

9. Emergency Response

This chapter is intended to summarise the plans, equipment and arrangements that BRM would deploy in response a major accident occurring on the Botany Road site as required by Regulations 11-18.

9.1 Overview

9.1.1 Introduction

The Major Accident Prevention Policy (MAPP) identifies the planning of appropriate response measures to emergencies as a key risk control. It is primarily delivered by the Safety Management System (SMS) as described in Section 7. This chapter details the range of emergency arrangements that BRM have in place to respond to major accident hazards. These include:

- ▶ Fixed or mobilisable equipment to control or mitigate the consequences of a major accident and prevent escalation;
- ▶ The site approach to maintenance, inspection and testing of emergency response equipment;
- ▶ Testing and reviewing the emergency procedure;
- ▶ The site's Emergency Management Procedure (EMP) and Emergency Recovery Procedure (ERP).

9.1.2 SRAM Requirements

Table 9.1 Criterion 14 – SRAM Emergency Response Requirements

Criterion	Emergency Response Criteria	Section(s) addressed in this report
Consultation		
14.1	The safety report should confirm that the operator has consulted the following in the preparation of the on-site emergency plan: those working in the establishment; the Agency; the emergency services; the health authority; the local authority [Regulation 9(3) and (4)]	9.2 9.10
Organisation of Alert and Intervention		
14.2	The safety report should describe the organisation of the alert and intervention in the event of a major accident to provide evidence that the necessary measures have been taken on-site (Schedule 4 Part 2, para 5b)	9.3 9.4 9.5 9.6
Description of Mobilisable Resources		
14.3	The safety report describes the on-site and off-site resources which can be mobilised by the operator to provide evidence that the necessary measures have been taken to limit the consequences of a major accident to people and the environment (Schedule 4 part 2, para 5c)	9.4
14.3.1	The safety report should provide evidence that sufficient personnel can be made available within appropriate timescales to carry out the mitigatory actions required by the on-site emergency plans (Schedule 4 part 2, para 5c)	9.4
14.3.2	The safety report provide evidence that suitable and sufficient arrangements are in place to ensure that the equipment to be mobilised for mitigating the consequences of reasonably foreseeable major accidents will be fit for purpose when called upon for use. (Schedule 4 part 2, para 5c)	9.5.6

14.3.3	The safety report should provide evidence that suitable and sufficient personal protective equipment will be available in the event of a major accident (Schedule 4 part 2, para 5c)	9.5.2
14.3.4	The safety report should provide evidence that suitable and sufficient on-site firefighting and fire protection provisions can be mobilised in the event of a major accident, taking account of resources available from local and other fire brigades. (Schedule 4 part 2, para 5c)	9.3.4 9.3.6 9.5.1
14.3.5	The safety report should provide evidence that suitable and sufficient provisions can be mobilised to minimise the release of, and mitigate the consequences of, airborne toxic and/or flammable substances the event of a major accident. (Schedule 4 part 2, para 5c)	9.5.1
14.3.6	The safety report should provide evidence that suitable and sufficient resources can be mobilised to minimise the consequences of loss of containment of a dangerous substance(s) to ground or water (including Controlled Waters) (Schedule 4 Part 2, Para 5c)	9.5.3 9.6.2
14.3.7	The safety report provide evidence that suitable and sufficient provisions for monitoring and/or sampling can be mobilised in the event of a major accident (Schedule 4 part 2 para 5c)	9.6.4
14.3.8	The safety report should provide evidence that suitable and sufficient provisions have been made for the restoration and clean-up of the environment following a major accident. (Schedule 5 Part 1 para 4)	9.6.2
14.3.9	The safety report should provide evidence that suitable and sufficient provisions have been made to mobilise first aid/medical treatment during the emergency response. (Schedule 4 Part 2, Para 5c)	9.4.3
14.3.10	The safety report should provide evidence that suitable and sufficient provisions have been made to mobilise any ancillary equipment which may be required during the emergency response. (Schedule 4 Part 2, Para 5c)	9.5.4
Maintenance etc. of Emergency Response Equipment		
14.4	The safety report should provide evidence that suitable arrangements have been made for the maintenance, inspection, examination and testing of mobilisable resources and other equipment to be used during the emergency response. (This criterion only applies to mobilisable resources and other equipment which the operator has responsibility). (Schedule 2, para 4c)	9.5 9.8
Training in the Emergency Response		
14.5	The safety report should provide evidence that suitable arrangements have been made in the safety management system for training of individuals on-site in the emergency response. (Schedule 2, para 4a & 4e)	9.7 5.3.3.1
Testing of Emergency Plans		
14.6	The safety report should provide sufficient evidence that procedures have been made and adopted to test and review emergency plans, and to revise the emergency arrangements in the light of lessons learned (Schedule 2 para 4e)	9.8
Information Required for the Offsite Emergency Plan		
14.7	The safety report should supply information to enable the off-site emergency plan to be drawn up (Schedule 4, Part 1 para 4)	9.9
Elements in the Safety Report Necessary to Draw Up the On-site Emergency Plans		
14.8	The safety report should summarise those measures of protection and intervention which have been used as the basis for drawing up the on-site emergency plans. (Schedule 4 Part 2, Para 5d)	9.3-9.5
14.9	The operator should confirm the arrangements that have been made to give information to the public, and every hospital, school or other establishment serving the public in the area around the site so designated by the competent authority. (Regulation 14)	9.9

