Amazon Data Services Ireland Limited

Emissions from Storage BAT Reference Document

Attachment-4-7-3

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Licence Application Ref: LA011866

Conclusions on BAT from the Emissions from Storage BAT Reference Document (extracts)

The full and complete Emissions from Storage BAT reference document (July 2006) is available at the EIPPC Bureau website: http://eippcb.jrc.ec.europa.eu/reference/

SCOPE OF BAT

The particular processes and activities at the installation that come within the scope of the conclusions on BAT from the Emissions from Storage BAT reference documents (BREF) are:

- Fuel (diesel/HVO) is stored in multiple locations across the site:

  Existing Installation (Buildings W, X, Y)

  - Bulk fuel is supplied to the emergency backup generator tanks from the Bulk Tank Farm(s). 3 no. 52,000 litre bulk tanks associated with Building W, and 5 no. 54,000 litre bulk tanks associated with Building X and Y;
  - Building W: the emergency generators have 13 no. 2,500 litres double skinned steel day tanks;
  - Building X: the emergency generators have 20 no. 2,500 litres double skinned steel day tanks;
  - Building Y: the emergency generators have 7 no. 2,500 litres double skinned steel day tanks;
  - 2-no. fire pumps at the sprinkler house associated with Building W have 3 no. 1,000 litre tanks for supply to the fire sprinkler pump; and
  - 2-no. fire pumps at the sprinkler house associated with Building X and Y have 3 no. 1,000 litre tanks for supply to the fire sprinkler pump.

  Extended Installation (Buildings U, V)

  - Bulk fuel is supplied to the emergency backup generator tanks from the Top-up Fuel Tank. 1 no. 40,000 litre bulk tank associated with Building U and V;
  - Building U: the emergency generators have 10 no. 16,000 litres belly tanks and 1 no. 4,950 litre tank;
  - Building V: the emergency generator has 1 no. 8,500 litres double skinned steel belly tank and 1 no. 1,000 litre day tank; and
  - 2-no. fire sprinkler pumps at the sprinkler house associated with Buildings U and V have 2 no. 450 litre tanks and 1 x 900 litre tank for supply to the fire sprinkler pump.

- Fuel (diesel/HVO) pipelines above ground are Carbon Steel, and below ground are Close Fit PLX (dual-contained pipe system).
- Urea is stored on site for the SCR abatement system for the extended Installation:
  - Building U: 10 no. single-skinned urea storage tanks (each 850 litres useable capacity, 895 litres total capacity);
  - Building V: 1 no. single-skinned urea storage tank (1,275 useable capacity, 1410 litres total capacity).

Due to the Class of Activity being applied for it is the EPA's expectation that an applicant has regard to these Horizontal BAT Conclusions for emissions from storage.

Conclusions on BAT	Applicability assessment and description of the technique.	Schedule for implementation
5.1 Storage of liquids and Liquefied gases **5.1.1.1 General principles to prevent and reduce emissions**		
BAT 1. BAT for a proper design is to take into account at least the following: • the physico-chemical properties of the substance being stored • how the storage is operated, what level of instrumentation is needed, how many operators are required, and what their workload will be • how the operators are informed of deviations from normal process conditions (alarms) • how the storage is protected against deviations from normal process conditions (safety instructions, interlock systems, pressure relief devices, leak detection and containment, etc.) • what equipment has to be installed, largely taking account of past experiences of the product (construction materials, valve quality, etc.) • which maintenance and inspection plan needs to be implemented and how to ease the maintenance and inspection work (access, layout, etc.) • how to deal with emergency situations (distances to other tanks, facilities and to the boundary, fire protection, access for emergency services such as the fire brigade, etc.).	**Applicable –** The bulk fuel / top-up fuel tank storage areas have been designed in accordance with the requirements of BAT. The primary chemical stored onsite is fuel (diesel or HVO) for use in the emergency generators. A site wide Environmental Management System (EMS) has been developed for the facility. In addition, Emergency Operating Procedures (EOP), and Standard Operating Procedures (SOP) have been developed for the facility to reduce the risk of spill. Staff are fully trained in the use of the EOPs and SOPs. The design of the chemical storage (urea) tanks at the facility has taken into account the requirement for full containment and all containers are appropriate for the chemicals stored within. The bulk /top-up fuel tanks are steel tanks at atmospheric pressure. All tanks have been designed to BS799. For the emergency backup generators that have double skinned day tanks, all tanks have been designed to BS799. There is full primary and secondary containment for fuel storage, and all containers are designed to be suitable for the chemicals stored within and in accordance with the EPA's guidelines for the storage and transfer of materials for scheduled activities (EPA, 2004).	EMS in place.

	Breather vents are installed for the bulk /top-up fuel storage tanks to prevent vacuum formation or overpressure in the tank during drawdown or tank filling, or due to atmospheric temperature changes. Tank levels are monitored by level gauges with l alarms. These will detect leaks in the tanks. Bunds and delivery (fuel unloading) bays are equipped with hydrocarbon probes in the bund sump which detects fuel in the bund. This triggers closure of the sump discharge and sends an alarm signal to the BMS to alert EOTs. Further detail on this is supplied in the Operational Report (Attachment 4-8-1). A standard operating procedure for fuel unloading is in place at the site. The 2 no. dedicated fuel tanker unloading areas for the existing Installation include a foul water drainage channel, that directs waters through the full retention Class 1 hydrocarbon interceptors to capture any hydrocarbon spill. The 1 no. dedicated fuel tanker unloading area for the extended Installation includes a stormwater drainage channel that directs waters through a forecourt Class 1 hydrocarbon interceptor to capture any hydrocarbon spill. The site maintains spill kits at all storage areas, and stormwater systems including hydrocarbon interceptors are installed as discussed in Operational Report. An on-site Emergency Response Plan (ERP) is in place for the existing data centre facilities, and this will be updated to incorporate the additional developments as well as the requirements of the EPA's guidance.	
BAT 2.	**Applicable** – A risk based preventative maintenance schedule has been developed for the facility which will form part of the EMS for the site; this will incorporate existing EPA guidance on materials storage.	In place

