CRAMP Update 2011

Closure, Restoration and Aftercare Management Plan

Pfizer Ireland Pharmaceuticals, Askeaton

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EXECUTIVE SUMMARY

Pfizer Ireland Pharmaceuticals (t/a Wyeth Nutritionals Ireland) is an integrated manufacturing facility which produces a comprehensive range of infant nutritional product located in Askeaton, Co. Limerick. The site is licensed by the Environmental Protection Agency (EPA), under IPPC licence Register No. P0395-02 (and associated Technical Amendments A & B, June 2006 and April 2008 respectively). This CRAMP is prepared in the event of site closure or partial site closure of this facility.

The basis of the requirement for the preparation of a Closure, Restoration, and Aftercare Management Plan (CRAMP) stems from the IPPC Directive (96/61/EC), which places a specific obligation on the regulator of an IPPC licensed site, to ensure that site closure is addressed as stated in Article 3:

"*the necessary measures are taken upon definitive cessation of activities to avoid any pollution risk and to return the site of the operation to a satisfactory state*"

This requirement is directly translated into Condition 14 of the operating IPPC licence (Register No. P0395-02). Note that the term CRAMP now replaces the term Residuals Management Plan (or RMP).

It has been estimated that, in the very unlikely event of site closure involving complete cessation of all production activities at the Pfizer facility at Askeaton, an allowance of approximately € 2.1 million would be required to bring the site to an environmentally safe condition. It should be noted that a percentage of this cost relates to any potential soil and groundwater corrective action.

The original CRAMP for the sit was prepared in August 2005. The second revision of the original CRAMP in 2007, in addition to updating the CRAMP to account for any changes in costs to the CRAMP, also accounted for the requirements of the most Recent EPA Guidance Document entitled "Guidance on Environmental Liability Risk Assessment, Residuals Management Plans and Financial Provision 2006". The CRAMP was updated again in 2008, 2009, 2010 and 2010 to account for any changes on the site.

This is the sixth revision of the CRAMP and will account for any changes to the physical infrastructure on the site and costs to underwrite the CRAMP since the 2010 CRAMP update.

1.0 INTRODUCTION

1.1. Introduction to the Facility

Pfizer Ireland Pharmaceuticals (t/a Wyeth Nutritionals Ireland), hereafter referred to as Pfizer was granted a revised IPPC licence, Register No. P0395-02, by the Environmental Protection Agency for the

"*manufacture of dairy products where the processing capacity exceeds 50 million gallons of milk equivalent per year"*

"the burning of any fuel in a boiler or furnace with a nominal heat output exceeding 50MW "

on 24th January, 2004. This licence was amended on the 26th June 2006 by the amendment document titled 678 S82(11) and again in April 2008 to account for changes in fuel burning in the combined heat & power plant (CHP). The details of the amendments must be read in conjunction with the licence. This IPPC licence supersedes previous IPPC Licence Register No. P0395-01 for the site.

The IPPC licence was transferred from AHP manufacturing B.V. trading as Wyeth Nutrionals Ireland to Pfizer Ireland Pharmaceuticals in January 2011.

The Pfizer site is located in Askeaton, Co. Limerick. The Pfizer facility is an integrated manufacturing facility which produces a comprehensive range of infant nutritional products, in both canned powder form and Liquid Ready-to-Feed (RFT) form in glass bottles and Tetra-Paks. Can manufacture also takes place on the site.

1.2. Requirement for a Closure, Restoration, Aftercare Management Plan (CRAMP)

In accordance with Condition 14 of the operating IPPC licence, Pfizer is required to prepare a Residuals Management Plan (RMP, now replaced by CRAMP) comprising a fully detailed and costed plan for the decommissioning or closure of the site or part thereof. Condition 14 also required this plan be submitted to the EPA for approval. The IPPC licence states, as follows:

Condition 14.1

"*Following termination, or planned cessation for a period greater than six months, of use or involvement of all or part of the site in the licensed activity, the licensee shall, to the satisfaction of the Agency, decommission, render safe or remove for disposal/recovery, any soil, subsoils, buildings, plant or equipment, or any waste, materials or substances or other matter contained therein or thereon, that may result in environmental pollution*."

Condition 14.2

"Residuals Management Plan:

The licensee shall prepare, to the satisfaction of the Agency, a fully detailed and costed plan for the decommissioning or closure of the site or part thereof. This plan shall be submitted to the Agency for agreement within six months of the date of grant of this licence.

The plan shall be reviewed annually and proposed amendments thereto notified to the Agency for agreement as part of the AER. No amendments may be implemented without the written agreement of the Agency."

Condition 14.3

"*The Residuals Management Plan shall include as a minimum, the following:*

A scope statement for the plan.

The criteria which define the successful decommissioning of the activity or part thereof, which ensures minimum impact to the environment.

A programme to achieve the stated criteria.

Where relevant, a test programme to demonstrate the successful implementation of the decommissioning plan.

Details of costings for the plan and a statement as to how these costs will be underwritten.

The original Residuals Management Plan (RMP) for the site was completed and submitted to the Environmental Protection Agency (EPA) in August 2005.

Since completion of the 2005 RMP report, there has been little change to operations on the site. The first update of the RMP was carried out in 2006 and reflected the most Recent EPA Guidance Document entitled *"Guidance Documents and Assessment Tools on Environmental Liabilities Risk Assessment and Residuals Management Plans incorporating Financial Provision Assessment (EPA Contract OEE-04-03) – Draft for Consultation, May 2005"* (hereafter referred to the EPA Guidance Document 2005). This guidance was finalised and issued in 2006 as *"Guidance on Environmental Liabilities Risk Assessment, Residuals Management Plans and Financial Provision, copyright 2006 –"* (hereafter referred to the EPA Guidance Document 2006). The CRAMP was again updated in 2007, 2008, 2009 and 2010 to account for any changes at the site.

This update has been prepared for the site to consider any site changes and impacts (if any) on the 2010 CRAMP update and associated costs submitted in the 2010 CRAMP update in response to condition 14.2 above.

1.3. Site Closedown Scenario: Comments & Assumptions

To develop a fully detailed and costed CRAMP, it is necessary to present a number of assumptions regarding the mode and management of a hypothetical site shut down.

Site closure or partial closure is considered to include:

- Cessation of the IPPC licensed activity under Article 90 of EPA Act, 1992 amended by the POE (Protection of the Environment) Act 2003;
- Voluntary or involuntary liquidation of the company or organisation holding the IPPC licence which results in cessation of the activity;
- Transfer of ownership under Article 91 of the EPA Act, 1992 amended by the POE (Protection of the Environment) Act 2003;
- Site closure as a result of corporate rationalisation or relocation;
- Partial closure;
- Mothballing.

Pfizer operates under strict environmental policies and procedures. Therefore, it is assumed that any shutdown of the site will be a well-planned and well-resourced event. This implies that the shutdown date will be known well in advance and that both production schedules and raw materials purchasing will be planned with the shutdown already factored in. It also implies that Pfizer will have the resources in terms of both financial inputs and manpower to implement the CRAMP through completion – with no requirement for external financing or manpower other than for expert advice.

A general assumption is that the site cannot be sold as a going concern to a third party and that completion of the plan will result in a decommissioned and decontaminated site with no restrictions placed on future land use. In reality, the Pfizer site is an extremely valuable asset with a current replacement value for the plant and equipment in excess of €800m. The assumption is made purely for the purposes of developing "worst-case" costs for site closure and decontamination.

The third general assumption is that all parts of the site are closed as part of one comprehensive CRAMP. No direct reference to partial closure is made in the CRAMP. Under a closure scenario involving a single plant or element of the site, the facility would still operate under its IPPC licence. The CRAMP and associated costs have been developed for a number of discrete programme stages arranged in a logical sequence to facilitate complete site closure. The actual steps to be carried out and their associated costs for any partial shut downs may be derived from the CRAMP by simply reviewing that part of the CRAMP which covers that specific activity or land-parcel.

It is a requirement of the IPPC licence that the CRAMP be reviewed annually and prop and proposed amendments notified to the agency for agreement as part of the Annual Environmental Report (AER). As part of this CRAMP preparation, site activities including planned activities for 2010 were reviewed.

1.4. Structure of the CRAMP

The CRAMP is divided into sections addressing the various issues on decommissioning and residuals management. The overall structure is as follows:

Section 2.0 Site Assessment

Section 3.0 Criteria for Successful Decommissioning

Section 4.0 Management of the CRAMP

Section 5.0 Programme to Achieve Stated Criteria

Section 6.0 Test Programme Implementation

Section 7.0 Summary of Costs Associated with the Implementation of the CRAMP

Section 8.0 Underwriting of the CRAMP

Section 9.0 Review of the CRAMP

Section 2.0 provides an overview of the scope of the CRAMP in terms of the buildings, activities and issues, which are covered in this plan.

Section 3.0 describes the proposed criteria to be used to demonstrate successful decommissioning and decontamination.

Section 4.0 outlines the responsibilities for management of the CRAMP.

