FIRE-WATER RETENTION FACILITIES

(Draft) GUIDANCE NOTE TO INDUSTRY ON THE REQUIREMENTS FOR FIRE-WATER RETENTION FACILITIES

Environmental Protection Agency
An Ghníomhaireacht um Chaomhnú Comshaoil

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This document does not purport to be and should not be considered a legal interpretation of the provisions and requirements of the E.P.A. Act, 1992.

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Environmental

Protection Agency

ESTABLISHED
The Environmental Protection Agency Act, 1992, was enacted on 23 April 1992 and under this legislation the Agency was formally established on 26 July 1993.

RESPONSIBILITIES
The Agency has a wide range of statutory duties and powers under the Act. The main responsibilities of the Agency include the following:

- The licensing and regulation of large/complex industrial and other processes with significant polluting potential, on the basis of integrated pollution control (IPC) and the application of best available technologies for this purpose;

- The monitoring of environmental quality, including the establishment of databases to which the public will have access, and the publication of periodic reports on the state of the environment;

- Advising public authorities in respect of environmental functions and assisting local authorities in the performance of their environmental protection functions;

- The promotion of environmentally sound practices through, for example, the encouragement of the use of environmental audits, the establishment of an eco-labelling scheme, the setting of environmental quality objectives and the issuing of codes of practice on matters affecting the environment;

- The promotion and co-ordination of environmental research; and

- Generally overseeing the performance by local authorities of their statutory environmental protection functions.

STATUS
The Agency is an independent public body. Its sponsor in Government is the Department of the Environment. Independence is assured through the selection procedures for the Director General and Directors and the freedom, as provided in the legislation, to act on its own initiative. The assignment, under the legislation, of direct responsibility for a wide range of functions underpins this independence. Under the legislation, it is a specific offence to attempt to influence the Agency, or anyone acting on its behalf, in an improper manner.

ORGANISATION
The Agency's headquarters are located in Wexford and it operates five regional inspectorates, located in Dublin, Cork, Kilkenny, Castlebar and Monaghan.

MANAGEMENT
The Agency is managed by a full-time Executive Board consisting of a Director General and four Directors. The Executive Board is appointed by the Government following detailed procedures laid down in the Act.

ADVISORY COMMITTEE
The Agency is assisted by an Advisory Committee of twelve members. The members are appointed by the Minister for the Environment and are selected mainly from those nominated by organisations with an interest in environmental and developmental matters. The Committee has been given a wide range of advisory functions under the Act, both in relation to the Agency and to the Minister.

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1. INTRODUCTION

This Guidance Note is one of a series produced by the Environmental Protection Agency. It is intended to provide guidance to operators of industrial activities on the requirements for, design and types of, firewater retention facilities. The document is primarily written for industrial activities regulated under the Environmental Protection Agency Act, 1992, but is sufficiently broad in scope to accommodate other industrial activities. The information in the Guidance Note should be used by all installations; particularly those that, in the event of an accident, have the potential to give rise to major pollution. It should be noted that this information is provided for guidance purposes only and each site must be considered on an individual basis taking account of site-specific characteristics.

The Guidance Note is comprised of five sections. Following this brief introduction, the need for a retention facility is discussed in Section 2. In Section 3, the design criteria for retention facilities are described in detail. Section 4 describes different types of retention facilities, while Section 5 contains a brief discussion of recycling, treatment and disposal of contaminated firewater.

The need for firewater retention at an industrial facility will depend on the results of an assessment of the risk of environmental pollution associated with contaminated firewater (described in Section 2). If it is determined from the risk assessment that a significant risk of contaminated firewater pollution exists, then a suitable risk management program must be designed and implemented. Risk management includes, but is not limited to, the construction of a firewater retention facility. A risk assessment and risk management program should accommodate the high degree of variability that exists from industry to industry.

New and Existing industrial facilities regulated under the Environmental Protection Agency Act, 1992, must conduct a risk assessment and implement a suitable risk management program. The danger of contaminated firewater pollution at existing facilities may be significantly reduced by the implementation of an effective risk management programme. In such cases, the volume of contaminated firewater to be retained and the type of retention facility can be adjusted to take account of such control measures.

2. REQUIREMENTS FOR FIREWATER RETENTION FACILITIES

2.1 WHAT FACILITIES REQUIRE FIREWATER RETENTION?

It is difficult to list explicitly every industrial activity that requires a firewater retention facility. The difficulty is due to the large number of variables involved and the site-specific nature of industrial installations; however, contaminated firewater is relevant to both large and small activities that use potentially polluting substances. To assist in this determination, a list of the industrial operations that are considered to have significant potential for the release of contaminated firewater is provided in Appendix A. If your industrial facility has an operation listed in Appendix A, a firewater retention facility will generally be required.

If the operations listed in Appendix A do not take place at your facility, but potentially polluting substances are handled, then a risk assessment and management programme should be completed. The completion of a risk assessment will provide an industrial facility with the information required to determine the need for a firewater retention facility.

2.2 WHAT IS RISK ASSESSMENT AND RISK MANAGEMENT?

2.2.1 Risk Assessment

A risk assessment (for the purposes of this Guidance Note) can be loosely defined as an assessment of the risk that an industrial facility poses to the environment during a fire that brings firewater into contact with operations or substances that would cause significant pollution. A risk assessment will typically include the following:

Identification of existing and potential hazards
Identification of existing control measures
Assessment of the hazards with regard to the:

- probability of an incident occurring
- the impact of an incident on the environment on-site and off-site (soil, water and air)
- the impact of an incident on sensitive receptors in the area (residents, schools, businesses, hospitals etc.)

