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Date: 05/06/2013

Permit: EPR/BK6483IU/V003

Dear Aled,

Further to our email correspondence, I have enclosed a letter explaining the new vacuum distillation installation and my reasoning for not including this unit within the EPR installation boundary. If you have any queries please do not hesitate to contact me.

Yours sincerely,

Keith Martin
Senior Engineer
Facilities and Environment

Enc:
Explanation of Vacuum Distillation Unit
Schematic Diagram of Vacuum Distillation Unit
Plan View of Vacuum Distillation Unit
Toyota Permitted Installation Map

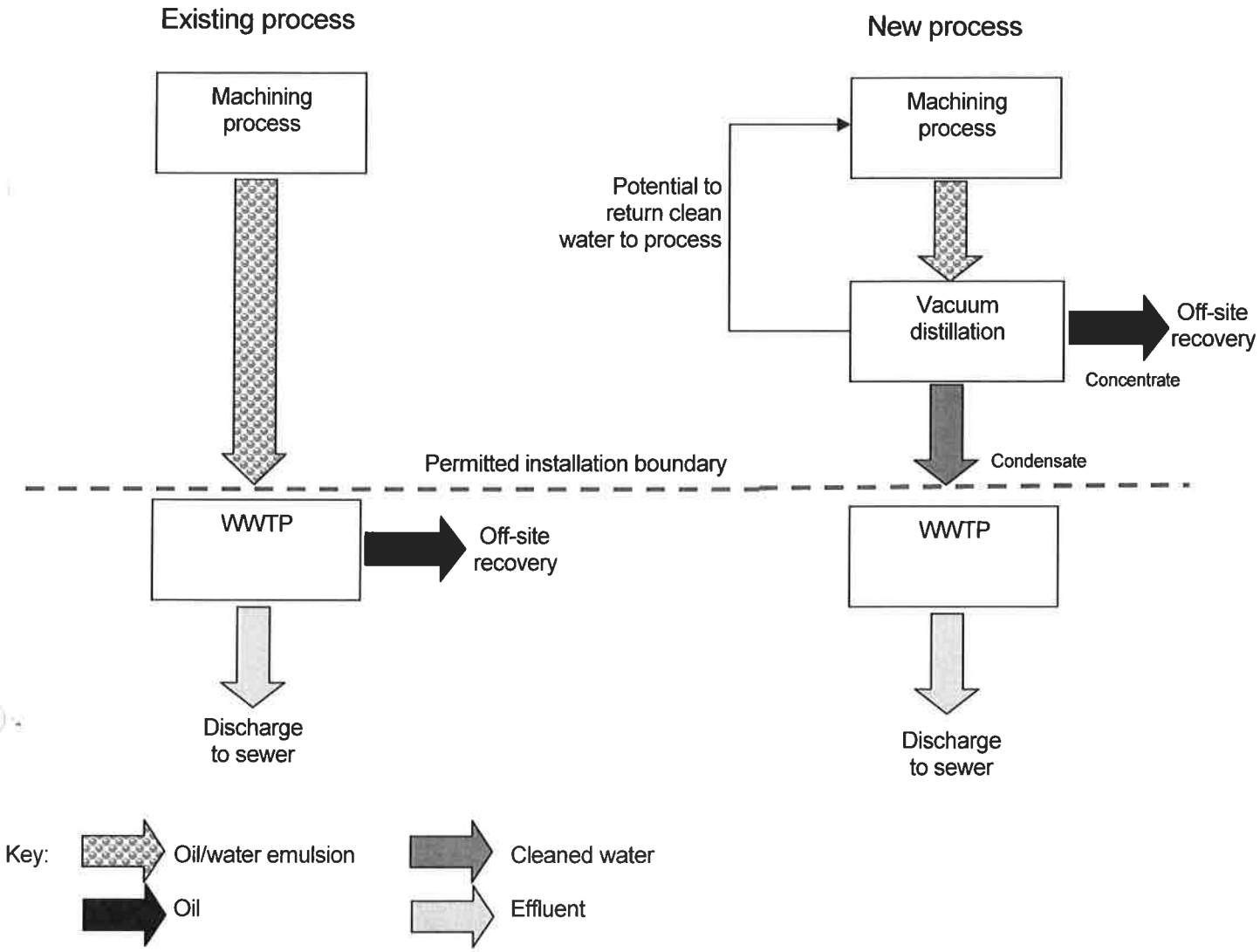
Explanation of Vacuum Distillation Unit

A vacuum distillation unit has been installed at the Deeside site to process coolant emulsion from the Machining process.