Section 5.0 describes the CRAMP in a project management style with definite stages and associated tasks. The CRAMP is considered in two main programmes, namely:

- **Short Term Programme (STP):** Decontamination of all above and below ground structures – including management of residues arising.
- **Long Term Programme (LTP):** Management of long term residual soil and groundwater contamination.

Section 6.0 describes the requirement (if any) for the preparation and implementation of a test programme for the CRAMP.

Section 7.0 provides a summary of the costs associated with implementation of the CRAMP.

Section 8.0 outlines the company's assurance to finance the implementation of the CRAMP to completion.

Section 9.0 outlines the requirement and importance of reviewing the CRAMP.

2. SITE ASSESSMENT

2.1. Pfizer Site Description and History

Pfizer was established in Askeaton, Co. Limerick in 1973 then operating as Wyeth Nutritionals Ireland (WNI). The entire site comprises approximately 14.5 hectares. The site is adjacent to the main Limerick-Foynes road near Askeaton town. The site is situated in farmland and is bordered on its eastern perimeter by the River Deel, a tributary of the river Shannon.

The Pfizer facility is an integrated manufacturing facility which produces and distributes a range of infant nutritional products. Products are manufactured by compounding and homogenisation of liquid and powder milk. Products have dedicated process lines. The products are packaged on site and dispatched to customers from the site. Approximately 45% of product is exported to the U.K.

There are approximately 550 permanent personnel employed at the Askeaton site. The facility operates continuously, seven days a week, twenty-four hours a day.

The production part of the site comprises of 11.5 acres of the total 36 acre site area. A site layout plan is provided in the Appendix A. The main features of the production operation are summarised as follows:

- RFT-Wet Process
- RFT-Krones Filling Room
- RFT-LAN/Barriquand Room
- RFT-Tetra-Pak Filing Line
- RFT-Packing Line/Warehouse
- Materials Handling
- Can Manufacturing Plant
- Batch Make-up and Dispensing
- Fat Blending
- Powder Plant Wet Process 1,2,2X , 3
- Evaporation/Drying
- Dry Blending Plant
- Canning Lines 2,3,4,5,6
- Pouch Filling Line
- Tote Bin Filling
- Tote Bin C.I.P Station
- Stickpack Filling Line
- Water Treatment Plant
- Wastewater Treatment Plant
- Utilities Operations
- Laboratory Operations
- Air Abatement Systems
- CHP Plant

The manufacturing operation is supported by a range of Administration, Utilities and Laboratory services on site as well as a new product and process development department.

2.2. Site Evaluation & Issue Identification

It is considered that the Pfizer facility and associated activities in Askeaton are well characterised at this stage and all potential residues arising in the event of site shutdown, including hazardous wastes and non hazardous wastes have been identified and discussed in terms of management and costing in this CRAMP. Any other potential residues arising in the future can be incorporated into the annual review of the CRAMP.

With regard to programmes for production decontamination, it is considered that many such programmes are currently in place due to the strict cleaning regimes and regulatory and legislative requirements in force. These programmes can be utilised or adapted for use as part of CRAMP implementation.

Furthermore, site utilities (namely adequate water supply, nitrogen system etc.) required for decontamination and decommissioning procedures are considered to be readily available on-site for utilisation during implementation of the CRAMP.

Although there is a minor soil and groundwater contamination issue associated with the site, this issue would have no impact on the CRAMP for this site as the source of contamination is outside the site boundary and therefore the site has no control over it. This issue is detailed in section 5.2 of this report.

2.3. IPPC Licence Compliance

Wyeth Nutritionals Ireland was granted a revised IPPC licence Reg. No. P0395-02 by the EPA on 24th January, 2004 for

"the burning of any fuel in a boiler or furnace with a nominal heat output exceeding 50MW"

"*manufacture of Dairy products where the processing capacity exceeds 50 million gallons of milk equivalent per year*

This IPPC licence supersedes previous IPPC licence Register No. P0395-01 for the site.

The IPPC licence was transferred from AHP manufacturing B.V. trading as Wyeth Nutrionals Ireland to Pfizer Ireland Pharmaceuticals in January 2011.

A review of environmental control documentation demonstrated a high compliance level with IPPC licence specified emission limit values. Pfizer are committed to a WWTP improvement programme with the aim to achieve 100% compliance with IPPC license limits. Wastes arising at Pfizer, comprising both hazardous and non-hazardous wastes, are characteristic of a food processing operation.

During 2010, there were no major accidents are no major non-compliances on the site.

Complaints are reported to the EPA monthly (except in certain emergency or serious circumstances) and submitted as part of the Annual Environmental Report.

The Pfizer facility is operated in compliance with the IPPC licence and should the site be subject to closure/partial closure, Pfizer will apply the same level of dedication to implementation of the CRAMP as shown to IPPC licence compliance.

2.4. Assessment of Potential Risks

An initial screening and operational risk assessment was carried out on the site. The EPA's Guidance Document 2006 provides a straightforward risk assessment decision matrix which can be used to classify sites according to Low, Medium and High Risk and thereby help in the preparation of an appropriate Residuals Management Plan and Financial Provision Requirements suitable for the site. Industries classified as high risk usually require both a Closure Plan and some form of Restoration and Aftercare Management Plan. Low Risk industries usually only require a Closure Plan.

The risk assigned to the facility depends on the complexity of operations at the site, the environmental sensitivity of the receiving environment and the pollution record (compliance history) of the facility. Based on the guidance given in the EPA RMP Guidance Document 2006, the Pfizer site is classified in a 'High Risk Category' and will therefore require some degree of Restoration and Aftercare Management Plan. Such a requirement is addressed in this CRAMP.

The full operational risk assessment carried out for the site is detailed section 3 of the Environmental Liabilities Risk Assessment Report (ELRA).

This CRAMP designed for site closure incorporating decontaminating and decommissioning procedures will contain a hazardous element. However, as the site is dealing with processes, materials and wastes on a regular basis, it is anticipated that the facility and personnel involved in decommissioning will be capable of dealing with any hazardous element of the CRAMP, in terms of decommissioning and waste management.

The implementation of the CRAMP at Pfizer may in itself create environmental risks. Therefore it is recommended prior to decontamination and decommissioning operations that an environmental risk assessment is carried out on-site. This assessment will identify potential risks associated with implementation of the CRAMP, which may include but is not limited to the following:

- Inadequate bulk storage of wastes prior to off-site disposal;
- Inadequate bunding of liquid wastes prior to collection by waste contractors;
- Structural hazards (e.g. overhead/underground services);
- Health and safety hazards.

It is recommended that a site safety plan be developed prior to the commencement of the decontamination and decommissioning process at Pfizer. Any other aspects of implementation of the CRAMP, which may involve specific health and safety issues, should be accompanied by a dedicated health and safety plan for that particular activity.

2.5. Scope of the CRAMP

Taking into consideration the site description, as previously detailed in Section 2.1, the scope of the CRAMP is proposed in two programmes:

The Short Term Programme (STP) will focus on the decontamination and decommissioning of most of the site activities related directly to production and the disposal of the residuals arising thereof.

This will involve decommissioning of:

- all production buildings;
- all ancillary/utility areas; and
- all storage areas.

The STP will also involve the disposal of all residuals arising as a direct result of decommissioning. Here, the term 'residuals' is used to describe any materials that should not be left on the site following process decommissioning. Therefore this includes raw materials, wastes, finished product, intermediate product, tankage, etc.

In the case of Pfizer, it is proposed that a Long Term Programme (LTP) will be also required. This programme will focus on post decommissioning soil, groundwater assessment and treatment as appropriate.

2.6. Exclusions from the CRAMP

Completion of the CRAMP will occur when all potential sources of environmental harm have been either removed from the site or rendered harmless (assuming contained industrial use of the land). The costs of removing above and below ground structures – effectively returning the site to "green field" status have not been included.

3. CRITERIA FOR SUCCESSFUL DECOMMISSIONING

It is essential to define criteria for successful decommissioning to ensure appropriate management of the residuals and minimum impact to the environment. The criteria considered relevant to the Pfizer facility should include the following:

- Confirmed removal of all hazardous substances;
- Agreement from the EPA on the Long Term Programme (LTP);
- Decontamination of soil and/or groundwater (as necessary).

The above criteria can be achieved as follows:

1. Decontamination Procedures, including the following:
    - Procedures to ensure appropriate decontamination of all process equipment according to site developed instructions and standards;
    - Procedures to ensure appropriate decontamination of all pipelines, ancillary works and utility systems according to manufacturer recommendations;
    - Specification of such decontamination/cleaning materials required in the procedures;
2. Materials and Waste Management/Disposal Operations, to include the following:
    - Documented and fully costed reports to ensure that all raw materials and finished product have been dispatched from the site that are not considered waste and so have a monetary value;
    - Documented and fully costed reports on the disposal of hazardous waste including full certification required under appropriate legislation;
    - Documented and fully costed reports on the disposal of non hazardous wastes including all certification required under the Waste Management Act and operating IPPC licence;
    - Clearance and final disposal documentation for any asbestos found on the site;
3. Remediation Programmes, as appropriate, should include the following to ensure successful decommissioning:
    - If contamination is found to be present, remediation of site soil and groundwater to pre-determined, risk based, remedial goals, agreed with the Agency and verified by a programme of groundwater monitoring post corrective action;

4. EPA Compliance:

   - Continued compliance with the operating IPPC licence during decommissioning operations;
   - Completion on any requirements raised in an EPA Closure Audit in the event of cessation of activities;

5. Documentation Management is an important criterion in successful decommissioning for validation and verification of all decommissioning and residuals management operations.

