacts which cannot be mitigated. Prepare a management plan including proposed work programs, budget estimates, schedules, staffing and training requirements, and other necessary support services to implement the mitigating measures.

Identification of Institutional Needs to Implement Environmental Assessment Recommendations

Review the authority and capability of institutions at local, regional/regional, and national levels and recommend steps to strengthen or expand them so that the management and monitoring plans in the environmental assessment can be implemented. The recommendations may extend to new laws and regulations, new agencies or agency functions, inter-sectoral arrangements, management procedures and training, staffing, operation and maintenance training, budgeting, and financial support.

Development of a Monitoring Plan

Monitoring of the environment in the immediate vicinity of potential hazards, as well as at the fence-line of the installation, provides an early warning of a hazard occurring. For example, air quality monitoring for volatile organics, oxygen levels, combustible gas levels, and/or specific air constituents could be conducted on a regular basis using portable equipment or a continuous basis with stationary equipment. Smoke detectors, heat monitors, radiation detectors, as appropriate to the type of installation, are used to signal a hazard occurring.

For solid waste projects which include a land disposal facility, environmental monitoring should include gas and ground water monitoring wells and a regular schedule of monitoring for key indicators of contamination. If the land disposal site has a gas collection and ventilation system, periodic monitoring of the composition of gas being discharged from the vents is recommended. Also recommended is periodic monitoring, on-site and off-site with a portable meter, of the ambient air's oxygen and combustible gas levels. Similarly, for projects which include an incinerator or resource recovery plan, environmental monitoring should include air quality monitoring of stack gases.

In the case of hazardous waste facilities, based on knowledge of site conditions relative to topography, wind direction etc., a site control plan should be developed, which determines the corresponding levels of required personnel protection in various areas around the site. If the hazardous conditions could potentially exist beyond the actual project site, for example to residential or farm properties, the plan should also address emergency notification and evacuation procedures. Community coordinators should be assigned who are responsible for lead any emergency response activities. The given community should always be made fully aware of any potential emergency that may occur in the area.

It should also be noted that medical monitoring is necessary for all workers who may be exposed to hazardous materials. Before the worker begins activities on-site, a baseline examination including blood sampling of the specific chemicals involved should be undertaken for comparison purposes. A questionnaire should be given inquiring about the worker's medical history. The worker should then undergo (at least) annual examinations to determine whether negative health symptoms are being caused by exposure to hazardous substances on-site.

When the nature of the hazard is known and routine, the precise type and level of protective gear can be defined and routinely used (e.g., hard hats, chemical-resistant gloves, air-purifying respirators, safety shoes, ear protection, safety glasses). On the other hand, when the nature of the hazard is unknown (e.g., when several hazardous materials accidentally are combined, or when a toxic waste dump is unexpectedly discovered), it may be necessary to use the most conservative type of protective gear (e.g., chemically resistant and gas impermeable suits, self-contained breathing apparatus), downgrading only after the hazard is identified as requiring a lower level of protective gear.

Personnel protection involves more than special clothing, glasses, hard hats, earplugs, etc., to protect the body from harm. The following items are also part of personnel protection, as appropriate to the situation: knife (for emergency exit of a protective suit), portable light, personal monitor (e.g., dosimeter for radiation, personal thermometer for heat/cold stress), harness and lifeline, safety belt, two-way radio, locator beacon (e.g., for locating a victim of hazard).

Health and safety planning involves a complete assessment of an installation with all potential hazards identified. The plan provides the following information: (a) Definition of all potential hazards. (b) Health and safety implications of each hazard. (c) Description of routine health and safety management techniques (e.g., health and safety inspections, maintenance /repair follow-up on inspection citations, record-keeping, personnel protective gear, and medical monitoring). (d) Outline of emergency response procedures following occurrence of a major hazard (e.g., organization structure of key trained personnel to act as emergency responders, action steps for entering and working within zone of hazard, evacuation procedures, protective gear requirements, decontamination procedures, lines of communication, emergency telephone numbers, map of route to nearest emergency medical care). (e) Follow-up procedures after the emergency is over.