The risk assessment should form part of the regulatory authority's assessment of the activity and if a significant risk exists for the release of contaminated firewater, then a suitable risk management programme must be implemented. Appendix B provides a list of risk

assessment criteria that should be used when conducting the risk assessment.

2.2.2 Risk Management Programme

A risk management programme will outline actions to be taken to reduce the risk of firewater contamination of the type identified during the risk assessment phase. These actions may or may not include the construction of a firewater retention facility and will depend on the level of pollution risk associated with the industry and the particular site. The risk management programme will include the implementation of management systems and engineering controls to reduce or eliminate potential hazards or sources of pollution. The criteria to be used in the development of a risk management programme are listed in Appendix C.

3. DESIGN OF FIRE-WATER RETENTION FACILITIES

3.1 HOW IS THE VOLUME OF CONTAMINATED FIREWATER TO BE RETAINED, CALCULATED?

The volume of contaminated firewater to be retained is calculated utilising the following criteria:

(i) The maximum volume of water likely to be used in fighting a fire including water available, on-site, adjacent to the site, or brought onto the site.

(ii) The volume of contaminated water to be retained as the result of a fire in a process area

(iii) The volume of contaminated water to be retained as the result of a fire at a tank farm

(iv) The volume of contaminated water to be retained as the result of a fire at a storage area, e.g. warehousing

The largest volume calculated for (i), (ii), (iii) or (iv), equals the minimum retention volume required. The estimated volume of contaminated firewater is based on a fire occurring in only one of the areas in (ii) to (iv) above. If there is a significant risk of fire occurring in more than one of these areas simultaneously, the volume associated with each area must be added to the overall retention capacity.

Additional capacity is required for rainwater that occurs during the fire event. This additional capacity must be included in the total required retention volume for contaminated firewater. The process of determining the correct firewater retention volume is explained in the following pages. In addition a sample calculation is provided in Appendix D to illustrate the method of determination.

3.2 THE VOLUME OF FIREWATER AVAILABLE TO THE SITE

Firewater is defined as water that is used to extinguish a fire. This includes sprinkler or non-sprinkler water and any other water used to cool adjacent buildings or property.

The total amount of available firewater must be assessed with reference to the following:

- The design standards for sprinklers,
- The requirements of the sprinkler system for stored water including the infill rate,
- The public or private fire hydrants available and their delivery rates,
- The stored water that may be brought on-site by fire fighting authorities,

- The additional sources of on-site water (i.e. cooling tower water, distillation water, recycled water, etc.),
- The local surface waters if required as part of a typical fire fighting effort.

The design standards for sprinklers will provide information on application rates, the area of coverage for fires, and the duration. From this information the expected firewater volume can be estimated. If the area of fire coverage and fire duration exceeds the sprinkler design condition, it is recommended that the total stored water capacity of the sprinkler system reservoir be used (i.e. the reservoir capacity plus the infill rate). Justification must be provided in the risk assessment if the sprinkler capacities used in retention calculations are less than the reservoir capacity.

Fire hydrants may be located on the local authority water main adjacent to the facility. The flow and pressure in the water main is dependant on many factors such as age, the condition and size of the water main, the source of water, the distance from the site, and the time of day. It is the actual performance of the hydrants, accounting for pressure losses that should be used when estimating firewater volumes. Additional sources of water from process operations and water brought on-site with the fire tenders, which may be available to fire crews, must be included when estimating firewater capability. The use of local surface waters for fire-water will depend on the distance from the facility, grade differential, and pumping capacity; however, surface waters should only be included in the fire-water volume calculation if they are required as part of a typical fire fighting effort. The local fire authority must be consulted to determine the actual performance of fire hydrants, the need for surface water as a source of water, the number of fire tenders and type of fire fighting equipment that would be used in a fire situation.

For facilities without sprinklers the expected duration of a fire must be estimated to determine the firewater volume. This volume will be estimated during the risk assessment with particular reference to the following;

Volume of products and raw materials at risk
Combustibility/flammability of premises/inventory
Speed of response by Fire Crew/Fire Brigade
Site housekeeping

The local Fire Authority must be consulted with a view to pre-planning responses to likely scenarios including the scenario of allowing the fire to

burn itself out. This will include determining the realistic performance of nearby hydrants, the response of the fire brigade and appliances in an emergency and plans for the minimisation of contaminated firewater as appropriate. This information will be included in the risk assessment report to be submitted to the Agency.

3.3 THE INITIAL VOLUME ESTIMATE OF CONTAMINATED FIRE-WATER

Contaminated firewater is defined as water that has become contaminated with process materials used at a facility and the products resulting from combustion. To estimate the volume of contaminated water, three distinct areas, which are generally common to all industrial facilities, must be considered. These are the process, warehouse and tank farm areas. For each area, a list of factors must be considered when assessing the associated fire risk and/or resultant volume of contaminated water to be retained.

The assumption made is that the fire will occur in only one of the three areas; however, this is dependent on the proximity of one area to another and the control measures in place. If there is an appreciable risk of fire occurring in more than one of the areas, then the volume of contaminated firewater calculated for each of these areas should be included in the overall retention capacity.

