Technical Note

To:	Kieran Murphy, Irving Oil	**From:**	Douglas Adamson
Ref:	306-21P0516 R0	**FBS:**	306:07.02.05
Subject:	EPA inspection findings re. bund testing	**Date:**	11 May 2021

1 EPA Inspection Findings

Following a recent EPA remote site inspection, the EPA issued its report which included the following actions in relation to Condition 6.8:

1. Bund all IBCs and other such storage vessels containing liquid materials (other than water).
2. Carry out all future bund testing in accordance with the principles of the BS 8007standard, and not the CIRIA standard, using a suitably sized reference vessel, as outlined in the *EPA Guidance Note on Storage and Transfer of Materials for Scheduled Activities*…

   …If a seven day test on a reinforced concrete bund cannot be carried out, as per the guidance, then the reasons for this must be justified in any associated bund test reports.
3. Where the concrete areas used to store IBCs are considered to be remote bunds, outline the integrity testing, maintenance and management procedures associated with these areas.

We understand that the EPA has requested IO to respond to these actions by 14 May 2021; we provide our comments on each item in the following sections.

2 Item (1) Bund all IBCs

BÓC has carried out the bund inspections (and hydrostatic tests, where appropriate) at the site since 2012, which have included inspections of the process and utility areas where IBCs and drums may be stored. In general, we have found that IBCs and drums are either stored in designated storage areas provided with local retention, such as the chemical stores (area / bund 33), or are provided with individual / portable bunds (local retention).

Byrne Ó Cléirigh, 30a Westland Square, Pearse Street, Dublin 2, D02 PN76, Ireland.
Telephone: + 353 – 1 – **6770733**. Facsimile: + 353 – 1 – **6770729**. Email: **Admin@boc.ie**. Web: **www.boc.ie**

3 Item (2) Test Method

3.1 Background

The protocol for the inspection and testing of bunds, which we developed in 2012 and have since applied when carrying out the visual inspections and hydrostatic tests, was based on the overall content of the EPA's guidance. Following its review of previous hydrostatic test results, the EPA requested that the hydrostatic test method be revised to increase the duration of the test to 24-hours, and subsequent testing has been carried accordingly.

3.2 BS 8007 Test Method

The following is a summary of our understanding of the EPA's guidance as it relates to hydrostatic testing and BS 8007.

1. Section 1 of the EPA's guidance (2004) states:

   > *The techniques identified in this guidance note are considered to be the current best practice, at the time of writing, and are representative of a wide range of currently employed technologies appropriate to particular circumstances. This document does not however replace the need to carry out site-specific assessments / investigations prior to determining the appropriate type of containment / retention facilities. Additionally, the guidance issued in this note in respect of the use of any technology, technique or standard does not preclude the use of any other similar technology, technique or standard which may achieve an equivalent level of environmental protection.*

   In our opinion, it is evident that the EPA's guidance was not intended to be prescriptive or limited to the application of specific methods, techniques, standards, codes of practice or guidance. The EPA's guidance also acknowledged that it represented *current best practice* (in 2004), with the implication that good practice, and the underlying standards, codes of practice and guidance, may change over time.

2. The standard BS 8007 *Code of Practice for Design of concrete structures for retaining aqueous liquids* (1987) was superseded by BS EN 1992-3:2006 (Eurocode 2). In the UK, a National Annex to Eurocode 2 was published in 2006, which included the following:

   > *NA.4 References to non-contradictory complementary information*
   >
   > *BS EN 1992-3 is concerned with the structural aspects of containment structures. Guidance on the design of non-structural features in such structures, and on inspection and testing, can be found in BS 8007 and this may be used where it does not conflict with the requirements of BS EN 1992.*
   >
   > *NOTE When all necessary non-contradictory complementary information has been published, BS 8007 will be withdrawn.*
   >
   > *CIRIA Report C660 Early-age thermal crack control in concrete provides further complementary guidance on the control of early thermal cracking.*

   BS 8007 was ultimately withdrawn in March 2010 and, in the absence of an equivalent part in BS EN 1992-3 (or other Eurocode) setting out the requirements for hydrostatic testing, there is no longer a British Standard (or European standard) for conducting such tests.

We acknowledge that the approach set out in BS 8007 *may* be a useful reference in the absence of any other standard or guidance on the design and hydrostatic testing of structures for retaining aqueous liquids. However, we consider that it is reasonable to take into account the *status* of a standard, code of practice, or other guidance when identifying / selecting the appropriate one to apply, and that the application of *current good practice* may supersede older standards and guidance that has since been replaced.

3. Section 6.3.1 of the EPA's guidance identifies design standards for bunds and containment systems, and it recognises CIRIA 164 *Design of containment systems for the prevention of water pollution from industrial accidents* as one such standard.

   In 2014, CIRIA 164 was superseded by CIRIA 736 *Containment systems for the prevention of pollution*. In our opinion, it is reasonable to expect that the intention of the EPA's guidance was to recognise the current versions of standards, codes of practice, and guidance that it referenced. Therefore, we expect that CIRIA 736 is recognised as current good practice, rather than CIRIA 164.

4. CIRIA 736 provides guidance on testing containment structures, including guidance on hydrostatic tests. Therefore, as this guidance is *relevant* (it describes hydrostatic tests), *current* (it has not been withdrawn), and, in our opinion, *recognised* in the EPA's guidance, it is reasonable to consider that (1) it can be applied for testing bunds, and (2) that it is consistent with the EPA's guidance (see comment (1)).