9.1.3 Scenarios

The Emergency Management Procedure is the basis for emergency response activities. This plan is scenario specific and covers a number of credible scenarios which were identified during the Hazard Identification process and were included where relevant in the predictive aspects chapter. These scenarios include:

- ▶ Major gas release or fire onsite;
- ▶ Major release from liquefied gas storage;
- ▶ Airborne release of toxic combustion products;
- ▶ Loss of molten metal containment;
- ▶ Rapid Phase Transition within a processing kettle or furnace;
- ▶ Major leak of combustible oil;
- ▶ Loss of contaminated firewater or waste materials to surface water;
- ▶ Medical Emergency; and
- ▶ Intruder detection.

9.2 Consultation

In order to implement an effective emergency response, BRM has prepared the Emergency Management Procedure (EMP) (Ref 2).

There has been workforce involvement with the production of the COMAH Safety Report including the HAZID, Emergency Response Arrangements, technical measures and descriptive aspects. There is also workforce involvement with risk assessment of tasks required by the operator as detailed in the SMS.

There are very few hazards on-site with potential to impact off-site. The site has consulted Kent Fire Brigade, who have supported previous fire risk assessments, and are involved with familiarisation visits between the fire service and the site. These familiarisation visits allow the fire brigade to visit the site, understand the layout and hazards, and to check the compatibility of on-site firefighting capability.

The HSE has not designated BRM as part of a domino group.

The site will consult with Kent County Council, local emergency services and regulators to support the local authority in developing the external emergency response plan.

There will be continuing lines of communication between the site and the emergency services to maintain and amend the offsite emergency plan as required by the COMAH regulations and HSE Guidance on Emergency Planning (Ref 4).

9.3 Organisation of Alert and Intervention

The BRM Emergency Management Procedure describes BRM's approach to Emergency Management and details the six phases from Identification of Hazards through to Recovery from Emergencies. A summary of the key personnel involved in the emergency management procedures are included below in Table 9.2.

The BRM General Manager must approve any changes to the Emergency Management procedure.

9.3.1 Key Functions

Section 3 of the BRM EMP sets out the roles and their requirements before, during and after an emergency. Each of the required roles are allocated to various senior members of staff in Appendix B of the Emergency Response guide, these include a number of nominated deputies for key positions. This is important as it ensures clear roles and responsibilities in event of an incident and avoids duplication of effort or confusion.

Table 9.2 summarises the key roles in the EMP and who must fulfil these roles. The general philosophy is that the general/emergency manager will be responsible for the application of the EMP and ensuring suitable resources are available, while the most senior processing staff member onsite will act as the Emergency Controller and control the incident response. Other senior staff will support the Emergency Management

Team (EMT) as needed with technical input. Operators and technicians onsite will act under the direction of Emergency Controller to control or mitigate the potential major accident.