Currently, spent machine coolant is processed chemically in the Waste Water Treatment Plant (WWTP). The machining process is not permitted under the Environmental Permit Regulations. The WWTP is permitted due to its direct association with the permitted Casting plant. It is proposed that the vacuum distillation unit does not fall within the permit installation boundary on the basis that it serves the machining process.

The vacuum distillation unit will process the oil/water emulsion without chemical treatment, providing separated oil and water. This provides significant environmental advantages over WWTP, with a reduction in chemical use, improved recovered oil quality and cleaner waste water which reduces COD emissions in the effluent.

Flowchart of process:



Process Description:

Coolant from the machining process is transferred to the vacuum distillation unit by 1000l totes. From the tote it is pumped, through a solids filter and into a free oil separator. The separator is designed to remove any free oil from the emulsion using a difference in specific gravities to draw off the free oil into a dedicated tote. The free oil content is very minor, <1%, however it is important it is removed otherwise it will hinder the distillation process. The remaining emulsion is transferred by gravity to a 5000l holding tank which acts as a continuous supply to the vacuum distillation unit.

The vacuum distillation unit provides energy savings over normal distillation as it allows the water to boil at 85 deg. C. The unit initially fills with emulsion by a vacuum created by a compressor. Ambient air is then bled into the system and this