5. Section 6.6.2 of the EPA's guidance sets out the procedure for determining the most appropriate course of action to establish and confirm the integrity of bunds:

   > *The first distinction that needs to be made regarding each bund is whether the structure is a newly constructed bund or a bund that has been in service for some time.*
   >
   > *All newly constructed bunds must be tested in accordance with the testing requirements specified in the codes and standards to which the bund has been designed…*
   >
   > *…In the case of bunds that have been in service for some time, a number of factors must be considered before deciding the most appropriate course of action in assessing the integrity and water tightness of each individual structure. Consideration of the following factors should determine whether or not a physical test, such as a hydrostatic test, should be conducted on the structure…*

   In our opinion, this part of the EPA's guidance recognises that the test method for *existing* bunds should be determined on a case-by-case basis. It also indicates that it was not the intention of the guidance for *only* the hydrostatic test method in BS 8007 to be applied to *existing* bunds[1].

[1] The guidance requires new bunds to be tested in accordance with the testing requirements specified in the codes and standards to which the bund was designed. However, new bunds can no longer be designed to the withdrawn standard BS 8007, and the replacement standard for the design of such structures (EN 1992-3) does not specify a hydrostatic test. Therefore, in our opinion, a new bund could be designed, constructed, and brought into service without a hydrostatic test while still satisfying the Section 6.6.2 of the EPA's guidance.

6. Section 6.6.3 of the EPA's guidance states the following in relation to test methods:

> *Where a bund has been deemed safe and practicable to test, a prescribed test method shall be used which shall be appropriate to the nature of the containment situation and the materials of construction of the bund. In all cases, the test procedure should be specified, supervised and reported on by a suitably qualified person.*

   This section of the guidance does not stipulate that the method set out in BS 8007 is the *only* method that can be applied for hydrostatic tests; rather, it requires that an appropriate test method be applied.

7. Section 6.6.3.1 of the EPA's guidance states the following in relation to BS 8007 and the design of a hydrostatic test:

> *It should be understood that BS 8007 is a code of practice for the design of aqueous retaining concrete structures and as such the procedure described strictly only applies to newly constructed tanks/bunds. In the case of existing / established bunds, the supervising engineer shall determine the most appropriate methodology and tolerances for deciding on whether a bund is deemed to be of adequate integrity and water tightness following the test. Based on the principles of BS 8007, the licensee's appointed engineer should specify the following test parameters:*
>
> - *The required fill rate (usually not greater than 1.5 m in 24 hours).*
> - *The required stabilisation period.*
> - *The duration of the test.*
> - *The total permissible drop in water level for the given bund situation.*

   This section of the guidance refers to the *principles* of BS 8007 (as referenced in the EPA inspection report), although neither the EPA's guidance nor the standard itself set out any specific *principles*. In referred to the *principles* of BS 8007, the EPA's guidance requires to that the fill rate, the stabilisation period, the duration, and the permissible drop in water level are specified on a case-by-case basis. As these parameters are specified in the test protocol, and the CIRIA guidance, we consider that the test method satisfies the EPA's guidance.

Overall, in our opinion, the EPA's current, 2004 guidance does not *require* a bund to be hydrostatically tested, either to BS 8007 or, if it is not necessary, not practicable or not safe to do so, at all. In our opinion, it is clear from the EPA's guidance that it is not prescriptive either in the design standard for a bund, or the test method for a bund, provided that they represent current good practice. As CIRIA 736 is one of the most recent and comprehensive publications on *containment system for the prevention of pollution*, we consider that it represents current good practice.

The basis for the required action under the EPA inspection report to *carry out all future bund testing in accordance with the principles of the BS 8007standard, and not the CIRIA standard's request to conduct* is not evident to us. We are not aware of the EPA's guidance, or parts of its guidance, being withdrawn. Similarly, we are not aware of any changes or updates to the EPA's guidance, such that the test method under BS 8007 is now the *only* acceptable method of hydrostatic testing.

If the EPA maintains that hydrostatic testing should *only* be carried out to BS 8007, and that any guidance from standards, codes of practice, and industry guidance referenced / cited in the EPA guidance[2], should be discounted or disregarded, it would be both prudent and helpful to obtain written confirmation.

3.3 Practicality & Safety of Testing

The *Protocol for Inspection & Testing of Bunds at Irving Oil Whitegate Refinery, Co. Cork* (306-X0036 Rev 1) sets out the method for demonstrating compliance with Condition 6.8 of the IE licence.

In accordance with Section 6.6.2 of the EPA's guidance, the protocol considers whether it is necessary, safe, and practicable to conduct a hydrostatic test, noting that integrity testing (a hydrostatic test) should be conducted where it is both safe and practical to do so. However, given the nature of the site and the individual bunds, it may not be safe or practical to conduct a test in certain cases, with a non-exhaustive list of potential safety and practical limitations.

The corresponding bund inspection reports include a section stating (1) whether a hydrostatic test was conducted and, if not (2) a summary of the basis for not conducting such a test. In such cases, we consider that it is reasonable to interpret the bund test report and the underlying protocol together, without the need to include all the details in the report.

Nonetheless, in light of the EPA's comment, we propose to include additional detail in future bund test reports regarding the particular constraints relating to safe or practical hydrostatic testing.

4 Item (3) Remote Bunds

As we noted under our comments on Item (1) (Section 2), in general, we have found that IBCs and drums are either stored in designated storage areas provided with local retention, such as the chemical stores (area / bund 33), or are provided with individual / portable bunds (local containment).

* * * * *

[2] Either specifically related to hydrostatic testing or to secondary containment in general.