Table 9.2 Key Functions and Roles in an Emergency

Role in Emergency	Position	Nominated Deputies	Responsibilities
Emergency Manager	General Manager		
Emergency Controller	Shift Manager or deputy Plant Manager	Duty Managers/ Superintendents	The Emergency Controller is responsible for the functionality and organisation during the incident. The emergency controller will be the focal point for communication and coordinating the company's response with the EMT. This role should be filled by the most senior person onsite, such as the duty manager or superintendent.
Media Manager	Finance and Administration Manager	General Manager	The media manager will coordinate the company's response to the press.
Support Coordinator	HSE&T Adviser	Technical Superintendent, Quality and Inventory Manager, Acting HSE Adviser	The Support Coordinator is responsible for ensuring that all chemical data and information is current and providing this to the response teams. If necessary, they will provide technical support to external and internal emergency response teams regarding chemical and metal behaviour onsite. All duties associated with the company fire officer.
Recovery Coordinator	Development Engineer	Operations Superintendent, Plant Metallurgist, Maintenance Superintendent, Electrical Engineer, Purchasing Superintendent	The Recovery Coordinator is responsible for ensuring that recovery/contingency plans exist and are available to repair, replace, or recommission damaged equipment.
Customer Support Coordinator	Sales and Logistics Manager	ECHO Coordinator	The Customer Support Coordinator is responsible for contingency planning and coordinating with customers about ongoing supply of products.
Emergency System Coordinator	HSE&T Adviser	-	Supports the emergency coordinator in ensuring the systems are functioning and audits the system for compliance.
Emergency Incident Investigator	HSE&T Adviser	-	The Emergency Incident Investigator is responsible for conducting a thorough investigation into Major Accidents and other high potential events determining the root cause. This role reports directly to the General Manager.
Dangerous Goods Safety Adviser	Materials Stewardship, Systems & Compliance Advisor	-	

The site response to any incident is through use of procedural checklists to ensure all important stake holders are made aware and any required help is summoned in a timely manner. These will be initiated by the duty security officer, on receipt of an emergency call but later become the responsibility of the emergency controller. These are represented by Checklists A-V in the Emergency Response Guide and will be present in hard copy in the emergency pack given to the emergency controller, each checklist clearly states the intender user, the intended purpose, any actions that need taking and the next check list to complete. The checklist clearly states which actions can/should be delegated to other personnel. The

checklist approach ensures consistent application of the emergency management procedures and reduces the potential for missing a step.

9.3.2 Preventing Escalation

As described in the Predictive Safety and Environmental chapters of this report, suitable measures are provided to minimise the impact of potential major accidents. These measures are related to each scenario but include bunding around the oil storage tanks, operating procedures, isolation valves and the provision of firefighting equipment. These measures are discussed in more detail in the predictive chapter.

Systems have been designed in accordance with international codes and standards where feasible, and are constructed in accordance with onsite standards. Design safety for key systems and an applicable list of standards has been included in the Technical Aspects chapter of the safety report. Continued asset integrity is ensured by a thorough program of maintenance and inspection.

It has been estimated that 75% of incidents are caused by operator error of some type, either procedural deviation or error in judgement, to reduce the potential for these incidents to occur, where possible alarms have been installed to alert the operator to conditions outside of the normal range. Various automated audible alarm systems are installed around the site on key plant items and are activated by smoke, temperature baghouse differential pressure or particulate concentration. Manual alarm system call points are also located across the site to alarm locally and alert security.

Due to the manual operation and batch process nature of the site's operating streams, there are few instrumented shut down systems and focus is instead placed on safer design and operator intervention. The key safeguard for environmental protection is the ability to isolate site discharges of water to the Thames, this is offered by the Darcy Draintector valve currently installed in the culvert. This can be actuated locally or from security and allows all surface water flow to the river from the primary refinery area to be stopped. This should be activated by the security personnel (if required) in the first stages of the emergency response checklist and verified in person by the shift manager (Emergency Controller).

If the incident involves gas mains, part of the emergency response will be to isolate the gas flow as close as possible to the incident to minimise the inventory of gas which can contribute to the fire.

The fire risk assessment identifies that water should not be used to fight a fire in the metals store as this could lead to hydrogen generation upon reaction with alkali metals such as sodium and calcium. In this case, other suppressant means should be used by KFB.