Use of personnel protection equipment is appropriate for work with in the vicinity of potential hazards. Personnel protection choices are based on the nature of the hazard, the level and/or concentration of the hazard, the duration of exposure, and the person-specific susceptibility to being adversely affected.

Assist in Inter-Agency Coordination and Public/NGO Participation

Assist in coordinating the environmental assessment with other government agencies, in obtaining the views of local NGO's and affected groups, and in keeping records of meetings and other activities, communications, and comments and their disposition. The Terms of Reference (TOR) should specify the types of activities; e.g., interagency scoping session environmental briefings for project staff and interagency committees, support to environmental advisory panels, public forum.

Report

The environmental assessment report should be concise and limited to significant environmental issues. The main text should focus on findings, conclusions and recommended actions, supported by summaries of the data collected and citations for any references used in interpreting those data. Detailed or uninterrupted data are not appropriate in the main text and should be presented in appendices or a separate volume. Unpublished documents used in the assessment may not be readily available and should also be assembled in an appendix. Organize the environmental assessment report according to the outline below.

- Executive Summary.
- Policy, Legal and Administrative Framework.
- Description of the Proposed Project.
- Baseline Data.
- Significant Environmental Impacts.
- Analysis of Alternatives.
- Mitigation Management Plan.
- Environmental Management and Training.
- Environmental Monitoring Plan.
- Appendices:
- List of Environmental Assessment Preparers References Record of Interagency/ Forum/ Consultation Meetings

Schedule

Specify dates for progress reviews, interim and final reports, and other significant events.

Other Information

Include here lists of data sources, project background reports and studies, relevant publications, and other items to which the consultant's attention should be directed.

Reviewing

The user of this guideline is referred to the translated EU document entitled “Guidance on EIA: Reviewing” (June 2001) as an excellent reference for any reviewing that is undertaken for the given hazardous waste project. Essentially, however, a review must ensure that all relevant topics discussed in Chapter 3 regarding specific issues associated with hazardous waste disposal facilities are covered properly in the EIA report.

12. PUBLIC CONSULTATIONS

Public consultation is considered to be the cornerstone of the EIA process. Please refer to Chapter 5 for a fuller discussion.

What is required by law?

At present, Georgian legislation has been changed and the new law for Licenses and Permits has been adopted. The law mandated issuance of the permit and licenses within 20 days and reduced public hearing procedures down twenty days. Hence at this stage it is very unclear MoE attitude towards conducting of the public hearings.

Who must be present (or invited to be present) at a public consultation on hazardous waste facility project proposals?

There are a few individuals and organizations that *must* be present at a public consultation for any kind of EIA public consultation. These are as follow:

- representatives of the MoE;
- the developer and its consultant, and
- representatives of the associated regions.

Members of the public are also necessarily invited to any public consultation through the announcement of the public consultation through at least one local and one national newspaper.

However, specific to projects dealing with hazardous waste facilities, it is also desirable to invite NGOs concerned with this topic, related business NGOs and environmental NGOs, individuals or organizations involved in the waste cycle (especially collectors and disposers), and other groups that may be deemed appropriate given the particular circumstances.

13. MANAGING THE EIA PROCESS FOR WASTES

Proper management of the EIA process is very important because of the complex nature of the various involved parties and because of the multi-disciplinary nature of the environmental information involved. To be specific, proper management must take into account the following:

- the multitude of involved actors. These should include:

    1. the initiator of the plan (the waste authority);
    2. the environmental authority;
    3. other departments having an interest in waste disposal (e.g. housing, public health, safety);
    4. the decision-maker who has the competence to approve the final waste management design or plan (e.g. Parliament);
    5. non-governmental organizations (NGOs) and the general public;

- the complex nature of the alternatives and issues considered;
- linkage to planning and other assessments,
- the need for co-ordination and feed-back to avoid unnecessary delays.