BAT is to apply a tool to determine proactive maintenance plans and to develop risk-based inspection plans such as the risk and reliability-based maintenance approach; see Section 4.1.2.2.1.	Enterprise Asset Management (EAM) is the software platform ADSIL uses to maintain and manage its mechanical, electrical, and plumbing (MEP) equipment. This platform enables Infrastructure teams to do a variety of tasks: • Track and coordinate planned and unplanned maintenance. • Track the full life cycle of critical data centre assets. • Identify defective equipment through mechanisms like field service bulletins (FSBs). • Provide tracking for DCEO spare part inventory. • Provide key insights for equipment failure, root cause analysis (RCA), and total cost of ownership (TCO). The EAM team maintains the EAM system – the EAM team objective is to create and maintain a reliable maintenance platform that improves operational excellence, reduces both equipment failures and maintenance costs, and promotes standardized processes that support operations in ADSIL data storage facilities. In addition to the PM there are also regular inspections of all infrastructure onsite. Checks of all plant are done by operations staff twice per shift.	
BAT3. BAT is to locate a tank operating at, or close to, atmospheric pressure aboveground. However, for storing flammable liquids on a site with restricted space, underground tanks can also be considered. For liquefied gases, underground, mounded storage or spheres can be considered, depending on the storage volume.	**Applicable** – All fuel storage tanks are above ground structures operating at or near to atmospheric pressure.	In place

BAT 4. BAT is to apply either a tank colour with a reflectivity of thermal or light radiation of at least 70 %, or a solar shield on aboveground tanks which contain volatile substances, see Section 4.1.3.6 and 4.1.3.7 respectively.	**Applicable** – The fuel storage tanks are supplied in an appropriate colour to reflect heat, in accordance with BAT.	In place
BAT 5. BAT is to abate emissions from tank storage, transfer and handling that have a significant negative environmental effect, as described in Section 4.1.3.1	**Applicable** – There is full containment, and all containers are chosen to be appropriate for the chemicals stored within and designed in accordance with the EPA's guidelines for the storage and transfer of materials for scheduled activities (EPA, 2004). The fuel tanks are sealed and equipped with breathing vents for safety purposes. Emissions to air from the tanks is not anticipated to have a significant negative environmental effect. Delivery of fuel oil (diesel/HVO) is a controlled process and is undertaken in accordance with the Fuel Delivery SOP. Deliveries are supervised and will take place in designated bunded loading bays. Hydrocarbon interceptors are in place for tanker delivery bays to capture any spills. The removal of any waste (oil/fuel) from the hydrocarbon interceptors is undertaken by a licenced contractor.	In place
BAT 6. On sites where significant VOC emissions are to be expected, BAT includes calculating the VOC emissions regularly.	**Not Applicable** – no bulk solvents stored.	N/A
BAT 7. BAT is to apply dedicated systems; see Section 4.1.4.4.	**Applicable** - All tanks are dedicated to the specific substances held within and will not be used to hold other substances at any time.	In place
5.1.1.2 Tank specific considerations		

BAT 8. Open top tanks If emissions to air occur, BAT is to cover the tank by applying: • a floating cover, see Section 4.1.3.2 • a flexible or tent cover, see Section 4.1.3.3, or • a rigid cover, see Section 4.1.3.4. Additionally, with an open top tank covered with a flexible, tent or a rigid cover, a vapour treatment installation can be applied to achieve an additional emission reduction, see Section 4.1.3.15. The type of cover and the necessity for applying the vapour treatment system depend on the substances stored and must be decided on a case-by-case basis.	**Not Applicable** – No Open Top Tanks	N/A
BAT 9. To prevent deposition that would call for an additional cleaning step, BAT is to mix the stored substance (e.g. slurry), see Section 4.1.5.1.	**Not Applicable** – No Open Top Tanks	N/A
BAT 10. - External floating roof tank The BAT associated emission reduction level for a large tank is at least 97 % (compared to a fixed roof tank without measures), which can be achieved when over at least 95 % of the circumference the gap between the roof and the wall is less than 3.2 mm and the seals are liquid mounted, mechanical shoe seals.	**Not Applicable** – No external floating roof tanks	N/A
BAT 11. BAT is to apply direct contact floating roofs (double-deck); however, existing non-contact floating roofs (pontoon) are also BAT. See Section 3.1.2. A dome can be BAT for adverse weather conditions, such as high winds, rain or snowfall. See Section 4.1.3.5.	**Not Applicable** – No external floating roof tanks	N/A
BAT 12.	**Not Applicable** – No external floating roof tanks	N/A

For liquids containing a high level of particles (e.g. crude oil), BAT is to mix the stored substance to prevent deposition that would call for an additional cleaning step, see Section 4.1.5.1.		
BAT 13. - Fixed roof tanks For the storage of volatile substances which are toxic (T), very toxic (T+), or carcinogenic, mutagenic and reproductive toxic (CMR) categories 1 and 2 in a fixed roof tank, BAT is to apply a vapour treatment installation.	**Not Applicable –** No volatile substances stored (the fuel oil is a stable liquid at ambient temperatures).	N/A
BAT 14. For other substances, BAT is to apply a vapour treatment installation, or to install an internal floating roof (see Sections 4.1.3.15 and 4.1.3.10 respectively). Direct contact floating roofs and non-contact floating roofs are BAT.	**Not Applicable** – fuel is stored in liquid- and vapor-tight fixed roof tanks, equipped with breather valve.	N/A
BAT 15. For tanks < 50 m^3, BAT is to apply a pressure relief valve set at the highest possible value consistent with the tank design criteria.	**Applicable** – The day tanks and fire sprinkler pump tanks are < 50 m^3. Breather vents are installed for all fuel tanks in accordance with the manufacturers design. Fuel tanks are at atmospheric pressure.	In place
BAT 16. For liquids containing a high level of particles (e.g. crude oil) BAT is to mix the stored substance to prevent deposition that would call for an additional cleaning step, see Section 4.1.5.1.	**Not Applicable** – no liquids containing a high level of particles stored.	N/A
BAT 17. Atmospheric horizontal tanks For the storage of volatile substances which are toxic (T), very toxic (T+), or CMR categories 1 and 2 in an atmospheric horizontal tank, BAT is to apply a vapour treatment installation.	**Not Applicable** – No volatile substances (fuel is a stable liquid at ambient temperatures).	N/A
BAT 18.	**Not Applicable** – there are no atmospheric horizontal tanks; tanks are atmospheric vertical tanks and	N/A.

