

BRADWELL SITE

DUAL KEY RELEASE AND PRE DISCHARGE ANALYSIS FED (A2 OT2)

BRAD/EN/REP/195

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## 1. Purpose

This document is in response to a request by the Environment Agency to provide an operating technique to meet condition 2.3 for the Bespoke FED Permit EPR/DP3127XB. The operating technique requires 'Details of the dual key system for discharge release and the analysis to meet limits before discharge'.

## 2. Details of Requirement

To ensure that FED effluent is suitable for discharge, a representative sample of the effluent in final monitoring delay tank 2 (FMDT 2) is taken for analysis. At the time that the sample is taken, the tank must be isolated to prevent addition of further effluent prior to the discharge taking place, to ensure the sample remains representative. The results of the analysis are then assessed to authorise discharge of the effluent to the Blackwater Estuary.

## 3. Effluent Monitoring and Final Discharge

### Overview:

Once there is a suitable volume of treated FED effluent within FMDT 2 the tank is recirculated to homogenise the content. The length of recirculation is dependent on the volume in the tank and the minimum recirculation time for any volume is specified in a written operating instruction. Following recirculation of the tank, a representative pre-discharge sample ('A' sample) is taken for analysis. The results of this analysis are then reviewed to determine whether the effluent is suitable for discharge.

A Castell key system is in place to control the filling, recirculation, sampling and discharge of FMDT2. This system has a number of functions: to ensure the effluent is recirculated prior to sampling to provide a representative sample; to prevent addition of further effluent to the tank whilst the sample is analysed and the results are reviewed; to allow discharge of the contents of the FMDT2.

### Castell Key Interlock:

During the 'fill' and 'recirculation' operations the T21 fill key is located in the control panel within the AET control kiosk. Following a minimum of 30 minutes recirculation, the T21 fill key can be released and taken to the sample valve to allow the sample to be taken. Whilst the T21 fill key is in use, the T22 discharge key is locked within the Castell key exchange box. Release of the T22 discharge key requires both the T21 fill key and the Castell key designated 'HP1' (considered the 'authorisation key') to be inserted and as such, ensures that no inadvertent discharge can take place. Once the pre-discharge sample ('A' sample) has been taken, the T21 fill key is removed from the sample valve and placed into the locked 'environment Castell Key Post Box' (or held under the control of the Shift Leader). This ensures that nothing further can be added to the tank. Under routine operational arrangements, once the sample has been taken and the T21 fill key has been

locked away (or controlled by the Shift Leader) it will not be released until the discharge is complete unless the discharge is rejected.

Once the sample has been analysed the verified results are input into the discharge certificate which, together with the laboratory results pack and the controlling quality plan, is passed to the Appointed Suitably Qualified and Experienced Person (ASQEP) for supervision of disposals of aqueous waste, to determine whether the tank contents are suitable for discharge to the environment. If the results meet the criteria set for all analytes the discharge will be authorised. The authorisation requires specification of suitable discharge times on the discharge certificate and signature of the ASQEP on both the discharge certificate and the quality plan. In addition to signing off the discharge, the ASQEP must retrieve the T21 fill key and the HP1 authorisation key from the 'environment Castell Key Post Box'. The T21 fill key and then HP1 authorisation key are placed into the Castell key exchange box in sequence and turned. This both releases the T22 discharge key and locks the T21 fill key into the Castell key exchange box continuing to prevent addition of effluent to the FMDT2 prior to discharge. The T22 discharge key is then handed to the Shift Leader who keeps it secure until the discharge time at which point it is inserted into the control panel to open the 'hard interlocked' discharge valve.

Following completion of the discharge, the discharge key is returned to the Castell key exchange box. Insertion of the T22 discharge key releases the other two keys (T21 fill key and HP1 authorisation key) and is itself then locked in position preventing any unauthorised discharge. The HP1 key is returned to the 'environment Castell Key Post Box' which prevents unauthorised release of the T22 discharge key, and the T21 fill key is issued back into the control of Operations to allow refilling of FMDT2.

All of the operations described above are documented within site instructions.

Note: If the T21 key is required to be temporarily released back to the plant and is not under the control of the Shift Leader, the original sample results may be used as the pre-discharge 'A' sample, however a Non routine BAT assessment will be required to be approved by an appointed Provider of Advice, following interrogation of the system to ensure no further effluent has been added to the tank.

**Pre-discharge analysis:**

Analysis of the pre-discharge sample is carried out to ensure the effluent is suitable for discharge, prior to authorising discharge to the environment.

The following analysis is carried out on all pre-discharge samples:

Parameter	Method of testing
Visible oil or grease	Visual inspection of the sample is required prior to completion of laboratory analysis. The instruction to carry out a visual inspection is specified within a written site instruction and is an activity within the controlling quality plan.
pH	The pH of the sample is measured using a benchtop pH meter in accordance with a written laboratory operating instruction.
Specified metals	<p>The specified metals are measured using an ICP-MS in accordance with written laboratory operating instructions.</p> <p>The use of surrogate methods, for example spectrophotometers, are currently being considered for pre-discharge analysis to facilitate operational requirements. In accordance with Technical Guidance Note M18, Monitoring of discharges to water and sewer, any alternative method will be subject to a full evaluation prior to being used (eg. Performance characteristics and matrix suitability) and will require issue of suitable operating instructions for use to include suitable QC procedures.</p> <p>For Mercury, an alternative method of assessment of suitability for discharge is being considered. Mercury is not included within the FED composition; it is added to the process either from the NOx scrubber liquor or the Caustic Soda. It is therefore proposed to measure the Mercury concentration in the source materials and then confirm that the concentration is below the discharge limit. A suitable instruction to demonstrate this process will be produced.</p>
Nitrate as N	The concentration of Nitrate as Nitrogen is measured using a spectrophotometer in accordance with a written laboratory operating instruction.

In addition to the above the following analysis is carried out to ensure compliance with Radioactive Substances Regulations Environmental Permit EPR/ZP3493SQ:

- Gross beta using liquid scintillation counting
- Caesium-137, Cobalt-60 and Americium-241 using gamma spectrometry
- Turbidity using benchtop turbidity meter
- Total organic carbon using a portable total organic carbon analyser

All of the verified results obtained are reviewed, by an ASQEP against the limits specified within the site instruction for the management of liquid radioactive waste.