Note that, with respect to the above criteria, the costs and time to complete decommissioning should not exceed that estimated in the most up-to-date revision of the CRAMP in place at the time of decommissioning.

4. MANAGEMENT OF THE CRAMP

The overall responsibility and management of the CRAMP will be undertaken by designated members of site management lead by the Environmental Health and Safety (EHS) Manager. The personnel selected to form CRAMP including financial management, environmental management etc. All decontamination procedures, decommissioning operations and residuals management, as required under this CRAMP will be authorised by the group members. In addition, a person will be nominated to conduct all necessary communications with relevant authorities and ensure the appropriate information transfer.

5. PROGRAMMES TO ACHIEVE STATED CRITERIA

5.1. Short Term Programme

5.1.1. Introduction

The short term programme (STP) encompasses the decommissioning and decontamination operations associated with all above and below ground structures, and subsequent management of all residues arising as a result of such activities, in the short and medium term.

The structure of the STP of the CRAMP is based on a logical sequence of events (project milestones) that would occur in the event of a shutdown, similar in logic to an annual maintenance shutdown. However, STP completion involves the removal of all wastes and materials from the site that could pose a residual threat to the environment. All remaining structures/buildings would be in a steady-state and safe condition.

The STP would involve below ground structures, primarily in-ground sumps, bunds, and drains, only in terms of decontamination of internal surface areas i.e. emptying and flush/rinse etc. Issues associated with removal of such structures, disposal of resulting residuals and assessment of soil/groundwater contamination are dealt with in the Long Term Programme (LTP).

The STP is constructed in a Project Management style format with a number of stages, each with a set of specific tasks that involve the management of residual waste. The individual stages are in a logical sequence, however, some overlap in terms of timeframes is expected. Each stage includes the following elements:

- Tasks to complete the stage;
- Cost;
- Time to complete;
- Plant status at completion of stage.

STAGE NO	STAGE
1	Production decommissioning, including transfer of residuals to on-site storage.
2	Removal of excess residuals from Stage 1 (including raw materials, wastes and final product) from site.
3	Treatment of bulk liquid wastes in WWTP.
4	Removal of production related hazardous and non-hazardous waste.

STAGE NO	STAGE
5	Contract cleaning of bulk storage, sumps and bunds.
6	Decommissioning of site utilities, administration buildings and WWTP.
7	Removal of residual hazardous materials.
8	Documentation and certification of decommissioning and decontamination.

The individual stages proposed are set out as follows. A timetable is included in Appendix C.

5.1.2. Stage 1: Production Decommissioning, Including Transfer of Residuals to On- Site Storage

Preface to Production Decommissioning

This stage will involve decommissioning of the Powder Plant (including the Can Manufacturing Plant) and the Ready to Feed Plant. As each of the production operations are staffed with separate production teams, it is possible, in a complete shutdown situation to decommission the production plants in parallel.

Task 1: Transfer of raw material and products to appropriate site storage.

At this stage it is assumed that all blending and sterilisation steps are finished. Therefore, to fully complete the production run, allow for packing of product into bottles and cans, sterility testing and release by quality control department.

Residuals management will involve the following:

- Labelling product and transfer to packing line/warehouse for palletising;
- Isolation and purging of conveyors and transfer lines;
- Remove drums of laquor and thinners to the drum storage area;
- Transfer of raw material drums to the warehouse;
- Transfer of product samples and documentation to a designated off-site storage area where they can be stored for a minimum of 7 years.

The estimated quantities of residues generated at this point are contained in Table 5.1.5.1 and 5.1.5.2.

Task 2: Transfer of production liquid wastes.

Production liquid waste (which will be categorised as a strong effluent) will be transferred at a controlled rate to the WWTP for treatment. Laquers and thinners will be transferred to the flammable materials storage area.

Table 5.1.5.1 summarises the residuals expected to arise. Transfer lines from production/ bulk storage will be isolated and purged to transfer pipe volumes of production liquid waste back to bulk storage.

Task 3: Transfer all production solid wastes to storage.

This task will include the specific transfer of hazardous and non-hazardous solid waste to appropriate storage on-site, as follows:

- Transfer of all properly labelled drums of hazardous and non-hazardous waste – including drums of raw materials, packaging material, pallets, plastic, plastic scoops, and ink to the warehouse;
- Transfer of hazardous empty drums, lined bins, etc. to the waste storage compound;
- Removal of the carbon bed, cation and anion multimedia beds from the de-ionising plant to appropriate drums and transfer to the waste storage compound;
- Removal of all Heating, ventilation and air condition (HVAC) system HEPA filters from all HVAC units and transfer to the warehouse; and
- Removal of non-hazardous general skip waste (e.g., packaging not product contaminated) to dedicated general waste receptacles.

The remaining residuals are summarised in Table 5.1.5.1 (Hazardous) and Table 5.1.5.2 (Non-hazardous).

Task 4: Decontamination

All liquid streams produced here are classified as either “strong effluent” or “weak effluent”. Strong effluent is generated from the washings of interior of vessels. Strong effluent is composed of nitrogen, phosphoric blend, organic material from vessel internals and hydrogen peroxide. These are discharged to Industrial Bulk Containers (IBCs) and stored in the designated waste storage area. They can be released in a controlled manner to the Waste Water Treatment Plant (WWTP) where they will be treated.

Weak effluent will consist of floor washings. Floor washings are comprised of caustic based detergent at 0.2% solution, and ‘oxonia’ active. Weak effluent can be pumped directly to the WWTP. It is estimated that it will take approximately 1 week to clean each production area as the process is decommissioned.

This task specifically includes:

- Execution of Clean in Place (CIPs) for all equipment associated with each of the production steps including rinse checking. This process will involve the use of acid, caustic, condensate, deionised water and steam;
- Nitric acid and sodium hydroxide utilised for CIP in plant 1 and 2. They are recovered and reused in plant 2 until their strength drops below a set point. They are then discharged to a drain;
- Oil and fat blending tanks are steam cleaned;
- Cleaning of production building materials in contact with any product or raw material; and
- Purging and cleaning of transfer and conveying lines.

Task 5: Isolate from steam, compressed air & other utilities available.

There are no specific residuals associated with this stage.

Task 6: Isolate from HVAC, nitrogen storage, CO_2 storage, refrigeration plant, CHP plant and air abatement.

This stage will include isolation from HVAC system, nitrogen storage, CO_2 storage, refrigeration plant, deionised water plant, air abatement systems and CHP plant.

Task 7: Shutdown of Air emissions abatement units.

The cyclone and bag house abatement units attached to the dryers can now be shutdown. Residues arising from the air abatement units are detailed in the next task (Task 8).

Task 8: Transfer resulting wastes to drum storage (where required), bottle storage or to bulk tanks.

This task will include the specific transfer of resulting hazardous and non-hazardous waste to appropriate storage on-site, as follows:

- Draining of oil and fat residues from transfer lines, drum and transfer to drum storage area;
- Removal residual powder from the cyclones by vacuum;
- Removal of filter bags from bag house dryers and storage; and
- Removal of product and intermediate samples and obsolete chemicals from laboratories and production areas to drum storage area.

Plant Status at Completion of Stage 1

Following successful completion of Stage 1 (Tasks 1 – 8), the plant status is as follows:

- All site production equipment decontaminated and in a "safe to work" (and environmentally secure) state;
- All production related residuals transferred to bulk storage or warehouse; and
- All auxiliary systems decommissioned and working mediums – oils, fats, vitamins, minerals, lacquers, etc. removed from production buildings to storage.

Time to Complete

It is estimated that Stage 1 would take approximately 2-3 weeks to complete utilising the full compliment of production and maintenance staff at Pfizer. Where necessary, external contractors will assist in the decommissioning and decontamination operations.

Budget Cost Estimate

As described in Section 1.2 it is assumed that the shutdown is a well-planned and resourced event and all costs in terms of manpower will be allocated to normal plant running costs for the period in question. However, it is anticipated that 50 external technical staff will be required for three weeks to complete specific aspects of decommissioning. This results in a cost of **€240,000**. Additionally, plant and equipment hire will be required for various decommissioning procedures, at an estimated cost of **€100,000**.