For other substances, BAT is to do all, or a combination, of the following techniques, depending on the substances stored: • apply pressure vacuum relief valves; see Section 4.1.3.11 • up rate to 56 mbar; see Section 4.1.3.11 • apply vapour balancing; see Section 4.1.3.13 • apply a vapour holding tank, see Section 4.1.3.14, or • apply vapour treatment; see Section 4.1.3.15. The selection of the vapour treatment technology has to be decided on a case-by-case basis.	breather valves are installed for all fuel tanks in accordance with the manufacturers design.	
BAT 19. Pressurised storage BAT for draining depends on the tank type but may be the application of a closed drain system connected to a vapour treatment installation, see Section 4.1.4. The selection of the vapour treatment technology has to be decided on a case-by-case basis.	**Not Applicable** – No pressurised gas storage.	N/A
BAT 20. Lifter roof tanks For emissions to air, BAT is to (see Sections 3.1.9 and 4.1.3.14): • apply a flexible diaphragm tank equipped with pressure/vacuum relief valves, or • apply a lifter roof tank equipped with pressure/vacuum relief valves and connected to a vapour treatment installation. The selection of the vapour treatment technology has to be decided on a case-by-case basis.	**Not Applicable** – No lifter roof tanks	N/A
BAT 21. Underground and mounded tanks For the storage of volatile substances which are toxic (T), very toxic (T+), or CMR categories 1 and 2 in an underground or mounded tank, BAT is to apply a vapour treatment installation.	**Not Applicable** – No underground tanks	N/A
BAT 22.	**Not Applicable** – No underground tanks	N/A

For other substances, BAT is to do all, or a combination, of the following techniques, depending on the substances stored: • apply pressure vacuum relief valves; see Section 4.1.3.11 • apply vapour balancing; see Section 4.1.3.13 • apply a vapour holding tank, see Section 4.1.3.14, or • apply vapour treatment; see Section 4.1.3.15. The selection of the vapour treatment technology has to be decided on a case-by-case basis.		
5.1.1.3 Preventing incidents and (major) accidents		
BAT 23. BAT in preventing incidents and accidents is to apply a safety management system as described in Section 4.1.6.1.	**Applicable -** A safety management system (SMS) has been developed for ADSIL's facilities. The SMS sets out the ways ADSIL will prevent or minimise the occurrence of incidents and accidents. The safety management system will be reviewed to ensure it complies with this BAT.	SMS in place.
BAT 24. BAT is to implement and follow adequate organisational measures and to enable training and instruction of employees for safe and responsible operation of the installation as described in Section 4.1.6.1.1.	**Applicable** – Relevant site staff are fully qualified and fully trained for safe and responsible operation of the installation. All training records are held on site. Training is provided to staff on all relevant SOPs, emergency response procedure, housekeeping, safety procedures and future EMS procedures.	EMS is in place.
BAT 25. BAT is to prevent corrosion by: • selecting construction material that is resistant to the product stored • applying proper construction methods • preventing rainwater or groundwater entering the tank and if necessary, removing water that has accumulated in the tank • applying rainwater management to bund drainage	**Applicable -** the fixed roof closed tanks are not expected to have significant rainwater infiltration. The materials of construction are appropriate for the material stored. This will ensure that corrosion is avoided. Fuel pipelines above ground are Carbon Steel, and below ground are Close Fit PLX (dual-contained pipe system) corrosion is not expected to be a significant concern for these materials.	In place

• applying preventive maintenance, and • where applicable, adding corrosion inhibitors, or applying cathodic protection on the inside of the tank.	Fuel pipelines are routinely inspected as part of the operation's daily inspections and during vendor maintenance. Tanks are integrity tested by the manufacturer prior to installation. Concrete bunds are integrity tested on site once construction has been completed. Enterprise Asset Management (EAM) is the software platform ADSIL uses to maintain and manage its mechanical, electrical, and plumbing (MEP) equipment. This platform notifies the DCEO team if maintenance is due on any piece of equipment or plant. Each bulk tank is bunded to a volume of 110% of the capacity of the tank within the bund. Drainage from the bunds is diverted for collection and safe disposal. Bunds and delivery bays are equipped with hydrocarbon probes in the bund sump which detects fuel in the bund. This triggers closure of the sump discharge and sends an alarm signal to the BMS to alert EOTs. Further detail on this is supplied in the Operational Report (Attachment 4-8-1). Preventative maintenance is undertaken regularly at all ADSIL sites. Checks of all plant are done by operations staff twice per shift. Tanks, bunds, sump probes, etc. are regularly inspected in accordance with the EAM schedule.	
BAT 26. Additionally for an underground tank, BAT is to apply to the outside of the tank: a corrosion-resistant coating; plating, and/or a cathodic protection system.	**Not applicable** – No underground storage tanks.	N/A
BAT 27. BAT is to prevent stress corrosion cracking (SCC) by:	**Applicable** – Regular inspections and maintenance is carried out at the site as part of its preventative	In place

• stress relieving by post-weld heat treatment, see Section 4.1.6.1.4, and • applying a risk based inspection as described in Section 4.1.2.2.1.	maintenance programme and repair of tanks and pipework is carried out as required. It is not envisioned that SCC will be an issue. There are no ammonia storage tanks on site, which are prone to SCC. The substances on site should not cause stress and are not within a corrosive environment. Integrity testing (pressure testing) on the pipelines is completed at time of installation.	
BAT 28. BAT is to implement and maintain operational procedures – e.g. by means of a management system – as described in Section 4.1.6.1.5, to ensure that: • high level or high pressure instrumentation with alarm settings and/or auto closing of valves is installed • proper operating instructions are applied to prevent overfill during a tank filling operation, and • sufficient ullage is available to receive a batch filling.	**Applicable** - The fuel tanks also have high/low level alarms (90% high, 30% low) and a high-level switch which alarm to the BMS/EPMS critical alarm (locally referred to as high-high) and an equivalent low level alarm (low-low). A refuelling Standard Operating Procedure (SOP) is in place as part of the SOPs for the delivery of substances to the site to prevent tank overfill and will ensure that there is sufficient capacity in the tank to accept the delivery. Operations staff receive regular training on the SOP.	In place
BAT 29. BAT is to apply leak detection on storage tanks containing liquids that can potentially cause soil pollution.	**Applicable** – The bulk fuel tank bunds contains hydrocarbon detection probes which shut off the bund drainage and alerts the operations staff by raising a critical alarm to the BMS to alert EOTs if fuel is detected in the bund. For the emergency backup generators that are containerised (Buildings W, Y, U and V), the containerised generator housing includes retention bunding in the base of the container, there are leak detection systems within the bund to alert in the event of a leak from the generator fuel day tank or lubricating oil tank	In place