9.3.3 Site Alarms

The site has one emergency alarm system which covers all major incidents onsite including fires. This can be activated either at local "break glass" points or centrally from security, when activated locally, the alarm alerts the local area to the hazard and triggers an alarm in the security office. Once activated, the security officer will begin the emergency response check list, send supervisors/first aiders if required and can extend the alarm to cover all areas of site and trigger an evacuation.

This alarm will alert staff through a combination of sirens, bells and visual alerts in every occupied building onsite. The immediate response should be to leave machinery in a safe state and attend their designated emergency assembly point via the shortest safe route and await instructions.

When the alarm is activated, the security officer will also announce it over the tannoy and radios to ensure all site staff are alerted to evacuate. The tannoy/radio message will also indicate the nature and location of the emergency and instruct evacuating staff to avoid those areas. The diverse methods of communication (radio, tannoy, and alarm) ensure that all personnel receive the evacuation signal and proceed to their assembly point.

Radio silence should be observed following declaration of an evacuation by the duty security officer/Emergency Controller.

9.3.4 Communication Systems

A pack of relevant information is maintained in the security room for the incident controller to access hard copies of documents which may aid the emergency response efforts. These include employee contact details, key process equipment details, details of building services, roads and stores, customer contact details, evacuation procedures and a list of onsite personnel. This information is also available on the BRM intranet.

The emergency response is carefully planned and checklists are used to ensure important tasks are undertaken by the appropriate person in a timely manner, this may include the contacting of off-site personnel and summoning them to site (e.g. the media manager) by phone. In addition to office phone numbers, home and mobile numbers for employees are listed in the emergency response guide.

Communication is primarily by radio onsite, and there are additional radios kept in the security office for the Emergency Management Team. The Emergency Response Team are also issued red PPE to identify them more quickly. The radios do not depend on power to operate, so will continue to function in event of loss of power.

9.3.5 Incident Control

Incident control is under the management of the Emergency Controller who has full command of the site unless relieved by the Emergency Manager. The Emergency Controller will attend the security office to collect their radio and PPE, they will then move around site as required depending on the nature of the emergency.

As other members of the Emergency Response Team (ERT) reach the site, then they will be issued with a radio and jacket. Security will then inform the Emergency Controller that they have arrived. Depending on the nature of the emergency, the ERT will convene in a safe location. Communication by the team will either be by site radio or mobile phone as appropriate.

The philosophy at the site is to evacuate and allow Kent Fire Brigade to manage any established fires that cannot be safely and successfully tackled by operators with extinguishers.

9.3.6 Site buildings

The buildings onsite are of typical construction for their usage, they are not intended to serve as emergency refuges, instead use of an off-site muster point is assigned if a site evacuation is required. Although the buildings onsite are all designed with a minimum level of fire protection, especially in emergency evacuation routes.

- ▶ All fire doors should be at least one hour rated and fitted with self-closers;
- ▶ Emergency routes must not be obstructed, be clearly marked with a width of at least 1 m and be provided with emergency lighting. These routes should reach a safe area within two minutes;
- ▶ Stairways and wells must be at least 1 hour fire rated; and
- ▶ Fire/Emergency exits should be provided within 45 m of all areas (25 m from high risk areas) or 18 m/12 m if only a single exit is available.

9.3.7 Assembly Points

Assembly points are designated for all personnel onsite including escorted visitors. They are notified by security, during their induction or by their host where their relevant assembly point is. A rollcall is then taken based upon the roster of those who have signed into site. The site has a primary assembly point split into four roll call zones (A-D) to ease the roll call process in an evacuation, there is also an additional assembly point at the northern end of the refinery zone F if the primary assembly point is compromised.

The emergency controller is responsible for ensuring the roll call is conducted at the assembly points and assessing whether staff should be redeployed to a location of greater safety.

9.3.8 Emergency Service Access

The primary access point for the emergency services is via the main gate which is adjacent to security in the admin building. An alternate access point is available further down Lower Road at the northern end of the refinery.