It is, in fact, the overall planning and assessment process which has to be managed. Done well, considerable time and quality gains are possible (based on DG Transport, 1999).

Division into clear-cut scheduling, roles and responsibilities

Each of the steps of the EIA process (e.g. scoping, impact assessment and review) should be divided into phases with clear tasks, roles and responsibilities. At the end of each phase, intermediate decisions should be made to accept or reject the outcome and to determine the work that still has to be done. Georgian law prescribes a specific EIA procedure. This should involve formal and informal co-operation between all involved authorities.

Phasing and structuring the process over time

Each of the steps of the EIA process (e.g. scoping, impact assessment and review) should be divided into phases with clear tasks, roles and responsibilities. At the end of each phase, intermediate decisions should be made to accept or reject the outcome and to determine the work that still has to be done. EIA legislation exists in Georgia and the law does prescribe an EIA procedure. Transparency is greatly enhanced by agreeing a clear procedure at the start of the EIA process. This procedure may specify (i) the initial project description, (ii) the objectives of the EIA process, (iii) the sequential steps of the procedure (i.e. documents and decision points), (iv) the time frame, (v) provisions for consultation and participation, (vi) the actors and their roles. The size of these documents depends on the complexity of the decision-making problem (i.e. the number of environmentally relevant issues) and the degree of openness and transparency. The most complex step is the assessment itself.

Flexibility - ensuring that the EIA process is not too rigidly defined

The EIA process should respond appropriately to the various inputs from consultation and participation. The EIA procedure should therefore be flexible with respect to its phasing and organization. Flexibility can be enhanced in a number of ways:

- anticipating possible outcomes from consultation and public participation;
- communicating frequently, and at an early stage, with interested agencies and groups; listening to signals and clearly explaining the EIA process;
- making short-term or framework contracts with consultants to respond to uncertain outcomes.

Applying management tools - other tools for EIA process management

The initiator may appoint an EIA process manager, who is in charge during the whole EIA process. The following management tools are particularly helpful in the assessment step:

- setting **clear targets** for the EIA report and its intermediate drafts;
- setting up an **inter-disciplinary team** of experts (e.g. ecologists, waste management experts, geo-hydrologists, socio-economic experts, landscape planners, etc.);
- ensuring good **collaboration** exists between the planning and environmental authorities;
- enabling effective **feedback** to be made between assessment results and the planning process, for example by:
    1. drawing up organization charts;
    2. preparing internal draft plans and assessments which are circulated among those taking part in the planning and assessment work;
    3. stationing planners and environmental experts in the same location;
    4. applying team-building techniques;
- providing sufficient **time and resources** to open up the assessment and planning phase by encouraging external parties and the public to comment on the drafts;
- ensuring that the results of the evaluation are taken into consideration in the **final decision.**

There are many advantages in setting up informal collaborations between departments in carrying out an EIA (*Ibid*).

14. ROLES AND RESPONSIBILITIES

Planning

The Ministry of Environment (MoE) is responsible for implementation of the EIA process cycle, from scoping to final evaluation and approval.

The MoE is responsible for giving orders for different kinds of studies as required by the screening process. In the first stages, the MoE must decide whether the project purpose and description as submitted in the general format are adequate. If not adequate, it makes the request for any editing required. If it is complete, the MoE calls for state ecological expertise representatives of related institutions and organizations, Ministry officials.

The MoE checks the EIA report submitted by the developer and determines whether it is in accordance with the format that was assigned to the developer, and has a XXXX business day period to do so. It may then assign a period of up to six months to make changes or corrections as required. If the EIA report is in compliance with the format, it is copied for each member of the commission, and mailed with an invitation to the next meeting for the examination of the EIA report by the MoE. The Ministry and Regional Directorate in question must then notify the public through an appropriate medium (internet) that the EIA report appraisal is occurring, and that the report is available for public viewing. The MoE must then make the report available for viewing.

The Ministry then takes into account all the studies brought forth by the project and the history of the meetings of the past months, and issues an EIA Positive or an EIA Negative order with XXXX working days. It notifies the developer, the concerned Regional Directorate and other parties, and the Regional Governorate announces the decision through appropriate media to the concerned public.