	Underground fuel distribution pipelines are double lined and comprise a system of leak detection. Fuel unloading bays include concrete bunded areas, these fuel delivery areas are surrounded with hardstand concrete bases that drain to hydrocarbon interceptor. The bulk fuel tanks are fitted with automated level gauges and the online readings from these gauges are fed back into the facility's BMS/EPMS. The bulk tanks also have high/low level alarms (90% high, 30% low) and a high-level switch which alarm to the BMS/EPMS critical alarm.	
BAT 30. BAT is to achieve a 'negligible risk level' of soil pollution from bottom and bottom-wall connections of aboveground storage tanks. However, on a case-by-case basis, situations might be identified where an 'acceptable risk level' is sufficient. A negligible risk for soil pollution can only be achieved by applying the following technical combinations: • a thickness of the tank bottom of at least 6 mm, together with an impervious barrier between the tank bottom and soil surface, or • an original double tank bottom with a leak detection system and the thickness of the primary and secondary bottom of at least 6 mm, or • a thickness of the tank bottom of at least 5 mm, together with a leak detection system in combination with an external coating system and measures to prevent rainwater and groundwater ingress, or • a combination of other maximum measures in combination with a non-corrosive product or a tank bottom of more than 3 mm thickness.	**Applicable** – The fuel day tanks at the generators are double skinned and located on hardstanding concrete areas. The containerised emergency backup generator housing includes retention bunding in the base of the container, there are leak detection systems within the bund to alert in the event of a leak from the generator fuel or lubricating oil tank. The onboard controller for individual generators is connected to the Building Management System (BMS). The bulk fuel tanks are located within a concrete bund. Underground fuel distribution pipelines are double lined and comprise a system of leak detection. Due to the preventative measures outlined in the Operational Report 4-8-1 the onsite fuel storage is considered to meet a negligible risk level.	In place

BAT 31. BAT for aboveground tanks containing flammable liquids or liquids that pose a risk for significant soil pollution or a significant pollution of adjacent watercourses is to provide secondary containment, such as: • tank bunds around single wall tanks; see Section 4.1.6.1.11 • double wall tanks; see Section 4.1.6.1.13 • cup-tanks; see Section 4.1.6.1.14 • double wall tanks with monitored bottom discharge; see Section 4.1.6.1.15.	**Applicable** – All tanks are designed to fully meet the BAT requirements and are bunded in accordance with the EPA Guidance on Storage and Transfer of Materials. The bulk / top-up fuel storage tanks are contained within concrete bunds upon continuous hard standing. The day tanks at the generators are double skinned and located in an area of continuous hard stand.	In place
BAT 32. For building new single walled tanks containing liquids that pose a risk for significant soil pollution or a significant pollution of adjacent watercourses, BAT is to apply a full, impervious, barrier in the bund, see Section 4.1.6.1.10.	**Applicable** – The 9 no. steel bulk storage tanks are single skinned and are bunded within concrete bunds and located on hard stand. The design of all bunds conforms to standard bunding specifications - BS8007:1987. **Not Applicable:** The fuel day tanks at the generators are double skinned and located on hardstanding concrete areas.	In place
BAT 33. For existing tanks within a bund, BAT is to apply a risk-based approach, considering the significance of risk from product spillage to the soil, to determine if and which barrier is best applicable. This risk-based approach can also be applied to determine if a partial impervious barrier in a tank bund is sufficient or if the whole bund needs to be equipped with an impervious barrier. See Section 4.1.6.1.11.	**Applicable** – Bunds are reinforced concrete with an impervious barrier. There are in place adequate operational systems, inspections, training and record keeping, along with appropriate instrumentation/alarm systems and therefore there is no requirement to retrofit bunds.	In place
BAT 34. For chlorinated hydrocarbon solvents (CHC) in single walled tanks, BAT is to apply CHC-proof laminates to concrete barriers (and containments), based on phenolic or furan resins. One form of epoxy resin is also CHC-proof. See Section 4.1.6.1.12.	**Not applicable** – no bulk storage of solvents.	N/A

BAT 35. BAT for underground and mounded tanks containing products that can potentially cause soil pollution is to: • apply a double walled tank with leak detection, see Section 4.1.6.1.16, or • to apply a single walled tank with secondary containment and leak detection, see Section 4.1.6.1.17.	**Not applicable** – No underground storage tanks.	N/A
BAT 36. For toxic, carcinogenic or other hazardous substances, BAT is to apply full containment.	**Applicable** – All tanks containing toxic, carcinogenic or other hazardous substances, are designed to fully meet the BAT requirements and are fully bunded in accordance with the EPA Guidance on Storage and Transfer of Materials.	In place
5.1.2. Storage of packaged dangerous substances		
BAT 37. BAT in preventing incidents and accidents is to apply a safety management system as described in Sections 4.1.6.1. The minimum level of BAT is to assess the risks of accidents and incidents on the site using the five steps described in Section 4.1.6.1 Step 1: identify the hazards Step 2: decide who and/or what may be harmed (and/or damaged and/or contaminated and how seriously) Step 3: evaluate the risks arising from the hazards and decide whether existing precautions are adequate or if more needs to be done Step 4: record significant findings Step 5: review assessment from time to time and revise it if necessary.	**Applicable** – A safety management system (SMS) has been developed for ADSIL's facilities along with the EMS. The SMS sets out the ways ADSIL will prevent or minimise the occurrence of incidents and accidents. The safety management system will be reviewed to ensure it complies with this BAT. Standard Operating Procedures for Emergency Response and Spill Prevention are in place.	In place SMS in place.