For all three areas there are a number of common points to be considered and assessed. These are as follows:

(a) The criteria listed in section 1.1 of Appendix B
(b) The sprinkler design, density, layout, zoning and duration
(c) The availability and capability of the fire crew/fire brigade

3.3.1 Process Areas

To assess the volume of contaminated firewater that may be generated in the process areas, the following points should be considered:

(a) The construction of the main sprinkler distribution pipes (150 mm or above) and level of explosion proofing.
(b) The Assumed Maximum Area of Operation (AMAO) on which the sprinkler design is based compared to the actual floor area.
(c) The presence of compartmentation and the level of fire resistance supporting such compartmentation (e.g. fire doors, etc.).
(d) The presence of explosion relieving areas and walls in the building design.

(e) The volume of process water/product present in the process equipment that may combine with and contaminate the firewater.

The design density for sprinkler systems is based on the AMAO and assumes that the fire is actually put out by the sprinklers within a reasonable period of time. If the actual area is greater than the AMAO the design density must be multiplied by the larger area.

3.3.2 Tank Farms

To assess the volume of contaminated firewater that may be generated in the tank farms, the following points should be considered:

(a) The design and duration of the deluge system.
(b) The number of tanks, their size, construction or separation distances.
(c) The presence of radiation walls.
(d) Size and make of bunds.
(e) The type and quantity of product at risk.
(f) The location of the tank farm and its proximity to other property.

3.3.3. Warehouses

To assess the volume of contaminated firewater that may be generated in warehouses, the following points should be considered:

(a) The sprinkler design density and duration at the roof level and whether in-rack protection is included.
(b) The nature of the materials being stored.
(c) The warehouse design (e.g., open plan, compartmentation, aisle widths).

3.4 ESTIMATE OF REQUIRED RETENTION VOLUME FOR CONTAMINATED FIRE-WATER

3.4.1 Industrial site Contributions

The largest volume calculated for 3.3.1, 3.3.2 or 3.3.3 above is selected as the initial estimate of the volume of contaminated firewater. This estimate is then compared with the firewater likely to be used for the site as calculated in section 3.2. The larger volume is selected as the required retention volume for contaminated firewater.

3.4.2 Rain Water Contributions

Provision for the retention of rainwater that occurs prior to or during the fire must also be included in the required retention volume estimated in section 3.4.1 above.

For rain that occurs during the fire event, the maximum volume of rainfall to be included should be based on at least 50 mm of rainfall, or if significantly different, the 20 year, 24-hour, rainfall event. The actual volume of rainwater to be retained will be determined on a case-by-case basis. The area of coverage should include the total plant area, unless it can be demonstrated that smaller areas of coverage need only be considered due to separation of the storm water from any process areas or loading areas. It should be demonstrated that there is negligible risk of contamination of the separated storm water. Please note that no permanent standing water should be permitted in the retention facility.

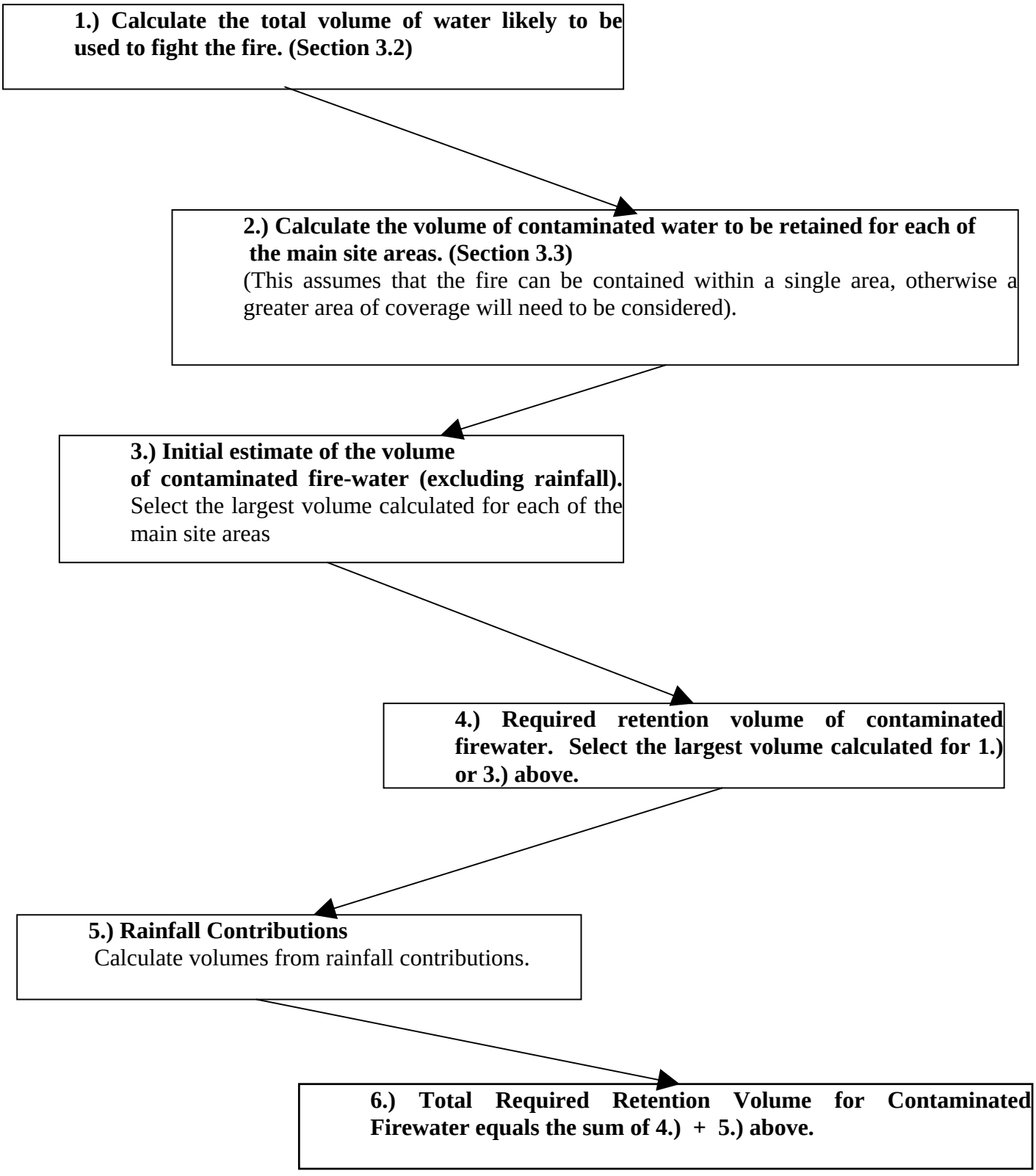
3.4.3 Total Required Retention Volume for Contaminated Firewater

