Schedule 5 request for more information EPR/XP3830UR/V007 (PAN-019159)

Project Augerre permit variation application.

Issued: 19/05/2023

Response deadline: 23/06/2023

Assessment of the suitability of the containment and drainage systems for new silos

Failure likelihood and potential scenario

Important to the discussion around containment of the silos at the site is consideration of what a failure would look like and what is considered to be an event that could occur.

Each of the silos is on a maintenance schedule of non-destructive testing (NDT) which is carried out by a third party on our behalf. These checks on the condition of the silos are done on a routine basis as part of the plant's shutdowns.

Our milk and whey silos are subject to a maintenance and assessment program and have been inspected in such a way on a regular basis for many years. The objective of this testing is to pick up on any small cracks that may occur and then observe and repair these as part of a maintenance contract. This crack testing also serves to ensure there are no cracks ongoing that could harbour microbes from a food safety perspective. This gives some indication as to the early stages of crack development that would be being identified i.e. much earlier than structural issues.

We have consulted with our inspection company to give an independent view on the likelihood of a total failure and they have fed back in line with our historic view that given the design of the silos are not subjected to extreme pressures which would result in total failure and that the third party risk from an accidental strike from a vehicle is reduced by the location of the silos on plinths and the site speed limit of 10mph, that the likelihood of catastrophic failure is negligible (please see attached appendix 1, Independent Integrity Inspection Limited letter).

As part of this assessment, we therefore move to assess what is the more likely scenario the site would be faced with.

It is not considered that the pipework itself, given it is made from high quality stainless steel would rupture during operation and the site has no history of this having occurred. It is our consideration that the more likely scenario would be a failure of a pipe connection point or valve on the silo base that would then allow for milk or whey to either leak out of (most likely) or to spray out (less likely) to the surrounding hardstanding.

The site around the silos and yard area is made up of hardstanding and it is our consideration that were we to experience such a failure on the pipework connections that the material lost would spill out onto the hardstanding and make it way to the site drains where it would then travel to the Effluent Treatment Plant (the ETP balance tank has a capacity of 1,800,000 litres and the ETP divert tank has a capacity of 1,800,000 litres) and be captured in the treatment process.

In order to carry out an exercise to assess this the site has carried out simulation tests of "losing liquid" to ground. We are fortunate to have on site the ability to empty full tankers of water to the yard in order to simulate such a large loss of volume. It is considered that the emptying of a tanker from its valve suitably simulates the flow that were to be lost should the site experience a failure of a pipe connection or valve.

As such two exercises have been carried out, one at the new whey silo location and another at the new milk silo location.

Travel distances

Whey Silos

Material leaving the whey silos has been observed through simulation from on-site tankers to flow from the silo platform area down the roadway and towards the drain located in the centre of the roadway near to the GDL office block (see photo 4).

Photo 1 – tanker being emptied to ground at the new whey silo location. Valve opened and water permitted to flow freely.

Photo 2 – tanker being emptied to ground at the new whey silo location. Valve opened and water permitted to flow freely.

Photo 3 – Route of any flow from the whey silo location. Note direction down roadway and towards the drains.

Photo 4 – Route of any flow from the whey silo location. Note direction down roadway and towards the drains.

Material was not observed to flow towards the main gate given the gradient of the roadway in this direction.

The distance between the silo location and the drain that would typically take the runoff material is 35m away.

Milk Silos

Material leaving the milk silos area has been observed through simulation from on-site tankers to primarily flow from the silo platform area back towards the milk intake area of the site (inwards) and to drains located in that area. A smaller proportion of the material was observed to run across the yard area and towards the drain near to side gate.

Photo 5 – tanker being emptied to ground at the new milk silo location. Valve opened and water permitted to flow freely.

Photo 6– tanker being emptied to ground at the new milk silo location. Valve opened and water permitted to flow freely.

Photo 7 – main water flow towards the milk intake area and drains.

Photo 8 – main water flow towards the milk intake area and drains.

Photo 9 – main water flow towards the milk intake area and drains.

Photo 10 – main water flow towards the milk intake area and drains.

Photo 11 – proportion of flow towards the side gate drain.

Photo 12 – proportion of flow towards the side gate drain.

Photo 13 – proportion of flow towards the side gate drain. Small volume exceeded drain gully and flowed to gateway.

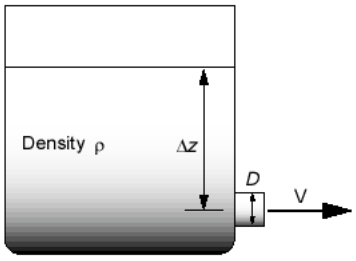
Photo 14 – proportion of flow towards the side gate drain. Small volume exceeded drain gully and flowed to gateway.