BAT 38. BAT is to appoint a person or persons who is or are responsible for the operation of the store.	**Applicable** – Relevant staff are fully trained specifically in relation to the storage and handling of all substances being used at the facility. Wastes are collected by appropriately authorised waste contractors for disposal offsite. ADSIL require third-party waste contractors to provide all the relevant permits and waste disposal documentation. A number of waste SOPs are in place at the facility including a Hazardous Waste Management SOP. Online training is provided for all Operations staff which must be repeated on an annual basis including; Emergency Response and Spill kit deployment training. The waste storage areas are inspected as part of the shift inspections and site staff must inspect all areas on a monthly basis to ensure that there is no unrecorded hazardous waste on site.	In place
BAT 39. BAT is to provide the responsible person(s) with specific training and retraining in emergency procedures as described in Section 4.1.7.1 and to inform other staff on the site of the risks of storing packaged dangerous substances and the precautions necessary to safely store substances that have different hazards.	**Applicable** – Relevant staff are fully trained in site procedures for safe and responsible operation of the installation. Online training is provided for all Operations staff which must be repeated on an annual basis including; Emergency Response and Spill kit deployment training. The operations teams hold drills which are training exercises to ensure the operations staff are appropriately trained.	In place
BAT 40. BAT is to apply a storage building and/or an outdoor storage area covered with a roof, as described in Section 4.1.7.2. For storing quantities of less than 2500 litres or kilograms dangerous substances, applying a storage cell as described in Section 4.1.7.2 is also BAT.	**Not Applicable** – There are no external materials storage areas other than those stated, there are no smaller quantities (< 2500L), or dangerous substances stored. Any materials required, for example for maintenance, are brought to site by maintenance contractors.	N/A

BAT 41. BAT is to separate the storage area or building of packaged dangerous substances from other storage, from ignition sources and from other buildings on- and off-site by applying a sufficient distance, sometimes in combination with fire-resistant walls.	**Applicable** – The separation distances from ignition sources have been considered and implemented. It is anticipated that the only flammable material stored on a regular basis is fuel oil.	In place
BAT 42. BAT is to separate and/or segregate incompatible substances. For the compatible and incompatible combinations see Annex 8.3.	**Applicable** – All incompatible substances are separated.	In place
BAT 43. BAT is to install a liquid-tight reservoir according to Section 4.1.7.5, that can contain all or a part of the dangerous liquids stored above such a reservoir. The choice whether all or only a part of the leakage needs to be contained depends on the substances stored and on the location of the storage (e.g. in a water catchment area) and can only be decided on a case-by-case basis.	**Applicable** – Bulk fuel is stored in concrete bunded tanks external to the buildings. The bunds are liquid tight and contain oil detection probes which shuts off the bund drainage and alerts the operations staff by raising a critical alarm to the BMS to alert EOTs if oil is detected in the bund. All other fuel is stored in double skinned tanks or bunded tanks.	In place
BAT 44. BAT is to install a liquid-tight extinguishant collecting provision in storage buildings and storage areas according to Section 4.1.7.5. The collecting capacity depends on the substances stored, the amount of substances stored, the type of package used and the applied fire-fighting system and can only be decided on a case-by-case basis.	**Applicable** – Hydrobrakes are installed to allow the stormwater discharge from the installation to be shut off in the event of a fire.	In place
BAT 45. BAT is to apply a suitable protection level of fire prevention and fire-fighting measures as described in Section 4.1.7.6. The appropriate protection level has to be decided on a case-by-case basis in agreement with the local fire brigade.	**Applicable** – There is a comprehensive fire detection and suppression systems in place across the facility. The appropriate protection level has been designed in agreement with the local fire authority.	In place
BAT 46. BAT is to prevent ignition at source as described in Section 4.1.7.6.1.	**Applicable** – SOPs are in place to prevent ignition at source as described in Section 4.1.7.6.1. Measures	In place

• smoking and smokers' materials • maintenance work, particularly involving hot work • electrical power supplies • storage close to hot pipes or light fittings • arson • heating systems incorporating open flames • warehouse vehicles and battery charging facilities • LPG fuelled shrink-wrapping machines.	will also be incorporated within the EMS to prevent and reduce ignition in at risk areas. Measures include (but are not limited to); designated smoking areas, fire resistant control areas, appropriate security, and a scheduled routine maintenance program.	
5.1.3 Basins and lagoons		
BAT 47. Where emissions to air from normal operation are significant, e.g. with the storage of pig slurry, BAT is to cover basins and lagoons using one of the following options: • a plastic cover; see Section 4.1.8.2 • a floating cover; see Section 4.1.8.1, or • only small basins, a rigid cover; see Section 4.1.8.2. Additionally, where a rigid cover is used, a vapour treatment installation can be applied to achieve an extra emission reduction, see Section 4.1.3.15. The need for and type of vapour treatment must be decided on a case-by-case basis.	**Not applicable** – no storage basins or lagoons for the storage of raw materials or wastes on site.	N/A
BAT 48. To prevent overfilling due to rainfall in situations where the basin or lagoon is not covered, BAT is to apply a sufficient freeboard, see Section 4.1.11.1.	**Not applicable** – no storage basins or lagoons for the storage of raw materials or wastes on site.	N/A
BAT 49. Where substances are stored in a basin or lagoon with a risk of soil contamination, BAT is to apply an impervious barrier. This can be a	**Not applicable** – no storage basins or lagoons for the storage of raw materials or wastes on site.	N/A