The total required retention volume for contaminated firewater is equal to the sum of:

a) The initial volume estimate calculated in section 3.4.1.
b) The rainfall contributions calculated in section 3.4.2.

A summary of the steps to calculate the volume of firewater to be retained is outlined in Figure 1.

Fig. 1: Flow Chart to Determine the Total Required Retention Volume for Contaminated Fire-water



4. TYPES OF RETENTION FACILITIES

4.1 PURPOSE-BUILT RESERVOIRS

Where firewater retention is necessary, a dedicated purpose-built reservoir or lagoon must be provided. The lining of the reservoir must be compatible with all classes of products and contaminants washed into the pond. The shape, depth, location and side slope design will be dependant on the construction material, area available, and level of maintenance desired.

The construction material will also determine the level of water erosion protection provided. Wave action and hydraulic turbulence adjacent to influent pipes and sumps are typical forms of water erosion. Wave action protection, where required, typically extends from 1 foot below the minimum water surface to 1 foot above the maximum water surface. The freeboard required will depend on the area of the retention facility and wind speed.

Retention facilities should be kept relatively free from grass and weeds and undergo regular maintenance. Provision must be made for access around the facility by maintenance vehicles and pumping trucks in all weathers. It is advisable to provide a sump for effective evacuation of the facility by pumping.

Leakage from retention facilities should be no greater than 0.5 litres/m^2/24hr period as a general guide. This design objective will be dependant on the construction material used, the length of retention and the materials to be retained as determined in the risk assessment.

The layout of any influent pipes should facilitate a sustained flow. The piping should be suitably sized to take flow direct from bunding, process drains and storm water drains simultaneously. The capacity of any reservoir must be calculated to avoid drain back-flow during peak flow situations.

Retention facilities must be monitored daily to ensure that large quantities of runoff or rainwater do not accumulate in the pond thereby reducing the retention capacity of the pond for a potential fire situation.

4.2 PROVISION OF RETENTION FACILITIES FOR EXISTING PLANTS WITH SPACE LIMITATIONS

If for varying reasons the installation of a purpose-built reservoir at an existing facility is not possible, then a number of alternatives must be considered for the purposes of retaining firewater.

4.2.1 Bunding

For existing facilities, the use of existing bunds may be considered for the retention of firewater. The primary purpose of a bund is to contain material spills, overflows or flange leakage in process areas and to contain the contents of a tank in the event of a tank rupture. Accepted practice is to design the bund such that 110% of the volume of the largest tank will be contained within the bunded area.

Bunding can be designed to hold a greater percentage of material to facilitate the collection of contaminated firewater in a fire situation. The bunding height may be limited by the class of materials to be contained. For instance, for highly flammable materials high bund walls are not recommended due to fire fighting concerns. In this case the ability to direct a material spill to a separate retention area or individual sump and thus remove the fire exposure is an important consideration.

Other options for bunding to be explored include:

a) Bunds within bunds,
b) Run-off bund weirs.

The total volume of a bund, if properly designed, may be used as part of the overall retention facilities.

4.2.2. Partial Reservoir Construction

Where space limitations on site prevent the construction of the required volume for a reservoir, a smaller reservoir to retain a partial volume may be constructed in conjunction with other contaminated firewater control measures. These measures are subject to the approval of the Agency.

4.2.3 Drainage Systems

The drainage system for a large facility can be complex since it may incorporate storm water, foul sewage; process drains prior to treatment, underground sumps/tanks, or concrete compartments. Individual or interlinked pipe work may be considered when assessing alternative retention capacity. Below ground storm water culverts may provide significant firewater retention providing the culvert is suitably diked before its discharge point. Open concrete drains may be designed to rapidly collect firewater; however they offer limited on-site retention.

Equalisation tanks associated with effluent treatment plants may be considered as possible retention systems but many such facilities operate at or very close to their capacity and additional retention capability would be limited.

4.2.4 Dormant Above Ground Tanks

Dormant above-ground tanks located at industrial facilities may contribute to the contaminated firewater retention capability of the plant. Such tanks include disused oil tanks, raw material/product storage tanks and effluent tanks/chambers. The feasibility of pumping firewater to the tank should be investigated. These tanks may only be considered as an adjunct to any retention facilities and should not be considered the primary firewater retention facility.

4.2.5 Above Ground Dikes

The industrial site may be graded to provide temporary storage until such time as the liquid can be pumped to a tanker for removal and proper disposal. Bunding of the exits and entrances of an industrial facility utilising dwarf walls, ramps and steps is also a method of fire retention. Several hundred cubic metres of firewater may be contained in this manner. Due consideration should be given to the integrity of the containment walls. In addition, process drains within the facility should be eliminated to allow effective collection of the firewater. Where this is not an option, particular emphasis must be placed on the plugging of the drain system.