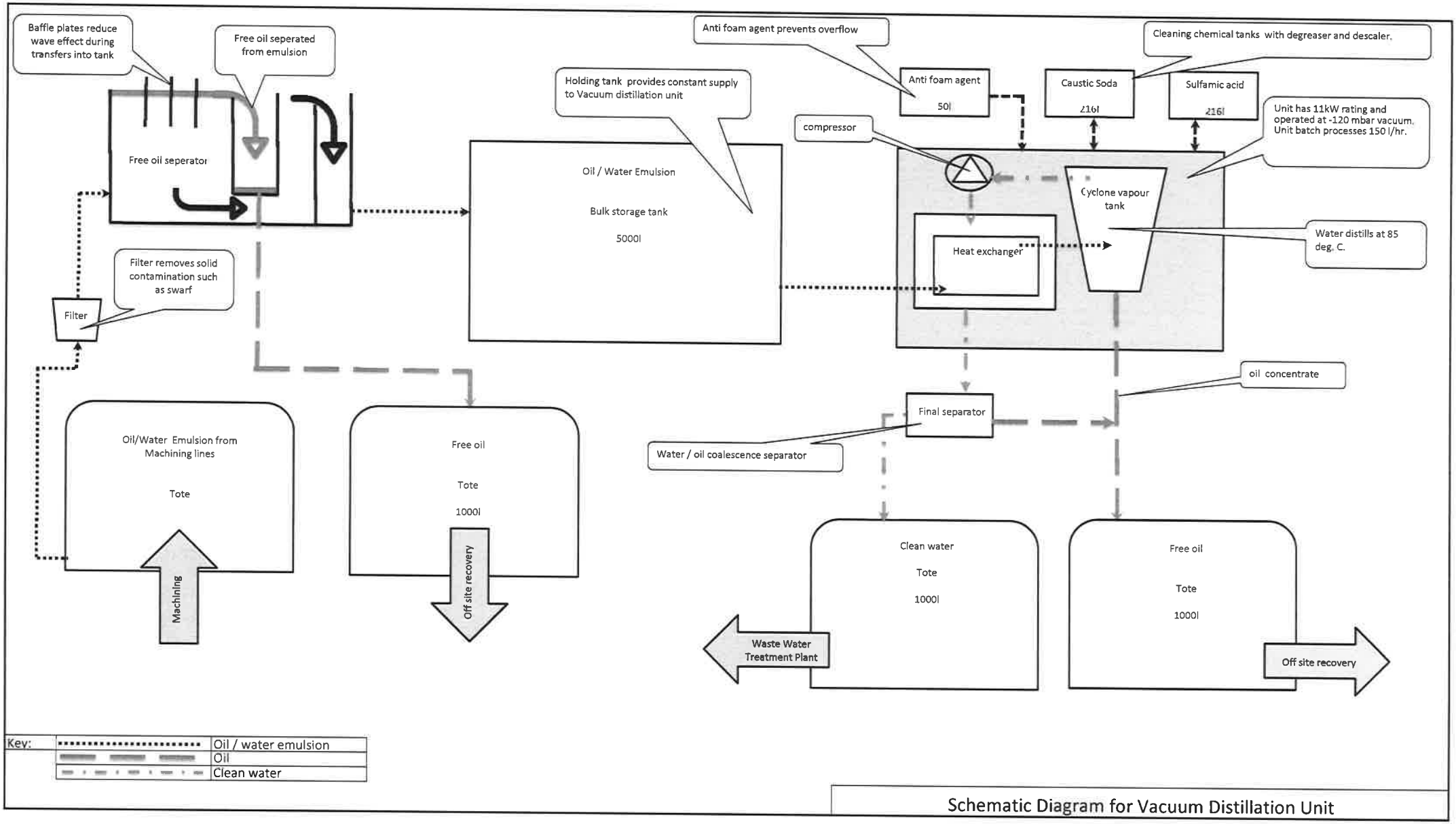
generates the initial heat. Once the operating temperature is reached, the air bleed is closed and the evaporation process starts. As water is distilled through the cyclone vessel, a demisting mesh and the addition of antifoam agent prevents emulsion carryover. The resulting water vapour is then recompressed by the compressor to atmospheric pressure. This increases the vapour heat to 120 deg. C prior to condensation via a shell and tube heat exchanger. During the condensation process the vapour heat is transferred through the heat exchanger to the emulsion, thereby continuing the evaporation process. A second, counter current heat exchanger, uses the remaining heat from the condensate water discharge to pre-heat the incoming emulsion. The oil concentrates in the bottom of the cyclone and is periodically discharged by compressed air. The circulation through the cyclone is achieved through natural convection. The unit automatically re-fills with the same volume discharged through self-monitoring. The unit can process 150 l/hr of emulsion.

The products from the process are oil concentrate and water condensate. Currently the water is disposed of through the WWTP as trade effluent, this is because it's quality and reliability require long term testing before the water can be re-used in the process, however, re-use as make–up water for the machining coolant will be investigated. The oil will be sent off site for recovery as a fuel oil.