5.1.3. Stage 2: Removal of Excess Residuals from Stage 1 (including Raw Materials, Wastes & Final Product) from Site

Task 1: Dispatch of finished product from final production

The Pfizer site is an integrated manufacturing facility which produces infant nutritional products in their final dosage. The site produces approximately 39 million kg of infant formula per annum. Once product leaves the site it is ready to be placed directly on the open market. It is therefore assumed that there will be no finished product remaining once production ceases. Intermediates can be shipped to other sites for final processing, formulation and packaging. Based on inventory data supplied to the Agency for the IPPC licence review of 2003, approximate maximum quantities to be dispatched during site decommissioning are summarised in Table 5.1.3.1. As the production volume is constant, this inventory has not significantly changed since 2003.

Table 5.1.3.1 Inventory of Intermediate Materials

Material	Storage Tanks
Process 1 Intermediate liquid	6 x 10,000 litres 2 x 30,000 litres 1 x 40,000 litres

Material	Storage Tanks
Process 2, 2X Intermediate liquid	4 x12,000 litres 6 x 45,000 litres 1x 65,000 litres
Process 3 Intermediate liquid	3 x 23,000 litres 4 x 65,000 litres

Task 2: Shipping of excess raw material and solvents off-site.

The following table approximates the raw materials on-site at any one time, which will require shipment off-site. As the production volume is constant, this inventory has not significantly changed since 2003.

Table 5.1.3.2 Inventory of Raw Materials

Material	Quantity	Storage
Solid Reagents (dry powders)	375 tonnes	25 kg bags 1000 kg bulk bags
Liquid Reagent	446 tonnes	Bulk storage
Laquer and Thinners	8.2 tonnes	25 litre metal drums
Acid/base	141 tonnes	Bulk Storage 1000 litre IBCs

Raw material purchase is planned on a schedule directly related to the planned production schedule. As the date for plant shutdown will be known in advance, it is assumed that stocks of raw materials will be reduced accordingly. However for the purposes of the CRAMP, it is assumed that the planned reduction in stocks reduces the inventory by 80% at shut down and that the remainder is shipped from site as a hazardous waste. Treating the material as a hazardous waste is a “worst case” scenario. In reality there will be alternative routes for this material including:

- Return of raw material to suppliers;
- Transfer of materials to other Pfizer sites;
- Use of some acids and bases in the wastewater treatment plant;

- Transfer of materials for reuse as animal feed.

All of the above routes would result in considerable costs savings when compared to the "hazardous waste" route. Based on an 80% reduction in inventory prior to shutdown, Table 5.1.3.3 summarises the raw materials, which will still be on-site and require off-site disposal.

Table 5.1.3.3 Residual Materials Remaining

Material	Quantity	Storage
Solid Reagents (dry powders)	75 tonnes	25 kg bags 1000 kg bulk bags
Liquid Reagents	89 tonnes	Bulk storage
Laquer and Thinners	1.6 tonnes	25 litre Metal drums
Acid/base	28 tonnes	Bulk Storage 1000 litre IBCs

Costs (both unit and total estimates) are provided in Table 5.1.5.1.

Plant Status at Completion of Stage 2

The warehouse, bulk storage and drum storage areas will be clear of raw materials.

Time to Complete

The residuals set out in Table 5.1.3.3 should all be removed over an 8 - 10 week period, allowing for documentation (including inventory lists) and arranging shipments.

Budget Cost Estimate

The costs associated with Task 1 are not considered as it is assumed that shipping costs will be absorbed as part of the net value of the intermediates and products.

The estimated costs, both unit costs and total estimates, for the disposal of the residuals from Task 2 are presented in Table 5.1.5.1.

5.1.4. Stage 3: Treatment of Bulk Liquid Wastes in the WWTP.

The production related bulk liquid wastes generated from decommissioning and decontamination operations during Stage 1 will be treated in the WWTP.

As previously described in Stage 1, all “weak effluent streams” generated during the shut down will be treated in the on-site WWTP. Strong effluent streams, which are readily biodegradable, will be treated at a controlled rate in the WWTP.

It is estimated that site shutdown will generate approximately 10,000 m^3 of wastewater. This quantity is based on production data reviewed for the purposes of the CRAMP study.

Plant Status at Completion of Stage 3

All bulk liquid wastes treated in WWTP.

Time to Complete

The time to complete will be determined by the WWTP throughput. It is estimated that on-site treatment of bulk liquid wastes in the WWTP will require 3 - 5 weeks. This is based on the assumption that it takes 10 days for process waste to pass through the WWTP. It is also assumed that treatment will start one week following the commencement of the shut down period.

Budget Cost Estimate

It is assumed that the WWTP operation is included with normal production related costs and therefore there is no net residual cost for this stage.

5.1.5. Stage 4: Removal of Production-related Hazardous & Non-hazardous Wastes.

Task 1: Create inventory of all waste to be disposed with correct classification (e.g., hazardous, non-hazardous).

At this stage, all hazardous and non-hazardous waste arising from production related decommissioning is confined to dedicated site storage and is quantified.

The gross inventory of hazardous waste anticipated to be disposed is detailed in Table 5.1.5.1. It is assumed that all hazardous wastes will be incinerated. A footnote to Table 5.1.5.1 explains the basis behind the figures presented. Disposal costs of approximately € 522 per tonne are based on the price charged by the site's hazardous waste management company in 2010.

The gross inventory of anticipated non-hazardous wastes arising for disposal is detailed in Table 5.1.5.2. It is assumed that all non-hazardous wastes will be recycled, composted or landfilled. Disposal costs of average price of €32 per tonne of non-hazardous waste are based on prices charged by the site's waste management companies in 2010.

Table 5.1.5.1 Anticipated Hazardous Waste Inventory

ITEM	DESCRIPTION	Tonnes	Total cost @ 522 per tonne (€)
1	*Solid Raw Materials*	75	39, 150
2	*Liquid Raw Material*	89	46, 458
3	*Acids/bases*	28	14, 616
4	*Waste solvent for incineration*	2.4#	1,253
5	*Laboratory smalls (COD vials)*	0.38	198
6	*Contaminated Drums (oil, solvent)*	60	31,320
7	*Waste Material for Recovery*	10*	5,220
8	*Other Waste Material for Incineration*	5**	2, 610
	TOTAL (approximate)	260	**140, 825**

laquer drum washings
*Includes batteries and an estimate of and any other small waste stream arising
** Includes aerosols, medical waste, and any other small waste stream arising

Table 5.1.5.2 Non-Hazardous Waste Disposal Cost Estimate

ITEM	DESCRIPTION	Tonnes*	Total cost @ €32 per tonne (€)
1	*Recycled sludge*	1,486.7	47, 574
2	*General waste*	388.4	12, 428
3	*Timber and wood packaging*	185	5,920
4	*Metal*	313.3	10, 025
5	*Cardboard and plastic packaging*	275	8,800
6	*Tailings*	244.88	7, 836
7	*Vegetable oil*	40.7	1,302
8	*Glass*	8	256
9	*Paper*	10.9	349
	Total	**2,953**	**94, 492**

* Amounts based on levels of waste for half a year, (RMP is expected to take 6 months to implement) figures estimated from recent year AER's.
#Transport cost only

Task 2: Contact disposal companies.

Following compilation of the hazardous and non-hazardous inventories, the administrative function of contacting disposal companies will be undertaken to arrange waste disposal operations. Although existing arrangements may be in place, Pfizer will ensure waste companies are licensed and will comply with all relevant waste management legislation.

Task 3: Remove waste from site.

Licensed waste disposal contractors will remove the specified waste from the site in accordance with the conditions of the operating IPPC licence and all relevant legislative requirements.

Plant Status at Completion of Stage 4

All wastes in dedicated storage removed off-site by licensed waste contractors.

Time to Complete

This stage will be carried out, following a lag time of approximately 2 weeks, in parallel to the decommissioning stages. Wastes arising on-site will be transferred for appropriate storage in the drum store and warehousing areas. This waste will then be quickly removed by licensed waste management contractors for incineration or landfill, to ensure waste storage areas have sufficient storage space. It is expected that this stage will take 6 weeks.

Budget Cost Estimate

Tables 5.1.5.1 and 5.1.5.2 summarise the anticipated costs associated with removal and disposal of wastes.

5.1.6. Stage 5: Contract Cleaning of Bulk Tanks, Sumps and Bunds.

This stage is started when bulk storage vessels or tanks begin to be emptied and all virgin and waste contents are removed for return to supplier or or disposal. At the site, there are approximately 35 above ground, external bulk storage tanks, associated with production (nitric tank, vegetable oils and fats) and the associated utilities (e.g. hydrochloric and caustic storage tanks) and the empty Heavy fuel oil (HFO) storage tank which was emptied of HFO during 2009. In addition there are approximately 16 bunds, nine small sumps and one very large sump. In 2010 a new chemical storage and dosing area adjoining the existing water treatment plant was constructed. The new storage and dosing area includes a salt saturator and an Alum tank, both of which are located in an external bund (The cleaning of these tanks is dealt with in stage 6).

A specialist company will be contracted to provide a comprehensive cleaning service for all tanks and pipelines including the collection of any residual sludge. Residual material will be drummed and disposed of off site by specialist waste contractors. Amounts generated have been included in table 5.1.3.3

Plant Status at Completion of Stage 5

All bulk storage, bunds and sumps decontaminated by specialist cleaning contractors and residual materials disposed of in environmentally sound manner.