4.2.6 Acquisition of Adjacent Properties

If space limitations prevent the construction of retention facilities then the possible acquisition of adjacent properties should be considered.

5. RECYCLING, TREATMENT AND DISPOSAL

5.1 RECYCLING

Firewater retention ponds used, as a firewater source for further application on a fire is not recommended due to the information that would be required on the likely entrained products prior to their use. Information on the entrained products such as the reactivity with water, corrosivity and toxicity must be developed. This required information might be neglected during a fire emergency situation. This option will, however, be examined on a case-by-case basis.

5.2 TREATMENT AND DISPOSAL

Contaminated firewater collected on-site must be analysed to determine the options for proper disposal. If adequate treatment is available, final disposal via normal licensed outlets may be permissible. The operator should have preliminary agreements in-place with final disposal facilities prior to approval of the risk management programme.

Treatment or recovery on-site is also permissible, provided the treatment or recovery methods have been approved by the Agency. Specialist firms may be used to help with on-site treatment or provide treatment systems to the site. Procedures for such events should be considered and formalised in the contingency/emergency-planning portion of the risk assessment.

6. REFERENCES

1. European Community, Proposal for Commission Directive on the Control of Major Accident, Hazards involving Dangerous Substances (COMAH) 94/C 106/04, OJ 14/4/94 to amend 82/501/EEC (as amended).

2. European Community Directive on Pollution Caused by Certain Dangerous Substances Discharged into the Aquatic Environment (76/464/EEC).

3. European Community (Major Accident Hazards of Certain Industrial Activities) Regulations S.I. 292 of 1986.

4. European Community (Classification Packaging, Labelling and Notification of Dangerous Substances) Regulations, S.I. 77 of 1994.

5. European Community Directive on Protection of Groundwater against Pollution by Certain Dangerous Substances (80/68/EEC).

6. Geological Survey of Ireland, "Guidelines on Mapping Groundwater Vulnerability to Pollution".

7. Geological Survey of Ireland, "Proposed Aquifer Protection Scheme".

8. Groupement International des Associations Nationales de Fabricants de ProduitsAgrochimiques (GIFAP), Guidelines for the Safe Formulation and Packing of Pesticides, 1993.

9. United Kingdom, Health and Safety Executive/AEA Technology, "The Design of Bunds" (SRD.HSE R500), March, 1990.

10. United Kingdom, Health and Safety Executive, "A Guide to the Control of Industrial Major Accident Hazards Regulations 1984, ISBN 011 8855794".

11. United Kingdom, Health and Safety Executive, "Storage of Packaged Dangerous Substances", 1992, ISBN 011 8859897.

12. United Kingdom, British Agrochemical Inspections Scheme (BASIS), "Guidelines to Legislative Requirements for Storing, Transporting and applying Pesticides", Basis (Registration) Limited, November 1992.

13. United Kingdom, British Agrochemical Inspections Scheme (BASIS), "Guidelines to BASIS Requirements for the Safe Storage and Handling of Pesticides", BASIS (Registration ROI) Limited, February 1994.

14. United Kingdom, Inspection and Approval of Agrochemical Stores by River and Fire Authorities for BASIS Registration, BASIS, NRA, SRPBA (Scottish River Purification Boards Association), The Chief and Assistant Chief Fire Officers Association, March 1992.

15. United Kingdom, National Rivers Authority, “Water Pollution Incidents in England and Wales 1991”, September 1992.

16. United Kingdom, Health and Safety Executive, “Health and Safety in Retail and Wholesale Warehouses”, 1992, ISEN 011 885731 2.

17. United Kingdom, National Rivers Authority, “Water Pollution Incidents in England and Wales 1992”, September 1993.

18. United Kingdom, Loss Prevention Council/Fire Officers Committee, BS 5306, Part 2, 1990.

19. United Kingdom; British Standard for Underground Hydrants, BS 750, 1984, and BS 5306 Part 1, 1976.

20. Factory Mutual Standards; FM 2.8N, FM 4.1N.

21. National Fire Protection Standards, NFPA 13 (Sprinkler Installations), NFPA 15 (Water Spray Systems), NFPA 231 (Block Storage), NFPA 231 C (Rack Storage).

APPENDIX A

TYPES OF INDUSTRIAL OPERATIONS THAT GENERALLY WILL REQUIRE FIRE-WATER RETENTION FACILITIES

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TYPES OF INDUSTRIAL OPERATIONS THAT

GENERALLY WILL REQUIRE FIRE-WATER RETENTION FACILITIES

Industrial operations that generally will require firewater retention facilities include the following:

(I) Facilities that store dangerous substances classified under the following risk phrase reference numbers (see note (c)) and which exceed storage quantities as follows:

Risk Phrase Reference No.	Risk Phrase	Storage Quantity (Tonnes)
R50	Very toxic to aquatic organisms	1
R51	Toxic to aquatic organisms	10
R52	Harmful to aquatic organisms	100
R53	May cause long-term adverse effects in the aquatic environment	1000

(II) Facilities whose activities involve potentially polluting substances and also discharge surface water or process effluent into receiving waters that is:

- Upstream of drinking water intake points,
- Salmon fisheries,
- Recreational waters,
- Recognised shellfish waters,
- Ecologically sensitive waters.