9.4 Mobilisable Resources

9.4.1 Onsite

The immediate intervention, containment and alerting activities are the responsibility of the shift teams of operators and technicians in the affected location under the leadership of the Shift Manager or nominated deputy (e.g. Stream Team Leaders). There is 24 hour security presence onsite, who are responsible for contacting key personnel, and calling and providing the information pack to the emergency services. The fire service has its own folder at security (gatehouse) and have done their own risk assessment for the site. The security team are based in the admin and amenities building significantly removed from the process areas. They monitor all site radio frequencies so can be alerted by radio or phone.

During normal working hours, the plant manager will be present to take the role of Emergency Controller, outside of these hours, the Shift Manager or Deputy will be present to take on that role. There are 4 shift managers, one for each shift and these managers work 12 hour shift patterns and one of the managers or a nominated deputy (in cases of annual leave or sickness) will be present continuously.

The General Manager is the nominated Emergency Manager, they will be present during normal working hours and on a call out basis outside of these hours.

Support for the emergency controller is provided by a number of key site staff who have nominated roles under the BRM Emergency Response Guide. Depending on the nature of the emergency, the emergency controller may be supported by the Media Manager, Support Coordinator, Recovery Coordinator, Customer Support Coordinator, Emergency System Coordinator, Emergency Incident Investigator and Dangerous Goods Safety Adviser.

The names, contact details (home and mobile phone numbers) and their nominated deputies are stored on the BRM intranet and at security.

The site is manned continuously by shift teams. Each shift has sufficient personnel and a shift manager who have the training and authorisation to invoke mitigation measures including to shut down process streams if required in response to an emergency scenario. The shift team is trained to do so effectively, without the need for offsite/on-call personnel.

The emergency controller is responsible for following the Emergency Response Plan and liaising with off-site authorities and the emergency services.

9.4.2 Off-site

BRM personnel with allocated emergency roles could be summoned to site if required, these include the emergency support personnel discussed in the on-site section.

BRM maintain a relationship with a waste disposal contractor who will come to site and remove contaminated rain, flood or firewater. The contact details for this service is included in the Emergency Response Guide.

BRM maintain a relationship with Kent Fire and Rescue Service who are familiar with the site and undertake periodic familiarisation visits and Fire Risk Audits.

9.4.3 First Aid Provision

First Aid trained personnel and equipment are located around the site and would respond to a medical emergency. The minimum number of first aiders on any shift is 3 spread across operations and maintenance,

this rises to four during the day shift. This is further increased to between 8 and 10 during office hours. BRM's First Aiders Procedure dictates the requirements for the number and training of first aiders onsite.

The site employs a full-time Occupational Health Nurse to monitor employees for long term health conditions.

First aid kits, eye wash stations, defibrillators and burn kits are located around the site. The provision of medical equipment is described below in Section 9.5.

If required, ambulances would be called from the nearby Gravesham Community Hospital or Darent Valley Hospital to deal with casualties. Locations and routes for these hospitals are given in Chapter 2.

9.5 Equipment

9.5.1 Fire Protection Equipment

There are 26 fire hydrants at strategic locations across the site covering all of the main process and storage areas which are fed from the two site firewater ring mains. These hydrants are serviced annually and provide water at 4-6 bar pressure delivering water at a rate of 600-1400 l/m

Fire extinguishers rather than hydrants are provided in locations where these are deemed more appropriate e.g. office space. These extinguishers are serviced regularly by a third party contractor.

The main electrical power station is fitted with suppression systems utilising water spray/mist system that can be activated manually. The IT server room is protected by an inert gas suppression system.

The firefighting capability onsite is regularly reviewed by BRM and Kent Fire Brigade (KFB) and BRM Fire Management procedure requires the company fire officer to follow up any recommendations from KFB visits or audits.

When any part of the fire system being modified or maintained or otherwise inoperable, then BRM will make arrangements such that firefighting capability is not compromised as required by their Fire Management procedure.

9.5.2 Personal Protective Equipment

Specific PPE for emergency response is not required, firefighting will be handled by KFB if it cannot initially be controlled at source using available extinguishers. BRM personnel will not be expected to combat established fires. No onsite fire brigade exists and the emergency services would be expected to fight large scale fires with their own protective equipment.