flexible membrane, a sufficient clay layer or concrete, see Section 4.1.9.1		
5.2 Transfer and handling of liquids and liquefied gases **5.2.1 General principles to prevent and reduce emissions**		
BAT 50. BAT is to apply a tool to determine proactive maintenance plans and to develop risk-based inspection plans such as, the risk and reliability based maintenance approach; see Section 4.1.2.2.1.	**Applicable** – Preventative maintenance and corrective maintenance is undertaken regularly at all ADSIL sites. See further details on the Enterprise Asset Management (EAM) under BAT 2 above.	In place
BAT 51. For large storage facilities, according to the properties of the products stored, BAT is to apply a leak detection and repair programme. Focus needs to be on those situations most likely to cause emissions (such as gas/light liquid, under high pressure and/or temperature duties). See Section 4.2.1.3.	**Applicable** – The bulk fuel tank bunds contain fuel detection probes which shut off the bund drainage and alerts the operations staff by raising a critical alarm to the BMS to alert EOTs if oil is detected in the bund. The containerised emergency backup generator housing includes retention bunding in the base of the container, there are leak detection systems within the bund to alert to the BMS in the event of a leak from the generator. Underground fuel distribution pipelines are double lined and comprise a system of leak detection. Checks of all plant are done by operations staff twice per shift (typically 4 times per day). Tanks, bunds, sump probes, etc. are regularly inspected in accordance with the schedule. Preventative maintenance and corrective maintenance are undertaken regularly at all ADSIL sites. The bunds have been constructed in accordance with the EPA Guidance on Storage and Transfer of Materials.	In place

BAT 52. BAT is to abate emissions from tank storage, transfer and handling that have a significant negative environmental effect, as described in Section 4.1.3.1.	**Applicable** – Handling and transfer of fuel and chemicals is carefully controlled to avoid waste and spills. Delivery of fuel is a controlled process. and is undertaken in accordance with the Fuel Delivery SOP. Deliveries are supervised and will take place in designated bunded loading bays. Hydrocarbon interceptors capture any spills from the fuel unloading areas. Online training is provided for all relevant Operations staff which must be repeated on an annual basis including; Emergency Response and Spill kit deployment training. A site wide EMS has been developed for the facility. Designated staff will be trained in these procedures. Spill kits are available in storage areas across the site.	In place
BAT 53. BAT in preventing incidents and accidents is to apply a safety management system as described in Section 4.1.6.1.	**Applicable** - A safety management system is currently being developed for ADSIL's facilities. The SMS will set out the ways ADSIL will prevent or minimise the occurrence of incidents and accidents. The safety management system will be reviewed to ensure it complies with this BAT.	SMS in place.
BAT 54. BAT is to implement and follow adequate organisational measures and to enable the training and instruction of employees for safe and responsible operation of the installation as described in Section 4.1.6.1.1.	**Applicable** –Relevant staff are qualified and trained for safe and responsible operation of the installation. All training records will be held on site. Training will include training staff on all relevant SOPs, emergency response procedure, housekeeping, safety procedures. Online training is provided for all Operations staff on relevant SOPs which must be repeated on an annual basis, for example: Emergency Response and Spill kit deployment training.	In place

5.2.2 Considerations on transfer and handling techniques		
5.2.2.1 Piping		
BAT 55. BAT is to apply aboveground closed piping in new situations, see Section 4.2.4.1. For existing underground piping, it is BAT to apply a risk and reliability based maintenance approach as described in Section 4.1.2.2.1.	**Applicable** –The majority of pipelines related to the storage and transfer of materials are underground, Underground fuel distribution pipelines are double lined and comprise a system of leak detection. Above ground fuel pipelines are routinely inspected as part of the operation's daily inspections and during vendor maintenance. The Operations teams visually inspect front and rear crankshaft seals and lubrication system gasket for leaks, check fuel system for leaks (pumps, coolers, fuel tanks); inspect flexible fuel lines for cracking, leaks, and pliability; Inspect steel fuel lines for cracks, leaks, and proper line support.	In place
BAT 56. BAT is to minimise the number of flanges by replacing them with welded connections, within the limitation of operational requirements for equipment maintenance or transfer system flexibility, see Section 4.2.2.1.	**Applicable** – Fuel pipelines above ground are Carbon Steel, and below ground are Close Fit double lined (dual-contained pipe system) Where possible and practically feasible the use of flanges has been reduced, by using a fully welded system.	In place
BAT 57. BAT for bolted flange connections (see Section 4.2.2.2.) include: • fitting blind flanges to infrequently used fittings to prevent accidental opening • using end caps or plugs on open-ended lines and not valves • ensuring gaskets are selected appropriate to the process application • ensuring the gasket is installed correctly • ensuring the flange joint is assembled and loaded correctly	**Applicable** – The pipelines for fuel distribution include using a fully welded system at the tank and along the lines. Fuel pipelines above ground are Carbon Steel, and below ground are Close Fit PLX (dual-contained pipe system). Flanges have been minimised where practical by utilising a fully welded system. Any flanges and valves are routinely inspected as part of the operations inspections and during vendor maintenance. Sheet gasketing is used for flanged connections. This provides increased residual gasket stress and greater	In place

• where toxic, carcinogenic or other hazardous substances are transferred, fitting high integrity gaskets, such as spiral wound, kammprofile or ring joints.	blow out resistance. All gasketing will be installed by an appropriate installer / contractor.	
BAT 58. BAT is to prevent corrosion by: • selecting construction material that is resistant to the product • applying proper construction methods • applying preventive maintenance, and • where applicable, applying an internal coating or adding corrosion inhibitors.	**Applicable** – The materials of construction for pipelines are compatible with the materials being transferred. Fuel pipelines above ground are Carbon Steel, and below ground are Close Fit PLX (dual-contained pipe system). All pipelines are subject to preventative maintenance scheduled on the EAM system. A preventative maintenance schedule forms part of the EMS for the facility.	In place
BAT 59. To prevent the piping from external corrosion, BAT is to apply a one, two, or three layer coating system depending on the site-specific conditions (e.g. close to sea). Coating is normally not applied to plastic or stainless steel pipelines. See Section 4.2.3.2.	**Applicable** – The pipelines for the transfer of materials have been designed to be appropriate to the environment at the facility location. Fuel pipelines above ground are Carbon Steel, and below ground are Close Fit PLX (Plastic).	In place
5.2.2.2 Vapour treatment		
BAT 60. BAT is to apply vapour balancing or treatment on significant emissions from the loading and unloading of volatile substances to (or from) trucks, barges and ships. The significance of the emission depends on the substance and the volume that is emitted and has to be decided on a case-by-case basis. For more detail see Section 4.2.8.	**Not applicable** – no bulk storage of solvents or other volatile substances.	N/A
5.2.2.3 Valves		
BAT 61. BAT for valves include: • correct selection of the packing material and construction for the process application	**Applicable –** Non-return valves are fitted on the fuel lines as required. Non return valves are fitted on the storage tanks to ensure pump prime and as a consequence the storage vessels shall operate	In place