Notes:

(a) Industrial operations, which may be covered under item (I) above, will typically include the following types of activities:

CHEMICAL AND ALLIED PROCESS INDUSTRIES

- Large chemical and mixed warehousing facilities.
- Processing of petrochemicals, and organic or organo-metallic chemical products.
- Processing of inorganic chemicals.
- Processing of artificial fertilisers.
- Processing, formulation and storage (including wholesale distribution depots) of biocides, pharmaceuticals or veterinary products and their intermediates.
- Processing or use of coating materials and powder coating manufacture.
- Biocide retailing outlets (including co-operatives).
- Tyre manufacture.
- Large scale laboratory facilities and associated storage (including third level education institutions and large health care facilities).
- Processing and storage of paints, varnishes, resins, inks, dyes, pigments or elastomers.
- Manufacture of glues, bonding agents and adhesives.

FOOD AND DRINK

- Processing of vegetable and animal oils and fats and dairy products.
- Commercial brewing, distilling and malting operations.
- Manufacture of sugar.
- Animal slaughterhouses.
- Processing of fish-meal/fish-oil and the rendering of animal by- products.

- Food manufacturing operations involving the use of ammonia refrigerant.

METALS

- Metal finishing.

- Metal treatment plants and associated storage.

- Processes involving the use of heavy metals.

- Operations involving coating with organo-tin compounds.

- Electroplating operations.

MISC. ACTIVITIES

- Manufacture of integrated circuits and printed circuit boards.

WOOD, PAPER, TEXTILES AND LEATHER

- Manufacture of paper pulp, paper or board (including fibre-board, particle board and plywood).

- Manufacture of bleached pulp.

- Treatment or protection of wood, involving the use of biocides.

- Processing of synthetic fibres.

- Dyeing, treatment or finishing (including moth-proofing and fireproofing) of fibres or textiles (including carpet).

- Fell mongering of hides and tanning of leather.

FOSSIL FUELS

- The handling or storage of crude petroleum.

- Petrochemical refining and storage (including distribution depots).

- The pyrolysis, carbonisation, gasification, liquefaction, dry distillation, partial oxidation or heat treatment of coal, lignite, oil or bituminous hale, other carbonaceous material or mixtures of any of these.

WASTE

- The disposal or recovery of hazardous waste.
- The disposal, regeneration and combustion of waste oils.
- The incineration of municipal waste.
- The disposal or recovery of non-hazardous waste.

(b) Facilities covered under (I) or (II) above and which do not have proposals for firewater retention should conduct a risk assessment to justify alternative control methods.

(c) A listing of risk phrases and their reference numbers is included in Schedule 2 of the European Communities (Classification, Packaging, Labelling and Notification of Dangerous Substances Regulations, S.I.77 of 1994).

APPENDIX B

RISK ASSESSMENT CRITERIA

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RISK ASSESSMENT CRITERIA

1.0 INTRODUCTION

Risk assessment is described on page 6 of this Guidance Note. This appendix is intended to provide guidance on preparing a risk assessment report. A list of criteria is provided and should be considered by the operator of an industrial activity.

1.1 RISK ASSESSMENT CRITERIA

If the applicant has submitted an IPC application only part 11 of the following criteria is required. If an IPC application has not been submitted the full assessment report should be made available to the regulatory agency with the following information:

1 General Information

The general information requirements are:

- Name and address of the applicant and /or beneficial occupier telephone number and fax number.
- Registered name and address of the beneficial occupier of the licensable premises if different from above.
- Copies of any Environmental Licences or permits.

2 Location of Activity

Address and location of the industrial activity, contact name/telephone number/fax number if different to those covered above. Provide location map and National Grid Reference.

3 Relevant Planning Authority

Provide name and address of Planning Authority in whose functional area the activity is or will be situated.

4 Relevant Sanitary Authority

Provide name and address of Sanitary Authority in whose functional area the activity is or will be situated.

5 Class of Activity

List the class(es) of the activity/activities (is it in the First Schedule of the EPA Act)

6 Description of the Activity

A brief description of the activity must be submitted. Details of existing or proposed disposal locations and effluent limits for the following should also be included:

- All emissions to waters.

- All emissions to sewers. [The name of the sewerage undertaker, details of further treatment by the undertaker, if any, and details of the resultant sewage emission to waters are required].

7 Operational Information Requirements

A list of all unit operations to be carried out, together with a plan of the site indicating the location of all activities and identifying all buildings and facilities must be supplied.

8 Materials

List all raw materials, intermediates, products and wastes generated including all other materials, i.e. cleaning chemicals, water treatment chemicals, cooling water/ boiler water additives. The list must also include, toxicity data and environmental information on these materials. In particular materials used, which appear in List I or List II of the EC Directive on Pollution caused by certain dangerous substances discharged into the aquatic environment of the Community [76/464/EEC]. Fuels and energy utilised in the activity must also be given.

9 Seveso Regulations

A statement must be provided as to whether the activity consists of, or is for the purposes of, an industrial activity or isolated storage to which regulations 12 to 18 of the EC (Major Accident Hazards of Certain Industrial Activities) Regulations 1986 (S.I. No. 292 of 1986) as amended by the EC (Major Accident Hazards of Certain Industrial activities) Amendment Regulations, 1989 (S.I. No. 194 of 1989) and the EC (Major Accident Hazards of Certain Industrial Activities) amendment Regulations, 1992 (S.I. No. 21 of 1992) apply.

10 Surface Water and Ground Water Protection

The following information should be provided:

Surface Water:

- Drawings with invert levels and pipe sizes of the collection system and emission points for all surface water.
- The area of the roof and other impervious areas drained for each collection system.
- Meteorological data for the site including rainfall intensities and duration over hours and days.
- Potential points of contamination/areas most at risk.