Specialist PPE for confined space working and working at height is stored in the stores and adjacent to every crane cab, and will be used if needed.

The Emergency Response Team have red PPE to identify them as part of the ERT and radios stored in the security office.

All site staff and contractors are required to undergo a thorough induction process which includes their requirements for PPE. All site staff supervising visitors are responsible for ensuring that they are issued appropriate PPE depending on the areas they are visiting. All personnel outdoors onsite are required to wear a hi-visibility vest.

All personnel within the process areas are required to wear high visibility vests, flame retardant overalls, internal steel toe cap boots, hard hat, eye protection and RPE fitted with P3 filters (offering the highest level of protection against metal fume and particulate inhalation hazards). The hard hat, eye protection and RPE are typically provided as a full face battery powered respirator for which a large number of spares are stored onsite and battery charging locations are located within most occupied buildings onsite. Although separate hard hats, eye protection and unpowered respirators are available for those unable to use the full face mask type.

Additional PPE is supplied where it is identified as required by the Task Analysis Risk Assessment (TARA) and Work Instruction (WI), such as "silver" jackets and helmet covers and hot work gloves for those making

manual additions to the kettles. Emergency PPE is supplied onsite where required, e.g. sulphur masks are located in each sulphur storage location.

9.5.3 Drainage Isolation Valves

The culvert allows surface water to be drained to the Thames via an outfall. Water is collected from a number of surface drains across the site between the outfall location, adjacent to the T Jetty and the site main entrance.

This outfall represent a potential source of tidal flooding of the site, due to reverse flow during periods of high sea levels, circumventing the protection offered by the sea wall. This outfall is protected from reverse flow by an inline Tideflex non-return valve. This valve is of fabric/elastomer construction which eliminates potential for corrosion related failures and ensures a tight seal despite potential for silting/small pieces of debris to be washed into the valve body.

This outfall also represents the most likely release point for contaminated water to the river Thames. To isolate the outfall if required, there is a “Draintector” isolation valve which can be inflated to prevent forward flow off-site. The valve bladder is inflated by a local air compressor which is fitted with an air receiver for use in event of air compressor failure. The valve can be controlled via the HMI either locally or from security, this system is fitted with a UPS to allow it to be used in case of loss of power.

9.5.4 Ancillary Equipment

Specialist equipment (e.g. heavy lifting equipment) may need to be procured to facilitate the recovery from an emergency scenario, however these are unlikely to be required during a major accident.

BRM maintains a relationship with a specialist waste contractor to remove any contaminated fire water that cannot be treated onsite at the water treatment plant. However onsite storage is available in the short term.

BRM have emergency diesel power generation capability allowing the VRs to be put on hold in event of site wide loss of power.

The following equipment has been deployed onsite as a result of risk assessment of the hazards of each scenario and is considered to be suitable and proportional to the level of risk.

- ▶ First aid stations – 30 locations across site including first aid boxes, burn kits and eye wash stations;
- ▶ Defibrillators (AED type) – Admin building, plant offices, Secondary refinery and the Ag plant;
- ▶ Hand held torches and supplementary lighting;
- ▶ Breathing air generator and replacement O₂ cylinders – Stores building;
- ▶ Sulphur masks – ISA floor, Secondary Refinery and Stores building;
- ▶ Additional PPE and RPE – Stores building and amenities;
- ▶ Oil Spill kits – Adjacent to 200 sec oil tank, adjacent to vehicle diesel tank, adjacent to 35 sec oil tank, and adjacent to the small cupel;
- ▶ Chemical spill kits – Stores building;
- ▶ Emergency Generators – emergency generator building;
- ▶ Mobile spill kits – admin building, adjacent to the generator compound, adjacent to the Ag plant oxygen tank, and covered bullion store;
- ▶ Work at Height rescue kit – attached to each crane onsite and spares stored centrally; and
- ▶ Confined Space equipment – Stores building (deployed if confined space permits are issued).

9.5.5 Emergency Lighting

All emergency lighting units onsite have battery backups to ensure continued availability in the event of power loss.

9.5.6 Emergency Response Equipment

Additional PPE, loudhailers, radios and lights are kept in the security room for the Emergency Response Team to use as needed in event of an incident.