Time to Complete

It will take approximately 12 weeks to complete this stage, assuming that one tank per day, 3 bunds per day and 5 sumps per day can be cleaned. This stage can start after two weeks into Stage 3 – Treatment of bulk liquid wastes.

Budget Cost Estimate

The pricing provided by a cleaning contractor in Dublin in 2009 is €1,500 a day for tank cleaning and €1,000 a day for sump or bund cleaning. In the worst case scenario, it would take a day to clean a 200m^3 tank, and approximately 3 – 5 sumps or bunds could

be cleaned in a day. Therefore, in this report a flat rate price of €1,500 per tank and €350 per sump or a bund is used.

- Tanks €1,500 x 35 = **€52,500**
- Sumps € 350 x 9 + € 2,000 x 1 = **€ 5,150**
- Bunds € 350 x 16 = € **5,600**
- **Total € 63, 250**

5.1.7. Stage 6: Decommission of Site Utilities, Administration Buildings and WWTP.

This stage of decommissioning will apply to the following site utilities and contractor compounds, plus site administration buildings and the site wastewater treatment plant (WWTP):

1. Nitrogen storage
2. Deionised water plant
3. CO_2 Storage
4. CHP
5. Boiler house (duty & standby boilers)
6. Refrigeration plant
7. Compressed air plant
8. Maintenance
9. Laboratories
10. Contractor compounds
11. Administration buildings
12. Water treatment plant
13. Wastewater Treatment Plant (WWTP)
14. Fire suppression system
15. Firewater utilities
16. LPG Plant

CHP, Boiler house, deionised water plant, refrigeration plant, CO_2 storage and nitrogen storage

With regard to the decommissioning of CHP, boiler house, deionised water plant, refrigeration plant, compressed air plant, CO_2 storage and the nitrogen storage, the following tasks will apply:

Task 1: Decommissioning of the nitrogen storage system and purge with air;

Task 2: Transfer of waste oils and machining waste from the maintenance building to the drum storage area;

Task 3: Cleaning of deionised water system and removal of resins to hazardous waste storage;

Task 4: Cleaning of refrigeration system;

Task 5: Removal and transfer of ammonia from the compressors;

Task 6: Isolation and shut down of compressed air plant;

Task 7: Removal of oil from the compressors, and desiccant from the dryers;

Task 8: Isolation and shutdown of the stand-by boiler and associated utilities (demineralisation plant);

Task 9: Isolation of gas, steam and electricity supply followed by shutdown of the CHP plant; and

Task 10: Return of waste oils to licensed waste contractor for recovery.

The following points should be taken into consideration for this stage of decommissioning:

1. The pressure swing adsorption unit for nitrogen production can be decommissioned when the final canning of product has taken place;
2. It is assumed that the deionised water plant, refrigeration plant, nitrogen storage system and boilers have a capital value and thus no residuals management is considered; and
3. An electrical contractor may be required to decommission some of the electrical equipment. This is subject to discussion between the owners of the CHP plant and Pfizer.

Refrigeration

There is a chilled water plant on site. There are 6 compressors, associated with the chilled water plant, which contain ammonia. The compressors contain an estimated

quantity of 1.6 tonnes of ammonia. The ammonia from the closed loop refrigeration system will be removed by a specialist contractor.

Cryogenics

The liquid nitrogen storage can store 19 tonnes of liquid nitrogen. In 2010, due to the addition of a new packaging project a carbon dioxide tank was installed on the site. It is anticipated that a specialised company will be contracted for decommissioning and removal from the site of liquid nitrogen and carbon dioxide storage.

Laboratories

It is assumed that laboratory instruments can be sold on as assets, with decommissioning costs associated primarily with expired chemicals and laboratory waste disposal.

Contractor Compounds

Pfizer will be responsible for ensuring the decommissioning of the contractor compounds on-site. Additional contractors will be required for the decommissioning process. It is anticipated that there will be no residuals associated with this operation.

Administration Buildings

At this stage, it is assumed that only partial administration facilities will be required for the remaining site decommissioning operations and the successful completion of the CRAMP. The only anticipated residuals associated with decommissioning of the administration buildings include waste electrical and electronic equipment (WEEE). Present figures indicate approximately 300 PCs and 100 printers at the facility, which would require disposal. Removal and disposal of fluorescent tubing is considered in Stage 7.

Water Treatment Plant

There is on-site storage for 757m^3 of treated water, once the plant requirement is reduced below this level decommissioning of the water treatment plant can begin.

The primary tasks in decommissioning the Water Treatment Plant would involve the following:

Task 1: Flush and isolate the feed lines;

Task 2: Treat remaining raw water through treatment stages;

Task 3: With submersible pumps or equivalent, pump the sludge in the clarifier to the WWTP;

Task 4: Remove the sand from the filters and resin bed from the softener;

Task 5: Remove the any remaining sodium hypochlorite;

Task 6: Power clean the system and discharge effluent to the sewer; and

Task 7: Dispose of residual treatment chemicals (alum, polyelectrolyte, sodium hypochlorite), salt, sand and resin.

Wastewater Treatment Plant (WWTP)

Production and subsequent decommissioning will generate the majority of the effluent to be treated in the on-site WWTP. Therefore, the WWTP may be reduced in loading rate to an acceptable minimum to allow functioning over the remaining decommissioning phase. It is anticipated that equipment, vessel, pipeline and tank washing generated effluent over the remaining decommissioning period will allow the functioning of the WWTP. Therefore, the WWTP will be the last process to undergo decommissioning.

It is assumed that the final effluent will be monitored throughout the decommissioning period for compliance with the operating IPPC licence as normal.

The primary tasks in decommissioning the WWTP would involve the following:

Task 1: Flush and isolate WWTP feed lines;

Task 2: Treat remaining raw effluent through treatment stages;

Task 3: With submersible pumps or equivalent, pump balance tank and sequencing batch reactor (SBR) contents to the sludge dewatering plant, and drain supernatant to tankers for off-site treatment in an activated sludge wastewater treatment plant;

Task 4: Power clean SBR and repeat Task 3;

Task 5: Decommission de-watering facilities; and

Task 6: Dispose of de-watered sludge.

Fire Suppression System

The fire suppression system at Pfizer contains 20,000 litres of FM200 agent. While FM200 is not categorised as an ozone depleting substance it does have global warming potential. The system is maintained by a specialist contractor. The gas can be recovered from the system prior to its decommissioning and reused by the contractors. This system will be one of the last systems to be decommissioned and can only be removed when all potential fire sources have been eliminated from the site.

Budget Cost Estimates

The cost of the gas removal will be covered by the resale value of the system.

Fire Water Utilities

There are two firewater tanks on the site. In addition there is a water storage tank associated with the water treatment plant and a water tank which contains the water supply for the sprinkler system. The water contained in the storage tank associated with the water treatment plant will be used during the final processing. The remaining water

can be discharged to the River Deel provided that it is uncontaminated. In the worst case, it can be discharged to the WWTP.

LPG Plant

LPG tanks can be isolated and removed by Calor. Calor also lease the tanks to Pfizer and will remove the tanks at no additional cost.

Plant Status at the Completion of Stage 6

All site utilities, with the exception of limited electrical supply, effectively decommissioned.

Time to Complete

Utility decommissioning should not start until cleaning (Stage 5) has been completed. The WWTP would be the final facility to be decommissioned. An overall estimate of the time to decommission all utilities is 6 weeks.

Budget Cost Estimates

The estimated cost to hire an electrical contractor to decommission some of the electrical equipment and to have the decommissioning work certified by the ESB is **€26,300**. The remaining residual management and disposal costs are detailed in the following sections:

Refrigerants

Following decommissioning, the disposal of gas will be coordinated by approved waste management contractors. This is a worst case scenario. The disposal cost of €16 per kg is only charged if, when a sample of the gas is analysed, the gas is not fit for recovery. In the case when the gas can be recovered, there is no charge. Table 5.1.6.1 provides a cost estimate based on €16 per kg.

Table 5.1.6.1 Cost Estimates for Ammonia Gas Removal and Recovery

Compound	kg	Disposal Cost (€)
Ammonia	1,600	25,600
Total Cost (approximate)		**25,600**

Laboratory Waste

It is anticipated that following decommissioning of site laboratories there will be expired chemicals and general laboratory waste requiring disposal. A PC sum of **€33,760** is provided for waste removal and subsequent disposal.

Waste Electrical & Electronic Equipment

The worst case scenario would involve disposal of all PCs and printers at the Pfizer facility. There are approximately 300 PC's and 100 printers, with present disposal costs at €80 per PC and €14 per printer, giving a total cost of **€25,400** for adequate disposal.

