C3.1.4 Waste Management, Storage and Handing

Maximum storage capacity for each category of waste:

FGD waste: residual product storage silo of 86 tonnes for 3 days. Waste in bulk containers will be stored until there will be enough for a consignment for shipment. Envisaged four weeks storage.

The container storage area is capable of accommodating a maximum of 60 by-product containers. If it is assumed that all 60 sealed containers were empty at the start of the period and 50 containers are full at the end of the 6 week period (assuming that each container can hold a maximum of 20 tons of by-product), then the site can store the equivalent of approximately 6 weeks' operation. Enemalta Corporation expects to place a request for the removal of by-product containers roughly every week, but this may also depend on mode of operation and also on the Contractor's offered removal proposal. The Contractor is to ensure that 20 empty containers are to be present on site to ensure continued and reliable operation of the power generation block.

Spent catalyst: will not be stored on site as it will be exported.

Seawater cooling: not applicable

Oil sludge: 2x40m^3 storage tanks

Boiler wash down sludge: 2 off 23m^3 boiler effluent & settling tanks + 2 off 2m^3 mobile sediment water evaporator basins. Boiler wash down sludge, total storage capacity 2 x 23m3 tanks i.e. 46m^3

Settling tanks are shown as ETB 31 & ETB 32 in Annex 30 – drawing 2970.D2.401.101, showing the sediment water evaporated basins 1 and 2. In drawing 2970.D2.402.101 shown effluent settling and storage tanks ETB 11 and ETB12 (23m^3 each). (Refer to Appendices J and K).

Storage sites:

	containment
FGD waste silo	no containment

Oil sludge	bunded together with FO & LO storage tanks: 35.5m x 18.5m x 0.8m
Boiler wash down sludge	Settling tanks directly above basins. Sludge contained within basins
Container storage area	No containment

FGD Waste

There are no storage locations in this drawing except for the waste silo. Waste containers will be stored in the container area. Please refer Annex 31 - drawing 2970.D2.011.001. showing the container storage area.

Bunding of waste silo:

Please refer to the following:

- Annex 32 - D100252-rev1
- Annex 33 - waste silo

Enemalta will contain the area under the waste silo with suitable side sheeting or panelling to contain any possible spillages within the unloading area and the cliff face. Appropriate shallow ramps (berms) will also be placed in the road at the Inlet and Exit from under the silo structure so as to limit any spill within such ramps. This will ensure that all 4 sides are bunded.

Oil Sludge

It is understood that these are labelled as GNL 51 & 52 on this drawing. Please refer Annex 34 – drawing 2970.D2.601.001.

Sedimentation tanks:

Sedimentation basins are steam heated and jacketed with oil filling between shells. Outer shell insulated and with aluminium cladding. They are located just below the settling tanks. See Annex 30 - Drawing 2970.D2.401.101, items ETB 31 & 32.

The two effluent settling and storage tanks are made of glass fiber reinforced phenacrylate (GRP) and are equipped with an air driven diaphragm mix pump and level transmitter for remote level indication and local level indication. For overflow protection the tanks are provided with a level switch connected to the DCS to raise an alarm.

For boiler washing only - these are shown as ETB 31 & ETB 32 in drawing no. 2970.D2.401.101 shown sediment water evaporated basins 1 and 2. In drawing 2970.D2.402.101 shown effluent settling and storage tanks ETB 11 and ETB12 (23m^3 each). (Annex 30 and Annex 35)

The GRP and settling tanks are the same referring to the effluent and storage tanks. Whereas basins refer to the sediment water evaporated basins.

The capacity of each tank is 2 x 2m^3 each. i.e. a total of 4m^3.

These are new tanks. Two mobile sediment water evaporated basins (4 0ETB31/32) are provided. The basins are equipped with steam coil placed in the bottom between the two shells and the space between is filled with oil. The outer shell is insulated and with an aluminum cladding. The steam to the basins are taken from the steam system.

Container storage area:

Container storage area is shown in drawing 2970.D2.011.001 as explained above (refer to Annex 31). This area contains the following:

UEK	SERVICE TANKFARM
UEM	FUEL OIL TREATMENT BUILDING
UGP	OILY WATER EFFLUENT PIT
UVJ	UREA HANDLING & DISSOLVING PLANT
UVE	STORAGE AREA FOR UREA & BICARBONATE
UEH	LOADING AREA LO & SLUDGE
UGX	BILGE WATER SHELTER
UYF	TRUCK WEIGHTING STATION
UQA	SEA WATER INTAKE BUILDING
UVX	UREA UNLOADING & HANDLING AREA

The container storage area caters for all the containers of Urea, SBC and FGD byporduct as well as the empty ones; which will be clearly demarked. UVE is the storage area for all filled and empty Urea, sodium bicarbonate and waste containers.