• with monitoring, focus on those valves most at risk (such as rising stem control valves in continual operation) • applying rotating control valves or variable speed pumps instead of rising stem control valves • where toxic, carcinogenic or other hazardous substances are involved, fit diaphragm, bellows, or double walled valves • route relief valves back into the transfer or storage system or to a vapour treatment system.	independently of each other, and tank levels will not normalise. All valves are fit for purpose and are installed by a qualified contractor. All valves are routinely inspected as part of the operations inspections and during vendor maintenance.	
5.2.2.4 - Pumps and compressors		
BAT 62. The following are some of the main factors which constitute BAT: • proper fixing of the pump or compressor unit to its base-plate or frame • having connecting pipe forces within producers' recommendations • proper design of suction pipework to minimise hydraulic imbalance • alignment of shaft and casing within producers' recommendations • alignment of driver/pump or compressor coupling within producers' recommendations when fitted • correct level of balance of rotating parts • effective priming of pumps and compressors prior to start-up • operation of the pump and compressor within producers' recommended performance range (The optimum performance is achieved at its best efficiency point.) • the level of net positive suction head available should always be in excess of the pump or compressor • regular monitoring and maintenance of both rotating equipment and seal systems, combined with a repair or replacement programme.	**Applicable** – Fuel distribution pump, fuel sump pump, fuel polisher pump, fuel forwards pump and fuel intake pump. All pumps are installed by a qualified contractor and are commissioned and tested prior to use. Installation is in accordance with BAT where relevant. All pumps are registered on the Enterprise Asset Management (EAM) system to ensure that preventive maintenance is undertaken at a frequency in accordance with the manufacturer's advice.	In place

BAT 63. BAT is to use the correct selection of pump and seal types for the process application, preferably pumps that are technologically designed to be tight such as canned motor pumps, magnetically coupled pumps, pumps with multiple mechanical seals and a quench or buffer system, pumps with multiple mechanical seals and seals dry to the atmosphere, diaphragm pumps or bellow pumps. For more details see Sections 3.2.2.2, 3.2.4.1 and 4.2.9.	**Applicable** – All pumps have been sized, selected and purchased for their dedicated systems for the new facility where relevant, or will be re-sized when replacement is due.	In place
BAT 64. BAT for compressors transferring non-toxic gases is to apply gas lubricated mechanical seals.	**Not applicable** No transfer of gases.	N/A
BAT 65. BAT for compressors, transferring toxic gases is to apply double seals with a liquid or gas barrier and to purge the process side of the containment seal with an inert buffer gas.	**Not applicable** No transfer of gases.	N/A
BAT 66. In very high pressure services, BAT is to apply a triple tandem seal system.	**Not applicable** No transfer of gases.	N/A
5.2.2.5 Sampling connections		
BAT 67. BAT, for sample points for volatile products, is to apply a ram type sampling valve or a needle valve and a block valve. Where sampling lines require purging, BAT is to apply closed-loop sampling lines. See Section 4.2.9.14.	**Not applicable** – There will be no volatile products onsite.	N/A
5.3 Storage of solids		
5.3.1 Open storage		

BAT 68. BAT is to apply enclosed storage by using, for example, silos, bunkers, hoppers and containers, to eliminate the influence of wind and to prevent the formation of dust by wind as far as possible by primary measures. See Table 4.12 for these primary measures with cross-references to the relevant sections.	**Not applicable** – no bulk storage of solids.	N/A
BAT 69. BAT for open storage is to carry out regular or continuous visual inspections to see if dust emissions occur and to check if preventive measures are in good working order. Following the weather forecast by, e.g., using meteorological instruments on site, will help to identify when the moistening of heaps is necessary and will prevent unnecessary use of resources for moistening the open storage. See Section 4.3.3.1.	**Not applicable** – no bulk storage of solids.	N/A
BAT 70. BAT for long-term open storage are one, or a proper combination, of the following techniques: • moistening the surface using durable dust-binding substances, see Section 4.3.6.1 • covering the surface, e.g. with tarpaulins, see Section 4.3.4.4 • solidification of the surface, see Table 4.13 • grassing-over of the surface, see Table 4.13.	**Not applicable** – no bulk storage of solids.	N/A
BAT 71. BAT for short-term open storage are one, or a proper combination, of the following techniques: • moistening the surface using durable dust-binding substances, see Section 4.3.6.1 • moistening the surface with water, see Sections 4.3.6.1 • covering the surface, e.g. with tarpaulins, see Section 4.3.4.4.	**Not applicable** – no bulk storage of solids.	N/A

5.3.2 Enclosed storage		
BAT 72. BAT is to apply enclosed storage by using, for example, silos, bunkers, hoppers and containers. Where silos are not applicable, storage in sheds can be an alternative. This is, e.g. the case if apart from storage, the mixing of batches is needed.	**Not applicable** – no bulk storage of solids.	N/A
BAT 73. BAT for silos is to apply a proper design to provide stability and prevent the silo from collapsing. See Sections 4.3.4.1 and 4.3.4.5.	**Not applicable** – no bulk storage of solids.	N/A
BAT 74. BAT for sheds is to apply proper designed ventilation and filtering systems and to keep the doors closed. See Section 4.3.4.2.	**Not applicable** – no bulk storage of solids.	N/A
BAT 75 BAT is to apply dust abatement and a BAT associated emission level of 1 – 10 mg/m^3, depending on the nature/type of substance stored. The type of abatement technique has to be decided on a case-by-case basis. See Section 4.3.7.	**Not applicable** – no bulk storage of solids.	N/A
BAT 76. For a silo containing organic solids, BAT is to apply an explosion resistant silo (see Section 4.3.8.3), equipped with a relief valve that closes rapidly after the explosion to prevent oxygen entering the silo, as described in Section 4.3.8.4.	**Not applicable** – no bulk storage of solids.	N/A
5.3.4 Preventing incidents and (major) accidents		
BAT 77. BAT in preventing incidents and accidents is applying a safety management system as described in Section 4.1.7.1.	**Not applicable** – no bulk storage of solids.	N/A