The distance between the milk silo location and the drain that would typically take the runoff material is 8m away

The distance between the milk silo location and the side gate drain is approx. 20m.

Maximum flow rate of each of the substances

In order to calculate the flow rates of the substances exiting the "spout" of the vessels we have used a calculator tool to use the Bernoulli equation. https://www.efunda.com/formulae/fluids/draining_tank.cfm#calc



Whey

Using the example of a pipe connection (100mm) failure at the outlet of the silo the max volume flowrate is calculated to be 105 l/s. Whey assumed density of 1.0025kg/l.

This is the worst-case scenario. The silos are often not completely full. As a comparison, please see below for a ½ filled silo.

Using the example of a pipe connection (100mm) failure at the outlet of the silo the max volume flowrate of a half-filled silo is calculated to be 74.3 l/s. Whey assumed density of 1.0025kg/l.

Milk

Using the example of a pipe connection (100mm) failure at the outlet of the silo the max volume flowrate is calculated to be 143 l/s. Milk assumed density of 1.035kg/l.

This is the worst-case scenario. The silos are often not completely full. As a comparison, please see below for a ½ filled silo.

Using the example of a pipe connection (100mm) failure at the outlet of the silo the max volume flowrate of a half-filled silo is calculated to be 101 l/s. Milk assumed density of 1.035kg/l.

Ability of the drainage to prevent the discharge of a substance from leaving the site boundary.

In the case of the whey silos liquid would flow down towards the GDL office area. If the drain there was to unforeseeably become overcome we would observe the area of the yard by the GDL offices and milk intake area take the volume until the drain began to then drain the area away. It is considered that there would be no risk that the material would leave the site boundary. The nearest location to the whey silos to do so would be the main entrance location.

In the case of the milk silos liquid would flow down from the silo platform area back towards the milk intake area of the site (inwards) and to drains located in that area. A smaller proportion of the material was observed to run across the yard area and towards the drain near to side gate.

It is considered that there would be a small proportion of the milk that would potentially leave the site perimeter. As such, in response to these findings the site has engaged with a civils contractor to explore options for this location including increased drain size at this location and / or some form of catchment bund.

The possibility for any substances to reach the Merlin's Brook in the event of failure of the new silos

The site drainage system has two main systems, a surface water system and an effluent drain system.

Under normal operation the site defaults to direct both drainage systems to the Effluent Treatment Plant. This is done by means of a valve set located in the engineering block buildings.

In the case therefore that a substance (milk / whey) was released from bulk storage and did make its way to a surface water drain, this substance would be directed to the Effluent Treatment Plant and not to the Brook. This arrangement is maintained in place as an additional control measure to minimise the risk to the Brook.

Dye testing has been carried out of the surface water drainage system to demonstrate that the water flowing into these drains does flow to the Effluent Treatment Plant. This exercise was witnessed by Welsh Water at the time of the test (May 2023).

Impacts of rainfall

It is acknowledged that heavy rainfall would impact upon the site drainage system with increased liquid flowing through the system as a result.

It should be noted that under observation during heavy rainfall periods, the site drainage system is observed to cope with the flow with no flooding or pooling observed in areas around the yards. The exception to this statement is the sunken pedestrian pathway that leads from the yard area to the main building entrance, next to the offices. This is seen to flood for periods when there is heavy rainfall due to the relatively small drain situated on this pedestrian pathway. This location is central to the site boundary and is not considered a risk from an environmental perspective.

Appendices

Appendix 1

First Milk Limited
Pembroke Road
Haverfordwest
SA61 1JN

29th May 2023

To whom it may concern

I have been asked for my opinion on the likelihood of one of the raw milk or whey silos located at Haverfordwest having a catastrophic failure occurring resulting in the contents emptying suddenly.

My career in Non-Destructive Testing (NDT) has exceeded over thirty years with the majority of the inspection being carried out within the food and beverage industry.

The raw milk and whey silos have always had a very good maintenance and assessment program and have been inspected by Independent Integrity Inspection Limited for over twenty years. As with all vessels, the occasional small crack will occur but will routinely be observed and repaired as part of the maintenance contract.

The location and design of the silos are not subjected to extreme pressures which would result in a total failure.

The third-party risk from an accidental strike from a vehicle is reduced by the location of the silos on plinths and safety barriers.

I would say that the likelihood of catastrophic failure is very low and therefore the silos are low risk, and not requiring a bund.

If you require any further information, please do not hesitate to contact me.

Yours sincerely

James Bayliss
Operations Manager

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