180 containers can be held in this area. These are 20 foot ISO containers can be stacked in this area. (9 columns by 4 rows by 5 containers high).

Please refer to Annex 36 - 2970.D2.621.001

Wash water treatment:

The wash water will be retained on site for re-use, in two GRP storage tanks, each with a capacity of 25 m^3. 50 m^3 of wash water will be used to clean the 8 boilers.

After boiler washing: neutralisation with NaOH and polymer (e.g. Organosulfid) dosing with which acts as a catalyst in the settling process that allows flocks of particles & heavy metals to be formed & settle.

NaOH chemical tank (4 0EUC30 BB010): Sodium hydroxide and polymer is added as for the normal boiler wash treatment where after the extended treatment begins. Please refer to MSDS Sodium_hydroxide_anhydrous - Annex 37.

TMT15 TMT15 chemical tank (4 0EUC50 BB010): Organosulfid e.g. TMT15 can separate heavy metal from the water phase. In order to establish the dosing of organosulfid in the extended treatment, water analysis must be carried out. Organosulfid is added by using the chemical dosing pumps. Please refer to document msds-engl TMT15 and data sheet. (Refer to Annex 38).

These chemicals will be stored in the existing bunded area reserved for chemicals as per exisitng Enemalta EMS policy.

Water analysis will be carried out 5 times per week minimum.

Extensive wash water cleaning prior disposal: when the wash water cannot be reused further it has to be treated prior disposal. The following treatments take place in the following sequence: NaOH neutralisation to pH 9, polymer treatment, $FeCl_3$ dosing for coagulation, polymer dosing at low concentration. Water is chemically tested for contaminants levels prior discharge.

$FeCl_3$ dosing $FeCl_3$ chemical tank (4 0EUC40 BB010): $FeCl_3$ is added for coagulation and is added by using the chemical dosing pumps. Please refer to document MSDS $FeCl_3$ PIX-111.pdf and data sheet. (Refer to Annex 39). Ferric chloride will be stored in the existing bunded area reserved for chemicals as per existing Enemalta EMS policy.

Polymer dosing Polymer mixing unit with a plastic tank (4 0EUC60 BB010): The polymer agitator is manually switched to high speed and the polymer dosing pump is manually activated. It is important that the polymer is dosed slowly in a low concentration. After dosing of polymer, the agitator is stopped and the flocks are allowed to settle for approximately 2-5 days. Please refer to MSDS Superfloc polymer A 1883RS (refer to Annex 40)

Wash water cleaning:

After settling for 2-5 days, the sediments are drained from the tank into the water evaporator container and dried.

The boiler wash water after extended treatment can be discharged to the water evaporator container for drying through a bottom side drain valve. Before discharge, the water phase may be circulated for approx. 1 hour through the soot particle filter. The last bit of water and the floating layer shall be directed to the water evaporator container for evaporation/drying. If the quality of the boiler wash water is too poor, disposal at DPS existing boiler wash containment area will be done. Therefore the waste water will not be mixed to any other effluent since it will be totally evaporated. Refer to original document Annex 41 - 2970.M0.K45.001.

Disposal of material in boiler wash containment area:

Any solid waste produced shall be transported to the existing boiler wash containment area where it shall be temporarily stored prior to final disposal to a cerified hazardous waste facility. Such disposal is periodically caried out.

Traffic:

A Traffic Impact Statement was conducted and is attached in Annex 42.

Regarding the transport of operational waste, the EIS stated that 'The 20ft containers will be shipped to waste treatment facilities abroad. The containers will be loaded on a ship berthed at the Delimara Power Station or will be loaded aboard from the Malta Freeport Terminals located opposite DPS' and that 'the worst case scenario being a slight increase in the road traffic from the Delimara station to Malta Freeport Terminal- no increase in road traffic should occur in the case that the transporting vessel be berthed directly at the Delimara station'.

The transport of waste was also a major concern identified in the social assessment in the EIS (Chapter 15) and during the public consultation phases of the EIA process, given that transport directly through Marsaxlokk may increase risks and impact on already heavily loaded roads.

Operational waste will be trasported to Freeport by land transport following the route identified in Annex 43 which does not traverse either Marsaxlokk or Birzebbugia residetial areas.

A Traffic Impact Statement (TIS) was carried out to assess any impacts caused by development traffic (Refer to Annex 42). The TIS considered a maximum of four 20-foot heavy vehicle containers per day. These containers will be sealed and ISO certified.