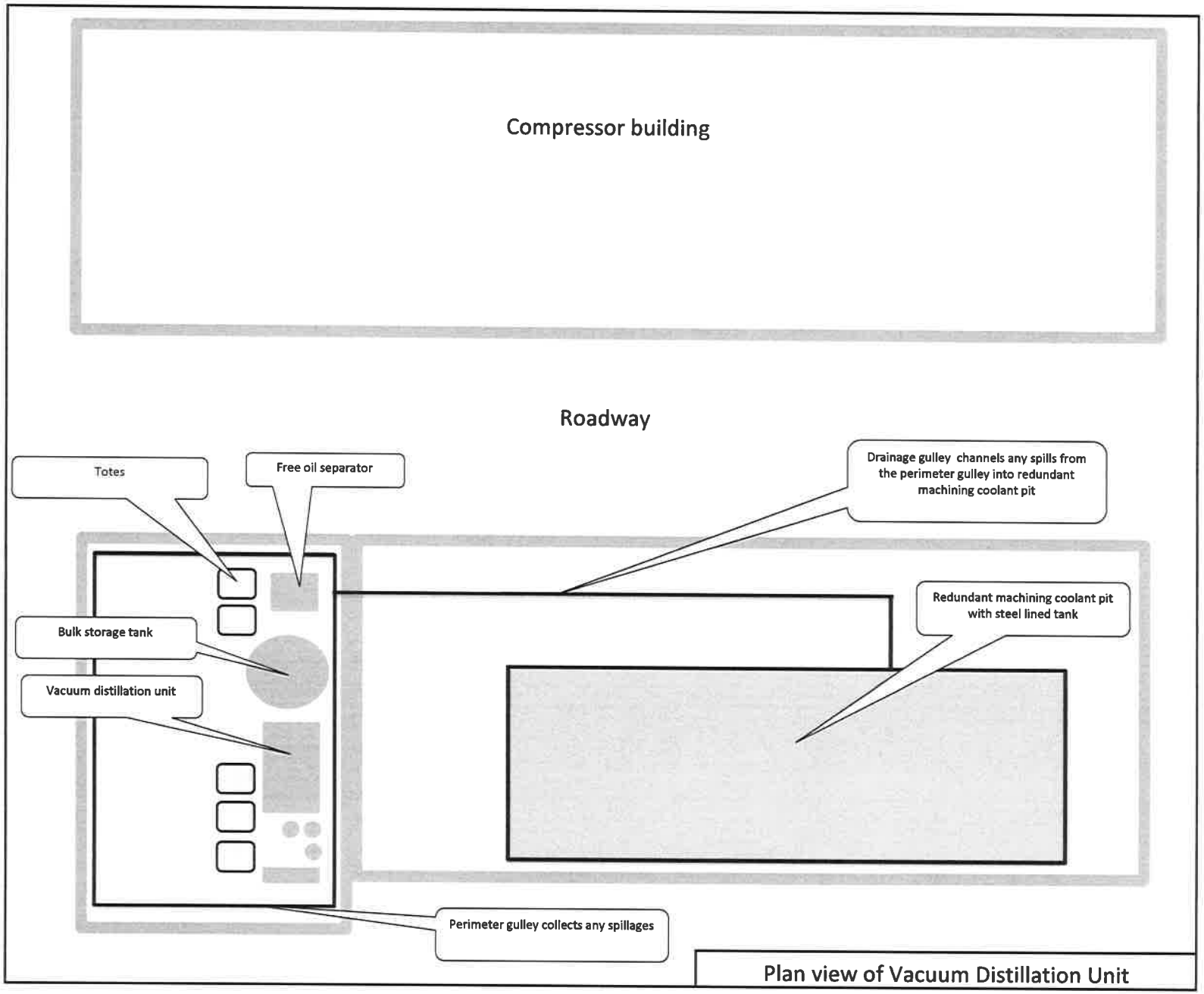
The vacuum distillation unit is self-cleaning due to its high flow rates and temperatures, however periodically a chemical clean is conducted using sulfamic acid to provide descaling and caustic soda to provide degreasing. The chemicals are stored in 216l tanks adjacent to the unit and can be re-used for 10 cleans. After the 10th clean the two chemicals are mixed together automatically to provide a neutral waste water.

The vacuum distillation unit is housed in an enclosed building which is served by a perimeter collection gulley for any spillages. To provide sufficient secondary containment capacity in the event of a major spill, the perimeter gulley is connected to a redundant machine coolant pit.

- Agree not in permitted installation.
- Points of risk - poll^{n} prev.
  1) Transfer of oil/water emulsion in 1 m^3 totes. - spill response + controls
  2) 2ndary containment + redundant pit.



Schematic Diagram for Vacuum Distillation Unit


Compressor building
Roadway
Totes
Free oil separator
Drainage gulley channels any spills from the perimeter gulley into redundant machining coolant pit
Redundant machining coolant pit with steel lined tank
Bulk storage tank
Vacuum distillation unit
Perimeter gulley collects any spillages
Plan view of Vacuum Distillation Unit