Water treatment plant

The decommissioning costs for the Water Treatment Plant are as follows:

1. In 2010 two storage tanks were constructed at the water treatment plant including an aluminium sulphate tank and a salt saturator tank also for water treatment both of which are installed in the same bund. The clarifier, sand filters, softener, chlorination, storage tank and the two new storage tanks: allow €10,000 per tank, 8 tanks. Total estimate: **€80,000**

2. The total sand filter tank volume is approximately 9 m^3 and total softener volume is 10m^3. It is assumed for the purposes of the CRAMP that the sand and resin are non-hazardous and so will be diverted to landfill at an approximate cost of €150 per tonne, with an overall costs estimated at **€1,200.**

This gives a total budget cost estimate for the Water Treatment Plant is **€81,200.**

WWTP

The decommissioning costs for the WWTP are as follows:

1. Effluent collection sump, balance tank, two SBRs, buffer tank, picket fence sludge thickener, sludge dewatering plant: allow €10,000 per tank, 6 tanks. Therefore estimate: **€60,000**

2. Dewatered sludge composting: Total balance tank volume is approximately 1,800 m^3 and total SBR volume is 5,000m^3. Based on 2007 waste data, Pfizer disposes of approximately 3000 tonnes of sludge on an annual basis from the WWTP by composting, at €100 per tonne, with an overall costs estimated at **€300,000**.

This gives a total budget cost estimate for the WWTP of **€360,000.**

5.1.8. Stage 7: Removal of Residual Hazardous Materials

This stage applies to the situation where there may be specific residuals associated with the building structure and plant equipment that may not be removed during an annual maintenance shutdown. This includes PCBs and fluorescent tubes but does not include for actual concrete that may be contaminated.

Task 1: Remove identified hazardous materials (asbestos etc).

Pfizers commissioned Safeway Environmental Ltd. to complete an Asbestos Survey Report during 2009. This survey was completed in March 2009 and the Survey Report lists the following asbestos materials present on site:

- Boiler Room:

- Compressed flange gaskets to pipe work, plant and equipment throughout;
- Compressed flange gasket debris to high level walkway;
- Mastic sealer to casing of Boiler #2;
- Galbestos cladding (part) to external walls and roof of boiler room;
- Compressed flange gaskets to pipe work, plant, equipment located outside the boiler room and on top of the boiler room;
- Compressed flange gaskets to pipe work in old oil pumping shed;
- Old style fire doors throughout Offices, Laboratories and production areas;

- Main Plant Area:
  - Galbestos cladding (part) to Dryer #1;
  - Galbestos cladding (part) to Dryer #2;
  - Galbestos cladding (part) to Dryer #3;
  - Galbestos cladding internally within Pipe Bridge;
  - Galbestos cladding internally within Old Tank Farm;
  - Galbestos cladding to roof over main production and canning area;
  - Compressed flange gaskets to pipe work and equipment within Old Tank farm;
  - Compressed flange gaskets to pipe work and equipment throughout Dryer #2;
  - Compressed flange gaskets to pipe work and equipment throughout Dryer #3;
  - Compressed flange gaskets to pipe work and equipment throughout Dryer #4;
  - Compressed flange gaskets to pipe work supplying Heating / Ventilation equipment throughout factory;
  - Bitumen mastic beneath floor tiles on Production Offices;
  - Old style fire doors throughout Offices, Laboratories and production areas;

- High Rise Warehouse:

- Compressed flange gaskets to pipe work supplying Heating / Ventilation equipment throughout High Rise Warehouse Area;

- RTF Building:
  - Compressed flange gaskets to pipe work supplying Heating / Ventilation equipment throughout the first floor plant room areas.

An approximate estimate of **€400,000** is given for removal and disposal of Asbestos materials. This estimate is based on the middle of the pricing range provided by an asbestos removal specialist company, who provided a range of €200,000 to €600,000. The exact costs would depend on the multitude of factors related to asbestos disposal options, asbestos accessibility, ease of removal, etc. The exact costs can only be determined upon the site visit and a thorough assessment of identified asbestos materials.

There are no PCB sources on the Pfizer site.

Task 2: Remove and dispose of fluorescent tubes.

It is difficult to estimate the number of fluorescent tubes that exist on the site - 5000 is an approximate figure. There are also UV lamps, used in the sterilisation processes on site which may be classified as hazardous. Based on the approximate weight of 300 grams per fluorescent tube, €1,046 per tonne of WEEE charged by the Irish Lamp Recycling Ltd. in 2010 and allowing 50% buffer, a budget of **€2,356** is allowed for lamp disposal.

Plant Status at Completion of Stage 7

All hazardous residual materials removed off-site.

Budget Cost Estimate

The overall cost estimate to removal asbestos material and fluorescent tubes from the site is **€402,356.**

Time to Complete

An overall estimate of the time required to decommission and remove all residual hazardous materials off-site is 6 weeks.

5.1.9. Stage 8: Documentation and Certification of Decommissioning and Decontamination

Throughout implementation of the CRAMP, documentation will be generated to track the progress. All residues removed from site will be recorded and final clearance certificates will be prepared as required under the terms of the IPPC licence and as required under relevant waste management regulations. Environmental documentation must be retained by the company for a period of 7 years, financial and health and safety data must be retained for much longer. Arrangements for secure storage must be made as one of the final tasks of the decommissioning process.

A full report on the outcome of the CRAMP will be prepared and submitted to the EPA (See Section 7 below).

5.2. Long Term Programme

5.2.1. Introduction

Soil and groundwater investigation work was completed on behalf of Pfizer by URS in January 2001 (Report 15282-143 dated 19 April 2001). The drilling investigation indicated that subsoils on site comprise of glacial till deposits with an increasing sand content moving west to east towards the Deel estuary.

The Pfizer site is located on a gently sloping coastal site, which slopes down to the east to the estuary of the River Deel. There is a sharp drop on the eastern side of the site to the Deel estuary, which is bordered by steep slopes and rock outcrops on both sides, just to the east of the site. The land also slopes down gently from the site to the north towards the Shannon estuary and to the south towards the town of Askeaton. The surrounding land use is predominantly agricultural, consisting mainly of pasture land.

Bedrock beneath the site has been mapped as Waulsortian limestone by the Geological Survey of Ireland (GSI). This limestone comprises fresh, massive, blue grey, fine to coarsely crystalline, occasionally cherty, unaltered, fossiliferous limestone. According to the GSI Online Maps, the bedrock aquifer in this region is classified as a Regionally important aquifer – Karsified, conduit (Rkc). This suggests the limestone is highly fractured and highly permeability. Local knowledge of the groundwater by site personnel supports this data.

Groundwater flows from west to east across the site toward the Deel estuary, following the local topography.

Groundwater monitoring results indicate that there is a degree of mixing between groundwater and surface water bodies close to the tidal River Deel estuary. During high tide in the river, the gradient of water flow appears to be from the river outwards into the surrounding limestone aquifer and this reverses during low tide conditions.

Table 5.1 contains a summary of the known historical aspects of releases to ground and groundwater on the site. No significant incidents occurred during 2009 or 2010 leading to soil and groundwater pollution on the site. Pfizer run a continuous programme of pipeline testing and repairs to ensure that potential soil and groundwater contamination is avoided. There has been no evidence of hydrocarbon contamination from groundwater sampling to date. The incidents summarised in Table 5.1 have been detailed in previous versions of the CRAMP.

Table 5.1: Historical incidents leading to soil and groundwater pollution on the site

Date	Incident & Effects	Current Status
2001	Temporary storage of fructose resulting in elevated sugar sourced COD in certain groundwater wells.	Sugar contamination largely flushed from limestone aquifer and significantly reduced well COD concentrations.

Date	Incident & Effects	Current Status
2001	Defective process drain resulting in slightly elevated pH and COD in groundwater well BH202.	Process drain repaired. Contamination levels reduced.
2004	Effluent overflow from the production areas. Groundwater in the area of well 202 was impacted, with an elevated COD.	COD had declined to below detection limits within several days.
2006	In January defective underground process effluent pipeline resulted in the release of process effluent and domestic sewage derived from the RTF process building, resulting in increased major ion concentrations and electrical conductivity in well 202. In September, a leak from an over-ground effluent pipeline resulted in the release of process effluent, resulting in the elevated major ion concentrations, COD and presence of coliforms in wells 101, 202 and 203.	Continuous groundwater monitoring confirmed that impact on groundwater quality was temporary.
2008	High total and faecal coliforms in groundwater from BH202 in February 2008.	It appears that this is as a result of mixing between groundwater and surface water bodies close to the river.

5.2.2. Characterisation of Potential Source areas of Chemical Release

Following the site closure, investigations of potential source areas of chemical release would be carried out by undertaking an intrusive investigation close to areas of potential concern. Undertaking a post site closure investigation also guarantees that data is collected at a point in time that marks the end of chemical use/transfer/storage on the site. The intrusive investigation would focus primarily on the subsoils (<5 m thick).

The existing groundwater database from the existing site bedrock wells is comprehensive. Therefore only a relatively limited groundwater investigation will be needed.

The budget required to complete a limited investigation of potential source areas, including soil drilling, laboratory analysis, drains survey, risk assessment and reporting is estimated to be **€11,000**.