For projects that receive either an “EIA Not Required” or an “EIA Positive” order, the Ministry monitors the events that occur during the implementation of the project and ensures that they adhere to what has been agreed upon on in the EIA report; the Ministry may also consult various experts and related institutions as necessary in the matter. The developer in either of these situations is responsible for providing reports on their activities in the construction, operation and post-operation phases, as well as copies of their various permits, to the Ministry. The Ministry forwards these items to the regional governorates so that they can inform the public.

If it is found that the construction has begun on a project without the complete execution of an EIA and without an “EIA Not Required” or an “EIA Positive” order, the works are suspended until one of these two orders comes through. If various conditions were set out in the EIA report or preliminary EIA report that are not met during the execution of the project, a non-extendable period of 60 business days may be granted by the MoE in order to fulfil the requirements. If after this period is complete the requirements have not been met, the project is suspended by the MoE until the requirements are finally met.

A number of other items are generally the responsibility of the MoE:

- Extra time can be appended to any of the periods mentioned with good reason and with Ministry permission.
- Changes in project ownership require the new owner to take over all responsibilities from the previous owner in terms of the EIA.
- In case of disputes, the Ministry always has the final word.
- The Ministry is permitted to carry out many kinds of educational and public-awareness activities in the field of EIA in cooperation with other organizations, at local, national or international levels.
- Regarding military projects, EIAs are carried out in cooperation with the organization in question along with the Ministry.

- For applications involving several projects, the Ministry may decide that a single EIA report or EIA preliminary report is required as opposed to multiple reports.
- The Ministry may issue communiqués regarding the EIA regulation when necessary.
- Items submitted before the enforcement date of the new regulation abide by the rules set out in the old legislation.

The Proponent

The project developer or proponent is responsible for preparing whatever kind of EIA study is ordered by the Ministry. It may hire a consultant in order to achieve this purpose.

Initially it is responsible for filing an application to execute the project in the general format specified in Annex III. If the MoE requests changes or editing the developer must finish this, and, when the MoE deems the application appropriate for further development, the developer must provide sufficient copies of the application to MoE.

The location of the public participation meetings must be convenient for interested parties' purposes and is assigned by the developer and the regional governor's office working together. Any costs associated with any such meetings are the responsibility of the developer. The developer is responsible for advertising the location, date, time and subject of public participation meetings at least five days in advance in a medium that is determined by the MoE.

During the scoping meeting, the most important environmental impacts to address are identified and the specific contents to be included in the format are determined. The commission also decides which professional branches will also take part in the preparation of the EIA report. It is the responsibility of the proponent to take all the advice of the Commission and the MoE into account in its EIA study.

The EIA format is valid for one year's time, and it is the responsibility of the proponent to complete the report within this period. During the review phase, the commission may ask the developer for detailed information on what measurements and analyses were performed, and in doubt the site may be visited, samples re-taken, or other expert advice sought. Expenses are the responsibility of the developer.

On completion of the review phase, and receipt of the report from the Commission on the EIA report, the developer has a 30-day period to correct the EIA report to reflect the judgments of the review meeting and re-submit it. As well, the developer must submit a signed document stating that the project and the final EIA report and annexes are his/her responsibility.

The Consultant

The responsibility of any consultant hired by the proponent is to undertake the tasks described above in a competent and objective manner.

The Public

At three points in the EIA process (two if no pre-EIA is involved), the public has the chance to participate in the process and thus aid in decision-making. It is the responsibility of the public to know its rights in this respect and add its voice to the process. The specific points that the public could participate in the gathering of environmental and social information in this process, in the absence of a pre-EIA, are 1) with the initial announcement of the intention to undertake an EIA for the given project in a public forum, and 2) with the completion of the EIA report and its available viewing at the MoE or at the regional directorate. At the end of the process, the EIA Positive or Negative Order shall be announced by the governorship to the public.