Ground Water:

- Description of geology/hydrogeology of the site.
- Ground water quality.
- Current or potential uses of the ground water.

- Potential points of contamination/areas most at risk. Facilities for the Protection of Ground and Surface Water
- Drawings with invert levels of all process wastewater drains, pipelines.
- Private sewers and ancillary manholes and appurtenant structures.
- Fabrication, quality, integrity and testing of these conduits, sewers and structures.

11 - Fire Abatement, Response, Training and Awareness
The following information should be provided:

- List fire fighting equipment and structures on-site and their Location,
- List fire safety systems and posting of local fire, police and hospital telephone numbers and location where these numbers are posted,
- Describe Emergency response procedures during a fire,
- Describe any design features that incorporate containment (isolation of fire and fire-water), fire and heat resistant containers, structures and processes, and spill containment,
- Describe available access by fire fighting equipment into and around the site,
- Describe current level of work force awareness on fire prevention, the consequences of fire, precautions, emergency procedures, fire drills and first aid,
- Detail the level of information held by local fire fighting unit including the availability of Material Safety Data Sheets (MSDS). Include maps of the facilities showing location of hazardous materials, available equipment, lists of flammable, explosive, corrosive, toxic, radioactive, materials, their location and whether in a solid liquid or gaseous form,
- Describe available equipment of the local fire fighting unit,
- Describe security arrangements on-site,
- Determine the approximate response time of local fire fighting unit,
- Describe emergency management structures, delegation of staff responsibilities and provision of fire awareness and response training.

1.2 RISK ASSESSMENT REPORT

Based on the information above the operator of an industrial facility must identify the existing and potential hazards of polluting the surrounding environment with contaminated firewater. Then the operator can determine: the probability of an

incident occurring, and the impacts of contaminated firewater on the environment, and sensitive receptors.

APPENDIX C

RISK MANAGEMENT PROGRAMME

APPENDIX C

RISK MANAGEMENT

1.0 INTRODUCTION

On the submission of a completed risk assessment report the Agency will determine if a risk management programme is required. The operator will be required to prepare an effective programme of risk management to control fire and run-off of contaminated firewater into the environment. The operator may submit the risk management program at the same time as the risk assessment report. It is recognised that control measures will be dictated by the site requirements and characteristics. The fire risk and associated pollution risk at a site will be significantly impacted by the implementation of an effective risk management programme. In such cases, the volume of firewater to be retained and the type of retention facility can be adjusted to account for such control measures.

1.1 INFORMATION REQUIRED TO COMPLETE A RISK MANAGEMENT PROGRAMME

A risk management programme should include some or all of the following procedures:

- Construction of a fire retention facility.
- Alteration, where possible, to the process or the facility (cleaner technologies, waste minimisation, increased cleaning and maintenance).
- Substitution of a potentially polluting raw material.
- Installation of pollution control equipment, structures or procedures.
- Alteration of storage arrangements for potential pollutants.
- Implementation of a new or revised fire safety system.
- Implementation of emergency response procedures.
- Establishment of emergency management structures, delegation of staff responsibilities and provision of fire awareness and response training.
- Developments of a review/audit process to regularly monitor the implementation of risk management measures and ensure their continuing effectiveness.

1.2 Examples of Fire Control and Protection

The following is a partial list of Active Fire Control Systems as a reference to users of this document; this is not a definitive listing. The use of any of these controls will be specific to each facility and is not a guarantee of adequate fire control or protection. :

- Retention facilities,
- Segregation,
- Compartmentation,
- Quantity limits,
- Process and storage arrangements,
- Spill containment & drainage (to prevent releases into public drains and watercourses),
- Hazard information and labelling (Classification, Packaging, Labelling and Notification of Dangerous Substances Regulations, S.I.77 of 1994).

- Fire safety systems,
- Operation controls and procedure,
- Transportation on-site,
- Bunding, construction of dwarf wall around buildings not requiring vehicular access,
- Emergency containment equipment (absorbent, ramps, sand bags and drain protectors).

A partial listing of active fire protection systems includes:

- Automatic Sprinklers,
- Isolating valves,
- Deluge systems,
- Warehouse protection,
- Maintenance of systems,
- Public/private fire fighting units,
- Fire mains and hydrants,
- Pipe sizing,
- Gas suppression,
- In-house fire fighting capability,
- Smoke and heat detection system,
- Zoning,
- Roof venting.

A partial listing of passive fire protection systems includes:

- Explosion resistance,
- Explosion relief,
- Adequate site drainage,
- Fire retardants.

APPENDIX D

SAMPLE CALCULATION

APPENDIX D

SAMPLE CALCULATION

Calculate the Total Required Retention Volume of Contaminated Fire-water for a Process Facility Site equipped with sprinklers

Calculation Assumptions

Fire occurs only in the process area. The tank farm and warehouses are not affected and are significantly smaller than the process area (Note 1);
Process area has a dedicated sprinkler system with a reservoir capacity for example of 450 m^3;
There are two local authority hydrants available in other areas of the site (assuming 1.1 m^3 /min each) (Note 2);
Cooling tower water is available on-site to fight fires (100 m^3);
Duration of fire is 90 minutes (Note 3);
90 m^3 of product material is stored in the process area;
Total site area is 5000 m^2, with 50 % of surface paved;
Fire tenders will most likely be used to fight the fire (4.5 m^3 capacity each) (Note 4);
55 mm of rainfall is the 20 years, 24-hour rainfall event recorded for the area in which the plant is located.
No surface water is utilised for fire fighting purposes.