Meetings with the relevant Local Councils (Marsaxlokk and Birzebbugia) will be held to explain the proposed land route. Should consensus with the Local Councils not be achieved, alternative means of transportation will be explored further.

Specific comments regarding the traffic impact statement (TIS):

(a) Section 2.1: One of the peak hours was identified as 14:30 to 15:30. How was this concluded, given that no measurements in this time period were taken?

Please note amendment: this should read 16:00 – 17:00 as indicated in table 2.5: Single peak hour for all junctions.

(b) Section 2.1: One of the peak hours was identified as 08:00 to 09:00, however in Section 4, the time period considered is not consistent with this peak hour.

Please note amendments: this should read 07.15 – 08.15 as indicated in Tables 4.1 – 4.4.

(c) Please update the TIS with maps indicating the points A, B, C and D referred to in Tables 3.1 to 3.4 and Tables 4.1 to 4.4.

Please refer to Annex 44: Maps four junction_traffic count directions.

(d) The TIS does not indicate the proposed route for waste transfer. Kindly update.

Please refer to Annex 43: Proposed land route of development traffic.

(e) Section 3.1: On what basis was the 2% p.a. traffic growth projection made?

This is based on MEPA/ Transport Malta terms of reference for traffic impact studies.

(f) Section 3.3 (p. 28): How was the assumption of four heavy vehicles per hour made? Please include calculations regarding waste generation.

Operating at 0.7% S HFO at full load, the volume of waste per day is expected to be around 27.75m^3. This amounts to slightly less than 1.4 containers (20 foot size) per day, which are being considered as two. The other two containers will be transporting urea and sodium bicarbonate respectively to Delimara.

(g) The TIS does not include a reference to the risks arising from land transport of hazardous waste, or the types of waste proposed to be transported on land.

There are no risks arising from land transport of hazardous waste given that the containers will be sealed except in the eventuality of an accident, in which case appropriate equipment will be used to address the spillage of the hazardous powder. The containers transporting the hazardous waste will be ISO certified. It has to be noted that spillages of oil/petroleaum is considered more dangerous. The proposed route does not traverse any residential areas.

(h) Appendix 1 (referred to in Sections 4.1 and 4.2) was not submitted.

Noted. Refer to Annex 45 - Revised TIS: Appendix 1.

(i) Table 4.1 (p.30) Traffic Growth at Junction 2 Ghaxaq roundabout: In some routes (e.g. A-A, A-B), no traffic impact is identified. Kindly clarify.

During the period of analysis in which traffic counts were perfromed, either none (A-A) or very few vehicles (A-B) were noted. Therefore upon addition of the development traffic, no impact is envisaged.

(j) Table 4.1 – 4.4 (pp. 36 ff.): Are the 15-minute morning and afternoon slots chosen worst case scenarios? If not, please update with worst case scenarios.

Yes, these are the worst case scenarios.

(k) Table 4.1: How is the RFC for weekday morning greater without the development than with?

This resulted in view of the minimal difference between the without and with development scenario. Infact it is practically the same 1.08. One can refer to the Annex 45 - Revised TIS: Appendix 1, to see that the values that were inputed for the with development scenario are larger than the values of the without devopment scenario.

FGD Waste:

Minimising the risk of spillage during FGD waste transfer:

Waste from the FGD process will be transferred to the 20ft tank containers for shipment through a sealed system.. Hence handling of this waste takes place in a completely contained manner with little risk of spillages.

Please refer to Annex 46. Annex 46 is a pressure and Instrumentation schematic diagram and the rest refer to components in the process cycle.

The residual product storage silo system consists of the following functions;

- Inlet transport system
- Residual silo (4 0HTP50 BB010)

- Residual separator (4 0HTP70 AT010)
- Container loading bellow (4 0HTP80 F01)

The silo receives residual product from all four FGD filters by the residual transport vessels.

The silo is unloading via the residual separator.

The separator is via a loading bellow loaded to a container.

The loading bellow is operated locally by a control panel.

The transport system and silo system are controlled by the DCS system.

When a container is in place under the silo, the loading bellow can by operating the local control panel be lowered and connected to the container. From the panel the operator can start the loading sequence (a ready to load signal will be given and the loading sequence will start.

Residual silo - Air filter:

The air filter cleaning system is started and running during filling (pneumatic transport system is running).

The efficiency of the air filters for the residual silos:

Please see the attached: Annex 47 - img-110713124509-0001 and Annex 48 - 0913020Z_071.