5.2.3. Design/implementation source area soil remediation programme (as appropriate)

Significant shallow soil contamination could continue to leach to groundwater, effectively acting as an ongoing source of groundwater contamination. If such contamination is discovered during the post-closure investigation, it would have implications on the potential future use of the site. Therefore the results of the post-closure investigation study will be used to establish whether specific corrective action will be required. Risk based decision making will be used to quantitatively evaluate the appropriate levels of residual contamination that can be left in place.

Based on the currently available data, significant shallow soil contamination is unlikely. For the purposes of this CRAMP, it has been assumed that no significant, long-term residual contamination beneath the Pfizer site exists and no groundwater interception and treatment will be required.

Annual modifications to the CRAMP may alter this assumption if, in the meantime, further investigations of potential soil contamination are completed.

5.2.4. Management of corrective action programme with post remediation monitoring

Following the site closure, a period of groundwater monitoring will be required.

In a site closure and decommissioning situation, the scope of the groundwater monitoring programme would be a variation on the current monitoring programme underway at Pfizer and would be based on the most up-to-date data available on the quality of groundwater at that time.

Assuming a total of two years monitoring, until final closure and surrender of the IPPC licence, groundwater monitoring and data assessment/reporting costs for the existing five wells at Pfizer Askeaton are estimated to be €13,000 per year, totalling **€26,000** over 2 years.

In the event that the EPA require further characterisation of groundwater based on the findings of the soil investigation, it is assumed that a further four bedrock wells would be required. Estimated cost for drilling a well is €5,500, and additional monitoring costs are estimated to be €1000 per well per year. The total additional cost is estimated to be €30,000 over 2 years.

6. SUMMARY OF COSTS ASSOCIATED WITH THE CRAMP

This section briefly summarises the costs presented in Sections 5.1 and 5.2 of this report. The summary is presented in Table 7.1 and includes all costs identified during the analysis of the Short Term and Long Term Programmes.

Table 7.1 Summary of CRAMP Costs

ITEM	DESCRIPTION	COST (€)
STP.1	**Production decommissioning**	**340,000**
STP.4	**Production related hazardous waste disposal**	**323,376**
	Production related non-hazardous waste disposal	**351,496**
STP.5	**Cleaning of bulk storage**	**63, 250**
STP.6	**Decommission site utilities, including:-**	
	Decommission & certification of electrical work	26,300
	Disposal of laboratory waste	33,760
	Disposal of ammonia gas	25,600
	WEEE disposal costs	25,400
	Decommissioning of water treatment plant	81,200
	Decommissioning of WWTP	360,000
STP.7	**Disposal of residual hazardous materials**	**402,356.**
	SUB TOTAL STP (approximate)	**2,032,738**
LTP	**Investigation for potential contamination sources**	**11,000**
	Management of groundwater corrective action	**56,000**
	SUB TOTAL LTP (approximate)	**67,000**
	CRAMP TOTAL (approximate)	**2,099,738**

In conclusion it has been estimated that, in the event of site closure involving complete cessation of all production activities by Pfizer at Askeaton, an allowance of approximately € 2.1 M would be required to confirm the site to an environmentally safe (inert) condition.

7. FINAL VALIDATION

It will be necessary to ensure independent verification of the closure plan for Pfizer. Therefore, the following is anticipated:

7.1. EPA Notification

Communication with the EPA at appropriate stages in the planned cessation activities at Pfizer will be important. In addition to the initial notification to the EPA of cessation of activities (or part thereof), at an appropriate time towards the end of the closure activities, Pfizer will seek written agreement from the EPA on exactly what is required for independent verification, or validation, of the closure plan for the site.

7.2. Closure Audit

Pfizer has assumed that the EPA will at least require, for independent closure plan verification, that a Closure Audit will be undertaken by an independent third party. The key components of that audit will be:

1. That the Closure Audit will take place towards the end of the closure activities detailed in this CRAMP, or post-completion of the CRAMP. Elements of the restoration and aftercare plan, depending on what the site investigation determines, may not at that point be completed but this will be reflected in the Closure Audit Report with plans on managing the restoration and aftercare plan.
2. The Closure Audit will take place within the confines of an exact audit boundary, which may be the entire site or part thereof;
3. The Closure Audit will consist of;
    a. Pre-audit preparation, including public records assessment;
    b. A detailed site tour;
    c. Interviews with management;
    d. A detailed documentation review;
    e. Preparation of a Closure Audit Report.

Assuming that the outcome of the closure audit is successful, the closure audit report will contain recommendations on any actions outstanding and will be submitted to the EPA within three months of the execution of the closure plan. The report will also contain a certificate of completion to the effect that the third party is satisfied that the CRAMP has been executed as planned and that, subject to any additional actions identified in the closure audit report, with responsibilities assigned, that Pfizer, as decommissioned, does not pose any significant threat of pollution of the environment.

This documentation and communications with the EPA and relevant authorities will be sufficient to demonstrate successful decommissioning of the CRAMP and a test programme will not be required. The cost estimate to undertake an independent closure audit is **€10,000**

8. UNDERWRITING THE CRAMP – FINANCIAL INSTRUMENT

Pfizer Ireland Pharmaceuticals, Askeaton, is a component site of Pfizer Ireland Pharmaceuticals. Pfizer Inc. is the ultimate parent company of Pfizer Ireland Pharmaceuticals. Pfizer Inc., which is headquartered in New York, discovers, develops, manufactures and markets leading prescription medicines and healthcare solutions, for humans and animals. Pfizer Inc. has total consolidated assets of $212 billion (USD) as at 31 December 2009 and consolidated net income in excess of $8.6 billion (USD) for the financial year ended 31 December 2009. The company is the world's largest pharmaceutical company and recorded global revenues of US$67.8 billion in 2010.

A decision to decommission all or part of the Askeaton site would be taken centrally by Pfizer under a coordinated review. Any such decision would be announced by Pfizer central management sufficiently in advance of implementation to allow adequate opportunity to migrate production to alternative locations, to explore divestiture options, to address legal and regulatory requirements, and to complete decommissioning activities where required. Any closure decision would therefore be taken significantly in advance of implementation.

In the event of such a decision, the site Residuals Management Plan (RMP) would be prepared for activation. The actions detailed in the RMP would begin upon cessation of manufacturing and preparation for closure.

It is a valid assumption that any shutdown of the site will be a well-planned and well-resourced process. This implies that the shutdown date will be known well in advance and that both production schedules and raw materials purchasing will be planned with the shutdown already factored in. It also implies that Pfizer will have the resources in terms of both financial inputs and manpower to implement the RMP through to completion, with no requirement for external financing or manpower other than for expert advice.

Pfizer, in common with many large multinational companies, provides central funds to its operating units through standard financial mechanisms.

Because of the likely lengthy interval between a decision to close and its actual implementation, adequate time would be available to ensure that such an allowance for central Pfizer funding would be incorporated into the site budget. Such central funding may be structured by Pfizer to stretch over several years as required to cover longer-term activities.

Attached (Appendix B) is a copy of the financial guarantee provision recently approved (Jan 2011) by the EPA.

9. REVIEW OF THE CRAMP

The summary of costs associated with the RMP, as presented in Section 7.0 of this report, are estimates only and are based on the information and data available at the time of compilation of the report. It is anticipated that these costs will vary as time progresses and will depend on factors, including the following:

- Site conditions;
- Legislative developments;
- Inflation.

Taking this into consideration therefore, it is important that the RMP report and associated costs are reviewed and updated to reflect the current site situation. In addition, IPPC licence requirements specify the RMP report must be reviewed on an annual basis as part of the Annual Environmental Report.

Appendix A - Site Sensitivity Assessment

SITE CHARACTERISATION

Site Sensitivity

The site is adjacent to the main Limerick-Foynes road near Askeaton town. The surrounding land use is predominantly agricultural, consisting mainly of pasture land. The site is bordered on its eastern perimeter by the River Deel, a tributary of the river Shannon.

Site Geology

Soil and groundwater investigation work has been completed on behalf of Wyeth by URS Dames & Moore in January 2001 (Report 15282-143 dated 19 April 2001) The drilling investigation indicated that subsoils on site comprise of glacial till deposits with an increasing sand content moving west to east towards the Deel estuary. The depth to bedrock is approximately 3m.

Bedrock beneath the site has been mapped as Waulsortian limestone by the Geological Survey of Ireland (GSI). This limestone comprises fresh, massive, blue grey, fine to coarsely crystalline, occasionally cherty, unaltered, fossiliferous limestone. According to the Geological Survey of Ireland Online Maps, the bedrock aquifer in this region is classified as a Regionally important aquifer – Karsified, conduit (Rkc). This suggests the limestone is highly fractured and highly permeability. Local knowledge of the groundwater by site personnel supports this data.

Site Hydrogeology

The main mass of bedrock is largely impermeable, with groundwater movement only occurring within fractures in the bedrock. There is evidence for the karstification of this limestone in the Askeaton area, and local wells are subject to large variation in yields. This indicates that groundwater flow in karstified fracture zones will depend on whether or not wells intersect the fractures. The GSI (Geological Survey of Ireland) have classified the aquifer beneath the site as a regionally important karst aquifer, but with the development potential limited by concentrations of flow.