9.5.7 Maintenance

The emergency response equipment is regularly tested as per the BRM Emergency Response Equipment Check and Test Program and maintained as required. The equipment in this program are items that are primarily used in emergency response scenarios, some examples are included below:

- ▶ The equipment and PPE intended for the Emergency Response Team is checked and tested monthly;
- ▶ The fire alarms are tested on a weekly basis. Fire extinguishers are tested twice annually, including in the computer room. The fire hydrants are serviced and tested on an annual basis by an approved third party;
- ▶ The emergency alarms, emergency doors and lights are tested on a quarterly basis;
- ▶ Other equipment requiring maintenance and servicing identified as safety critical are included in the maintenance SAP system described in the Technical Aspects chapter of this report.

9.6 Minimising and Mitigating Major Accidents

Control and mitigations safeguards were identified during the HAZID are discussed for each Safety MAH in the Predictive Chapter and for MATTE scenarios, the relevant safeguards are discussed in the Environmental Assessment Chapter.

9.6.1 Control Systems

Several systems have installed equipment which may reduce the potential for escalation of a Major Accident scenario, these include:

- ▶ The Culvert “Balloon” valve;
- ▶ Storage bays and flood gates;
- ▶ Explosion relief panels on the ducting and plenums; and
- ▶ Pressure relief valves in the oxygen/nitrogen systems.

Mitigating measures reduce the consequence of a major accident once it has occurred by protecting people or the environment. These include:

- ▶ Firefighting facilities; and
- ▶ Curbing and bunding onsite.

Key equipment items are discussed in further in the Technical Aspects chapter of this report

9.6.2 Pollution Control, Environmental Clean-Up and Restoration

The key MATTE scenarios identified include release of estuarine flood water or fire water carrying solubilised and dispersed solid ecotoxic materials into the Thames Estuary and onto various environmental receptors including the downstream Ramsar wetlands.

The site is generally well protected against coastal flooding by the seawall which is owned and maintained by the EA. It is considered that the EA will maintain the seawall in a functional condition to protect the site up to a height of 7.35 mAOD.

As described in Chapter 5, all waste materials containing lead oxide are stored within concrete bays that will be fitted with flood gates which should protect the material from flood water up to a height of 1 m above site ground level at that bay.

The larger oil tank (200 sec) is fitted with an external concrete bund, the smaller tanks are of integrated bunded construction.

Additionally, the sea wall also prevents flow from the site into the river, there are a number of culverts under the wall, and of these the only two that are operational (i.e. not sealed) are owned by BRM. The first has a non-return valve fitted to stop back flow on high tide and has a balloon valve that can be inflated to stop contaminated water being release to the Thames. This valve is discussed above and these scenarios are discussed further in Chapter 4. The other functioning outfall is the discharge from the water treatment plant, only water processed through the plant can be released from this pipe and there is no potential for reverse flow.

BRM maintain a relationship with a waste disposal contractor who will come to site and remove contaminated rain, flood or firewater, which cannot be treated onsite. The contact details for this service is included in the Emergency Response Guide.

In the event of a release of lead oxide to the Thames, the site will assess the potential for pollution and the scale of any pollution that occurs, and will, in conjunction with the Environment Agency and Local Authority, agree any necessary control, clean up or remediation measures.

9.6.3 Firewater Run-Off

Firewater can contain toxic combustion products and there is an increased likelihood onsite that it will be contaminated with lead oxide. The intention is to retain all firewater onsite and treat it before discharge. In event of a fire, the balloon valve is closed isolating the culvert drains from outflowing to the river. This valve is discussed above and in Chapter 5.

Once the firewater has been isolated onsite, it will be pumped to one of the two lagoons using the existing water logistics infrastructure.

Additional minimum storage capacity is reserved in both site lagoons for firewater. On the advice of Kent Fire and Rescue, even when full, 69 m³ is reserved in each lagoon to store contaminated fire water. This represents the worst case fire water usage for a major fire on both the primary and secondary side of the site.

BRM maintain a relationship with a waste disposal contractor with contact details in the ERG for removal of contaminated firewater, which cannot be treated onsite.