These filters are required to filter displaced air both from the silo and during the loading cycle of the container.

Silo heating:

The silo is in the bottom furnished with an electrical heating element. The temperature is controlled by a temperature element.

The heating is disconnected when ever residual product is transferred to the silo or unloading to a container takes place.

Given that the residue is hygroscopic, the silo is heated so that moisture can not agglomerate the residue inside the hopper thus allowing the product to be free flowing.

Air Shock blasters:

There are provided three air shock blasters in the bottom of the silo will be started/stopped as a part of the loading sequence. The air will prevent packing of product in the bottom of the silo.

The three valves are operated in a interval with one open in 0.5 sec then closed for 120 sec. Then the sequence will be switching to the next valve with same interval, and then the third one with same interval.

The fluidising air systems equipment (air shock blasters) are small in nature and are housed within the compartment housing under the filter bag house tank. It is essentially composed of an air supply tank and a nozzle together with actuators. Please refer to Annex 24: D100196-rev1. It is not expected that these are a source of noise.

Residual product separator:

The residual separator is furnished with:

- High Level switch connected to the DCS system for indication and control. When a high level alarm is sounded the transfer is stopped automatically.
- Low Level switch connected to the DCS system for indication.
- Air filter for cleaning of excess air during filling.
- Outlet valve to the loading bellow (The loading bellow is a sealed system therefore there is not the possibility of emissions from the loading bellow).
- Return air line from container to silo.

When the level is high (4 0HTP070 CL110), the transport to the separator is stopped.

Residual separator - Air filter:

The air filter cleaning system is started and running during filling (pneumatic transport system is running).

Return air line from container:

The return air system to the silo will prevent over pressure to be created in the container and separator. Therefore prevent dust to develop during loading of the container.

Container loading bellow:

The loading bellow will be of the make MIX, type SCH300E3P1911B2AZ. Please refer to brochure document Waste silo Loading bellow (refer to Annex 49)

The loading bellow is operated via a local control panel:

When the bellow is in place on the container, start and stop of the loading sequence takes place from the local panel.

A level switch stops the loading sequence and prevents the container from being over filled.

The loading bellow is furnished with:

- "Bellow in up position" switch is connected to the DCS system for "Bellow in container position" switch connected to the DCS system for indication and control.
- Return air line from bellow/container to silo.

When the "Bellow in container position" switch is activated, the outlet valve from the separator is release for manual operation indication.

Tank containers:

These containers will be used to store the sodium bicarbonate waste. Please refer to a typical drawing of a tank container document number 6746-00 Conjunto General S03 (Annex 50). This drawing is for information purposes and is only indicative as these sealed containers shall be supplied by the waste carrying contractor and therfore other sealed designs may be utilised.

The sealed tank containers that will be employed for the transport of the by-product, shall have the following minimum specifications:

- Dimensions 20' length x 8' width x 8' 9" (2.67m) height.
- Approximate capacity 21,000 to 25,000 litres.
- The container may be attached to a chassis / trailer with the use of twist locks and may be handled using a Reach Stacker and so locking mechanisms for handling shall be standard.
- The container gross weight shall not exceed 32,350 kg when fully laden with residue.
- Containers must have three to four 450 mm hatches/manholes.
- The top hatches/manholes:
    1. are located above the centre line of the container
    2. have swing bolts or equivalent fasteners
    3. covers open to 180 degrees

The manhole serves a dual purpose, as a means of filling up the container by means of the loading bellow and as well as access for internal inspection of the container.

- All openings are designed and constructed to allow sealing.
- Expected by-product temperature range during loading: from a minimum temperature 15ºC to a maximum temperature 170ºC (during unloading). However, during normal operation, the expected by-product temperature is around 100ºC.
- Design Pressure: Atmospheric
- The tank container is designed to ensure that personnel can safely work on top of the container. i.e. guarantee a safe access to the top manholes by means of an access ladder and suitable walkway with an anti slip surface.

The actual number of empty tank containers for storage of sodium bicarbonate depends on the logistical train to be adopted by the waste carrier contractor. However it is intended that a minimum of 20 empty containers shall be on site. This will give Enemalta adequate buffer time for residue filling capacity.

The capacity of each tank container is between 20 – 25m^3.

Contigency Plans for waste storage:

In case the waste generated exceeds the maximum storage capacity (that is if waste is not able to be exported on time), the plant is switched to gasoil firing, which eliminates the production of waste.

The only off-site storage required is temporary which will be provided within the Delimara powerstation boundaries. It is anticipated that the maximum amount of waiting time at the Freeport will not exceed 2-3 days.