There are 4 wells reported on the GSI database within an approximate 2km radius of the site; 3 of the wells are recorded as having unknown yields and the fourth has a poor yield (<44m^3 / day). It should be noted that the well records in Ireland are not complete –wells used for domestic purposes are often not declared by the owners. Therefore there may be additional wells located within a 2km radius of the site.

The GSI have classified the aquifer beneath the site as being extremely vulnerable to contamination. The classification is based on the low soil thickness in the area as well as the karstified nature of the aquifer.

Groundwater flows from west to east across the site toward the Deel estuary, following the local topography.

Surface Water

The Pfizer site is located on a gently sloping estuarine site, which slopes down to the east to the estuary of the River Deel. There is a sharp drop on the eastern side of the site to the Deel estuary, which is bordered by steep slopes and rock outcrops on both sides, just to the east of the site. The land also slopes down gently from the site to the north towards the Shannon estuary and to the south towards the town of Askeaton. The River Deel is classified by the EPA River Quality Report 2005 (http://www.epa.ie/rivermap) as moderately polluted (Q3/Class C) at the nearest measurement point, Kilcool Bridge, approx 7.0km South and upstream of the site.

Limerick County Council indicate that the public water supply in the Askeaton area is abstracted from the River Deel close to the bridge in Askeaton village and upstream of the site.

The River Deel is fished although not on any large scale. However the inner Shannon South shore is a designated proposed Natural Heritage Area and a local boat repair facility is situated approximately 150m down river from the site. As these sensitive areas are near the site and hydraulically down gradient, it is a potential vulnerable receptor for any potential contamination from the site.

The River Deel is assumed to be the discharge point for site groundwater (see above) and is the discharge point for site surface water and effluent outfall

Treated Effluent from the site is discharged to a sewer owned and operated by Wyeth Nutritionals Ireland. The effluent comprises trade effluent, sewage effluent and contaminated waste water domestic and trade effluent. The effluent is treated in the onsite waste water treatment plant prior to discharge to the River Deel. Stormwater is discharged from the site in a separate stormwater pipeline system. There are also 8 separate surface water discharges from the site.

In 2001 Wyeth Nutritionals Ireland commissioned a Dye study at the effluent outfall to determine the adequacy of the outfall to ensure that the location and the mixing zone is compatible with protection of the receiving water. The study concluded that under 2001 emission rates the receiving waters are capable of diffusing the effluent with no significant impact to the surrounding environment.

Sensitive Receptors

The overall site sensitivity with regard to the development of significant environmental liabilities is considered to be moderate to high for the following reasons:

The surrounding land use is predominantly agricultural, consisting mainly of pasture land.

The site is situated approximately 1 km from Askeaton town and a number of residential dwellings are also located in the immediate vicinity of the site and are considered potentially sensitive receptors.

The nearest surface water bodies and hence potential receptors for accidental releases from the site include the River Deel and Shannon Estuary. Neither body of water is particularly sensitive given their tidal/saline nature and the very large dilution volumes available. Neither supports large-scale fisheries. However the inner Shannon South shore is a candidate Special Area of Conservation and the River Deel is utilised by the local boat repair facility. As this sensitive area is near the site and hydraulically down gradient, it is a potential vulnerable receptor for any potential contamination from the site.

The public water supply in the Askeaton area is abstracted from the River Deel close to the bridge in Askeaton village and upstream of the site.

The aquifer beneath the site has been classed by the GSI as being extremely vulnerable to contamination.

Animal Health Issues

The Askeaton area was subject to a number of animal health issues during the early 1990s. It is noted that Wyeth Nutritionals Ireland was never implicated or involved at any stage.

During subsequent investigations (1995-1998) managed by the Irish Environmental Protection Agency (published 2001) the Askeaton area, including lands close to the Wyeth Nutritionals Ireland were the subject of an extensive program, which included the assessment of a number of environmental factors such as air, soil and ground and surface water quality. Soils within 1 km (to the east and west) of the site were tested for a range of nutrients, heavy metals, pesticides, hydrocarbons, dioxins and PAHS. All analytes tested were below the respective guidelines values (mostly Dutch C Limits) and were within the typical background ranges for Irish agricultural soils.

Appendix B - Parent Company Guarantee

Pfizer Inc
235 East 42nd Street
New York, NY 10017-5755

Financial Provision
Licence Register No. P0395-02

The Wyeth facility located at Askeaton, Limerick, County Limerick (the **"Facility"**) is owned by Pfizer Ireland Pharmaceuticals [formerly called Pfizer (NEW PIP) Holdings] (the **"Licensee"**), an unlimited liability company incorporated under the laws of Ireland and registered in the Companies Registration Office [Registered Number 490938]. Pfizer Inc., a Delaware corporation, (**"Pfizer Inc."**) is the ultimate parent company of Pfizer Ireland Pharmaceuticals.

The Facility is a dairy products production facility and is licensed by the Environmental Protection Agency (**"EPA"**) under Integrated Pollution Prevention and Control Licence, reference number P0395-02 (the **"Licence"**).

Pfizer Inc. carries on business as a research-based global biopharmaceutical company and owns a large number of affiliates and subsidiaries in a number of different countries, the number of which may change from year to year. Certain affiliates of Pfizer Inc. also carry on the business of manufacturing pharmaceutical, animal health, consumer health and nutritional products. Pfizer Inc. has total consolidated assets of $212 billion (USD) as at 31 December, 2009 and consolidated net income in excess of $8.6 billion (USD) for the financial year ended 31 December 2009.

Pfizer Inc. undertakes that it will arrange and pay for the completion to the satisfaction of the EPA of all works required to ensure that the conditions of the Licence are complied with in the event that the Licensee does not carry out or procure the carrying out of such works for whatever reason.

Pfizer Inc. further undertakes to meet any financial commitments or liabilities to the EPA or to any relevant Local Authority relating to environmental pollution as provided for in the ELRA, RMP or CRAMP as the case may be for the Facility, that have been, or will be, entered into or incurred by the Licensee in carrying on the licensed activity in accordance with the terms thereof or in consequence of ceasing to carry on that activity and in the event that the Licensee fails to meet those commitments or liabilities.

Where the Licensee fails to meet any financial commitments or liabilities, and where Pfizer Inc. has not had the works referred to above carried out within a reasonable time of being called upon to do so by the EPA, Pfizer Inc. undertakes to pay to the EPA the cost of so doing. The EPA may use any such payment to carry out or arrange for the carrying out of such works, either by itself or by a third party, and / or to reimburse any person who has carried out those works to its satisfaction. Where the liability of the Licensee has not been quantified, Pfizer Inc. undertakes to pay the amount of liability reasonably estimated by the Agency subject to a reimbursement or additional payment when the final liability is determined.

The Facility is committed to ensuring protection of the environment in its operations and regards this as an integral part of its normal business practice. This includes a commitment to safe and responsible residuals management where required, including the provision of funding to implement and progress any required residuals management.

This Financial Provision shall enter into force on 27 January 2011 and shall not be unilaterally terminated. In the event of sale of the Facility or Pfizer Ireland Pharmaceuticals, Pfizer Inc. undertakes to continue this Financial Provision until such time as the EPA shall have approved the transfer of the Licence, as applicable, or until the new owner of the Facility or Pfizer Ireland Pharmaceuticals respectively shall have entered into a financial security agreement to the satisfaction of the EPA.

Pfizer Inc. confirms that this letter is intended to constitute a legally binding obligation on it, and shall be subject to the exclusive jurisdiction of the Courts of Ireland and subject to the laws of Ireland.

Pfizer Inc acknowledges that the purpose of the licence is to prevent environmental pollution as defined in the Environmental Protection Agency Act 1992 as amended, and to remediate such pollution where it has occurred; and that accordingly this undertaking should be interpreted in order to ensure that that purpose is achieved.

Pfizer Inc. warrants that it is a corporation duly organized, validly existing and in good standing under the laws of the State of Delaware, that it has all requisite corporate power to enter into this undertaking and that this undertaking has been duly executed by it in accordance with the laws of the State of Delaware and that the same is a valid and enforceable obligation under the laws of the State of Delaware.

For and behalf of:

PFIZER INC.

By: _____

Name: Camilla Uden

Title: Vice President & Assistant Treasurer

Date: 26-01-2011

Appendix C - Gantt Chart

Figure: Timetable for Decommissioning Process

ID	Stage	W 1	W 2	W 3	W 4	W 5	W 6	W 7	W 8	W 9	W 10	W 11	W 12	W 13	W 14	W 15	W 16	W 17	W 18	W 19	W 20	W 21	W 22	W 23	W 24	W 25	W 26
1	Production Decommissioning																										
2	Removal of Excess Materials																										
3	Treatment of Bulk Liquid Wastes																										
4	Removal of Production Wastes																										
5	Cleaning																										
6	Decommissioning WWTP & Utilities.																										
7	Removal of Residual Hazardous																										
8	Documentation																										

Where W = week