5.4 Transfer and handling of solids		
5.4.1 General approaches to minimise dust from transfer and handling		
BAT 78. BAT is to prevent dust dispersion due to loading and unloading activities in the open air, by scheduling the transfer as much as possible when the wind speed is low. However, and taking into account the local situation, this type of measure cannot be generalised to the whole EU and to any situation irrespective of the possible high costs. See Section 4.4.3.1.	**Not applicable** – no bulk storage of solids.	N/A
BAT 79. When applying a mechanical shovel, BAT is to reduce the drop height and to choose the best position during discharging into a truck; see Section 4.4.3.4.	**Not applicable** – no bulk storage of solids.	N/A
BAT 80. BAT then is to adjust the speed of vehicles on-site to avoid or minimise dust being swirled up; see Section 4.4.3.5.2.	**Not applicable** – no bulk storage of solids.	N/A
BAT 81. BAT for roads that are used by trucks and cars only, is applying hard surfaces to the roads of, for example, concrete or asphalt, because these can be cleaned easily to avoid dust being swirled up by vehicles, see Section 4.4.3.5.3. However, applying hard surfaces to the roads is not justified when the roads are used just for big shovel vehicles or when a road is temporary.	**Not applicable** – no bulk storage of solids.	N/A
BAT 82. BAT is to clean roads that are fitted with hard surfaces according to Section 4.4.6.12.	**Not applicable** – no bulk storage of solids.	N/A
BAT 83.	**Not applicable** – no bulk storage of solids.	N/A

Cleaning of vehicle tyres is BAT. The frequency of cleaning and type of cleaning facility applied (see Section 4.4.6.13) has to be decided on a case-by-case basis.		
BAT 84. Where it neither compromises product quality, plant safety, nor water resources, BAT for loading/unloading drift sensitive, wettable products is to moisten the product as described in Sections 4.4.6.8, 4.4.6.9 and 4.3.6.1. Risk of freezing of the product, risk of slippery situations because of ice forming or wet product on the road and shortage of water are examples when this BAT might not be applicable.	**Not applicable** – no bulk storage of solids.	N/A
BAT 85. For loading/unloading activities, BAT is to minimise the speed of descent and the free fall height of the product; see Sections 4.4.5.6 and 4.4.5.7 respectively. Minimising the speed of descent can be achieved by the following techniques that are BAT: • installing baffles inside fill pipes • applying a loading head at the end of the pipe or tube to regulate the output speed • applying a cascade (e.g. cascade tube or hopper) • applying a minimum slope angle with, e.g. chutes.	**Not applicable** – no bulk storage of solids.	N/A
BAT 86. To minimise the free fall height of the product, the outlet of the discharger should reach down onto the bottom of the cargo space or onto the material already piled up. Loading techniques that can achieve this, and that are BAT, are: • height adjustable fill pipes • height adjustable fill tubes, and • height adjustable cascade tubes.	**Not applicable** – no bulk storage of solids.	N/A

These techniques are BAT, except when loading/unloading non drift sensitive products, for which the free fall height is not that critical.		
5.4.2 Considerations on transfer techniques		
BAT 87. For applying a grab, BAT is to follow the decision diagram as shown in Section 4.4.3.2 and to leave the grab in the hopper for a sufficient time after the material discharge.	**Not applicable** – no bulk storage of solids.	N/A
BAT 88. BAT for new grabs, is to apply grabs with the following properties (see Section 4.4.5.1): • geometric shape and optimal load capacity • the grab volume is always higher than the volume that is given by the grab curve • the surface is smooth to avoid material adhering, and • a good closure capacity during permanent operation.	**Not applicable** – no bulk storage of solids.	N/A
BAT 89. For all types of substances, BAT is to design conveyor to conveyor transfer chutes in such a way that spillage is reduced to a minimum. A modelling process is available to generate detail designs for new and existing transfer points. For more details see Section 4.4.5.5.	**Not applicable** – no bulk storage of solids.	N/A
BAT 90. For non or very slightly drift sensitive products (S5) and moderately drift sensitive, wettable products (S4), BAT is to apply an open belt conveyor and additionally, depending on the local circumstances, one or a proper combination of the following techniques: • lateral wind protection, see Section 4.4.6.1	**Not applicable** – no bulk storage of solids.	N/A

• spraying water and jet spraying at the transfer points, see Sections 4.4.6.8 and 4.4.6.9, and/or • belt cleaning, see Section 4.4.6.10.		
BAT 91. For highly drift sensitive products (S1 and S2) and moderately drift sensitive, not wettable products (S3) BAT for new situations, is to: apply closed conveyors, or types where the belt itself or a second belt locks the material (see Section 4.4.5.2), such as: • pneumatic conveyors • trough chain conveyors • screw conveyors • tube belt conveyor • loop belt conveyor • double belt conveyor or to apply enclosed conveyor belts without support pulleys (see Section 4.4.5.3), such as: • aerobelt conveyor • low friction conveyor • conveyor with diabolos. The type of conveyor depends on the substance to be transported and on the location and has to be decided on a case-by-case basis.	**Not applicable** – no bulk storage of solids.	N/A
BAT 92. For existing conventional conveyors, transporting highly drift sensitive products (S1 and S2) and moderately drift sensitive, not wettable products (S3), BAT is to apply housing; see Section 4.4.6.2. When applying an extraction system, BAT is to filter the outgoing air stream; see Section 4.4.6.4.	**Not applicable** – no bulk storage of solids.	N/A

BAT 93. To reduce energy consumption for conveyor belts (see Section 4.4.5.2), BAT is to apply: • a good conveyor design, including idlers and idler spacing • an accurate installation tolerance, and • a belt with low rolling resistance.	**Not applicable** – no bulk storage of solids.	N/A