9.6.4 Monitoring and Sampling

Particulate Monitoring (PCME) probes are installed in each of the bag house stacks to provide continuous alarmed monitoring of particulate emissions from the site. These probes alarm at a set concentration in the security office and the first procedural action is to inform the shift manager who must investigate. While these are likely to detect increased particulate emission in case of a fire within the baghouse, it is not considered feasible to automate these probes to actuate a shutdown function due to the safety hazards associated with loss of extraction and the sheer number of nuisance alarms (as a fire is an unlikely cause of alarm, bags requiring replacement and precipitation are more common causes).

Each of the operating stacks are also sampled periodically as required by the sites PPC permit, this ensures that the site abatement systems are achieving their required efficiency.

Water processed in the onsite treatment plant is sampled in storage in the holding tank before it is discharged to the Thames. These tests are to verify that the content of various heavy metal contaminants in the discharged water is below the permissible values in the site permit. These same sampling techniques

could be used to test firewater/floodwater to determine whether it can be safely discharged to the Thames in event of site flooding.

9.7 Training and Competence

Site personnel who have a role in the emergency procedures are specifically trained in their role. Operators and technicians will receive standard company training and additional specific training dependent upon their role to ensure they have the required competencies to conduct their normal roles safely and take immediate action if a hazard is occurs.

All staff receive a basic level of training including emergency evacuation routes and drills, fire extinguisher awareness, fire awareness and health awareness. Key personnel are then identified for additional training including managing an emergency, managing communication and risk assessment.

Contractors must undergo an in-depth induction for the site which includes details of emergency evacuation and potential hazards onsite. Visitors must undergo a brief induction for each location they visit which summarises hazards, emergency signals and muster points, all visitors must be escorted by a staff member.

9.8 Drills and Exercises

The site maintains a program of Emergency Response Evacuation drills on the intranet, this program includes a number of annual site wide shut down and evacuation drills.

Each of the four shifts of operators in the production streams undertake a shutdown and evacuation of the site during night and weekend shift patterns annually (8 drills in total). This ensures all operations staff practice twice annually and are prepared in event of an emergency.

A number of additional emergency response drills are undertaken including a full site evacuation once per year.

A site simulation exercise is carried out annually to ensure that specific hazards are covered including confined space and working at height incidents, and chemical and oil spills.

Kent Fire and Rescue Service also undertake periodic visits to the site to familiarise themselves with specific hazards.

9.9 Provision of Information for the Off-site and Onsite Emergency Plans

BRM will cooperate with Kent County Council Emergency Planning (the local authority) to provide the relevant information to allow them to develop of the Offsite Emergency Plan, if they deem one necessary. A summary of the likely information to be provided includes:

- ▶ Details of the site location and access routes;
- ▶ Site plans detailing location of the dangerous substances, muster points, and key process areas;
- ▶ Details of any major accident scenario which may impact off-site (from the predictive and environmental aspects);
- ▶ Details of the key personnel in the Emergency Management Procedure (on-site); and
- ▶ Details of the dangerous substances and the relevant safeguards e.g. MSDS's, location of fire hydrants and gas isolation valves etc.

9.10 External Emergency Services

No External Emergency Plan currently exists for the site, however, this section will be completed following receipt of the plan from Kent County Council. The deadline for the receipt of this plan is 1/12/2016, as set by the HSE.

9.11 Arrangements for Alerting the Public

In response to the site application for Hazardous Substance Consent, the HSE has recommended a “Zero CD” around the site as the hazards are recognised to be primarily environmental. The HSE has not designated a Public Information Zone (PIZ) around the site, so it has not been considered necessary to devise methods for alerting members of the public to potential major accidents.

Designated contacts at Seacon and the marine works have been identified and will be contacted if required under the Emergency Response Guide.

9.12 References

1. BRM Emergency Response Guide
2. BRM Emergency Management Procedure
3. BRM Emergency Recovery Procedure
4. HSE, (1999). *Emergency planning for major accidents: Control of Major Accident Hazards Regulations 1999 (COMAH)*. HSG 191. [online] Available at: <http://www.hse.gov.uk/pubns/priced/hsg191.pdf> [Accessed 12 Apr. 2016].