Notes:

1. The assumption that the fire will occur in one area only may not be correct for all sites and must be determined through the completion of a risk assessment.
2. Each site will need to determine the actual capability of its hydrants.
3 Duration of fire will be assessed through the overall plant capability based on the risk assessment.
4. Consultation with local fire authority is recommended to establish the likely responses in a fire situation.

Sprinkler Design Standards	
Density	17.5 litres/min.
Area of operation	260 m^2
Temperature of head rating	68 ºC
Number of hose streams	none
Water duration	90 minutes
Holding reservoir	450 m^3

Calculation

1.) Firewater Likely to be used for the Site

(1.a) Sprinkler Water Volume

Reservoir capacity for sprinkler system = 450 m^3

(1.b) Fire-water

Firewater from 2 local authority hydrants
Therefore fire-water volume = 2 x 1.1m^3 x 90 min = 198 m^3

(1.c) Fire-water from Other Sources

Volume of firewater, which could be brought on-site from fire brigade
= 4,500 litres x 3 = 13.5 m^3
Volume of cooling tower water available to fight fire = 100 m^3
Total fire-water available from other sources = 113.5 m^3

Total firewater likely to be used for the site (= 1.a + 1.b +1.c)
= 761.5 m^3 - (i)
Assume = 762 m^3

2. Volume of Contaminated Water to be retained for the Main Site Areas.

(2.a) Process Area

Sprinkler Firewater
Discharge rate of sprinkler water
= 17.5 litres/min/m^2 (sprinkler density) x 260 m^2 (area of operation)
x 90 min = 409.5 m^3

Process/Product Contributions
Amount of product material stored in the process area = 90 m^3

Total volume to be retained if the fire is in the process area = 499.5 m^3

(2.b), (2.c) Tank Farm and Warehouse
(Note: For simplicity, the calculations for the tank farm and warehousing areas are not included here, as per initial assumptions).

3.) Initial estimate of volume of contaminated fire-water = 499.5m^3 - (ii)
{Volumes for the warehouse and tank farm are calculated to be less than for the process area, i.e. (2.a) > (2.b), (2.c)}

4.) Comparing the results for (i) and (ii) above, the calculated volume for (i) at 762 m^3 is larger than (ii).

Therefore the required retention volume for contaminated fire-water = 762 m^3

5.) Rainfall Allowance
Rainfall amounts, which could occur during the fire, are now calculated.
The amount of rainfall that could occur
during the fire event =0.055 m x 5000 x 0.5 m^2 **= 138 m^3**

The total required retention volume for contaminated firewater is

$= (762 + 138)m^3$ $= 900\ m^3$

The above calculation is provided for illustrative purposes only. It must be emphasised that each site should be assessed through risk assessment on an individual basis, to determine its capability and likely response in a fire situation. The example does not include detail that would otherwise be required. This includes a detailed analysis of the storm-water runoff to account for the actual topography, buildings, paved, grassed and gravel areas and their associated runoff values. Also the availability of other sources of water such as surface waters, which may be used for fire fighting, is not included in the example.

APPENDIX E

OTHER IPC PUBLICATIONS

APPENDIX E

OTHER IPC PUBLICATIONS

I.P.C. Licensing Information Leaflets - Published by the Environmental Protection Agency

LC1 Integrated Pollution Control Licensing - Guide to Implementation and Enforcement in Ireland. €1.90

LC2 Integrated Pollution Control - Summary of Licensing Procedures. No charge

LC3 Environmental Protection Agency - Summary of its Structures, Powers and Functions. No charge

LC6 BATNEEC Guidance Note for the Chemical Sector. €6.35

LC7 BATNEEC Guidance Note for the Waste Sector. €6.35

Guidance on Environmental Liability Risk Assessment, Residuals Management Plans and Financial Provisions €20

IPPC Guidance Note on Storage and Transfer of Materials for Scheduled Activities. €10

These publications are available from EPA Headquarters, Wexford.

APPENDIX F

GLOSSARY

APPENDIX F

GLOSSARY

Bunds	Structures to contain material spills, overflows or flange leakage in process areas and to contain the contents of a tank in the event of a tank rupture.
Compartmentation	Division of buildings into separate fire areas by fire walls and doors, ideally < 25,000ft^2 .
Deluge Systems	Open-head sprinklers, which protect tanks and/or structures.
Entrained Products	Products from the facility and firewater mixed.
Explosion Relief	Elements of structure designed to give way in an explosion (typically 20 psf).
Explosion Resistance	Elements of structure designed to withstand explosion pressure (typically 100 psf).
Firewater	Water used to extinguish a fire.
Firewater (Contaminated)	Water that has become contaminated with process materials and products from a facility
Freeboard	The difference in elevation between the maximum elevation of the firewater retained and the minimum elevation of the impoundments.
Gas Suppression	Smothering of fire with inert or fire fighting gas, e.g. CO_2 etc.
In-Rack Protection	Sprinkler protection located within storage on racking.
Process Areas	Areas of production.
Radiation Walls	Walls designed to inhibit fire/heat transmission.
Risk Assessment	Assessment, in writing, of the risk to the environment due to fire.

Risk Management	The identification, assessment and control of risks associated with various hazards connected with an operation.
Roof Venting	Manual or Automatic means to vent smoke in a fire situation.
Segregation	Separate storage of non-compatible goods (relative to fire).
Sprinkler	Automatic fire control system.
Sprinkler Density	A water application design relative to the class of risk.
Sump	Small pit or well, within a bund, where initial spillages accumulate.
Tank Farms	A group of tanks located together generally within a bund or catchpit areas.