

	<h1>Drinking Water Audit Report</h1>
---	--------------------------------------

County:	Clare County	Date of Audit:	07/08/2014
Plant(s) visited:	Ennistymon PWS 0300PUB1004	Date of issue of Audit Report:	08/09/2014
		File Reference:	DW2014/277
		Auditors:	Mr Niall Dunne
Audit Criteria:	<ul style="list-style-type: none"> • <i>The European Union (Drinking Water) Regulations 2014 (S.I. 122 of 2014).</i> • <i>The EPA Handbook on the Implementation of the Regulations for Water Services Authorities for Public Water Supplies (ISBN: 978-1-84095-349-7)</i> • <i>The recommendations specified in the EPA Report on <u>The Provision and Quality of Drinking Water in Ireland.</u></i> • <i>The recommendations in any previous audit reports.</i> 		

MAIN FINDINGS

- i. **The turbidity and the chlorine monitors are not connected to dial out alarms or to a recording device / SCADA. This matter must be addressed as an urgent priority to ensure that any deviation for acceptable limits are quickly alerted to and acted on by the caretaker.**
- ii. **At the time of the audit the turbidity reading on the final water was 0.7 NTU and on one filter was 4.16 NTU. Irish water must ensure that turbidity levels after each filter and on the final water do not exceed 0.5 NTU.**
- iii. **This plant is operating at approximately 55% above its design capacity. Irish Water must ensure that measures are put in place to ensure that the plant is operated within its design capacity at all times.**

1. INTRODUCTION

Under the *European Union (Drinking Water) Regulations 2014* the Environmental Protection Agency is the supervisory authority in relation to Irish Water and its role in the provision of public water supplies. This audit was carried out in response to the notification by Irish Water dated 25/07/2014 of the failure to meet the E.coli parametric value (as specified in Table A of Part 1 of the Schedule of the Regulations) in the Ennistymon RWS. Where the text refers to the Water Service Authority this refers to Irish Water in accordance with Section 7 of the Water Services (No. 2) Act 2013.

Photographs taken by Niall Dunne during the audit are attached to this report and are referred to in the text where relevant.

The Ennistymon plant serves a population of approximately 14,000 and supplies approximately 6,000 m³/day. Treatment at the plant consist of coagulation, clarification, (with lamella plates), 3 no. rapid gravity filters, pH correction and fluoridation.

The opening meeting commenced at 10:45 am at the Ennistymon plant. The scope and purpose of the audit were outlined at the opening meeting. The audit process consisted of interviews with staff, review of records and observations made during an inspection of the treatment plant. The audits observations and recommendations are listed in Section 2 and 4 of this report. The following were in attendance during the audit.

Representing Irish Water: (* indicates that person was also present for the closing meeting)

Conor Foley - IW Above Ground Water Lead*;
 Kevin Murphy - IW Water Engineer*;
 Caimin Dillon - CCC Water Engineer*
 Martin O Looney - CCC Technician*.

Representing the Environmental Protection Agency:

Niall Dunne – Inspector.

2. AUDIT OBSERVATIONS

The audit process is a random sample on a particular day of a facility's operation. Where an observation or recommendation against a particular issue has not been reported, this should not be construed to mean that this issue is fully addressed.

1.	<p>Source Protection</p> <ul style="list-style-type: none"> a. The source for this supply is Lickeen lake, the surrounding land use is mainly forestry and low intensity farming. Clare County Council (CCC) stated that they are not notified of any forestry activities, as the forest is not yet fully mature. b. The Crypto risk score for this supply, according to CCC is low risk; and the quality of the raw water is good, but that there is issues with alkalinity. c. The reading on the raw water turbidity monitor was observed to be 2.51 NTU. d. The CCC confirmed that farm surveys were carried out in 2007.
2.	<p>Coagulation, Flocculation and Clarification</p> <ul style="list-style-type: none"> a. According to CCC the plant was designed for 4,800 m³/day and is currently producing 6,000 - 7,500 m³/day. Flow through the plant is set at 300 m³/hr. b. The ferric dosing point chamber was observed to be full of water; (see photograph 1), ferric is dosed flow proportionally. Poly is dosed at approximately 0.17 mg/l; the dose is manually set. c. CCC were not aware of the contact time within the mixing chamber; but stated that there were baffles within the chamber to assist with mixing of the poly and the coagulant. d. Lime is dosed automatically based on pH. e. The walls of the clarifier were observed not to be clean. The decanting channels were observed to be clean and in good condition; but the main channel was showing signs of rust; (see photograph 2). f. CCC stated that Chemifloc under take jar tests approximately twice a year off site; and that no jar tests are done on site. g. Sludge bleeds are on a timer and are set for every 6-8 minutes; each bleed lasts for approximately 1-2 minutes. A bleed was observed to run clear. Sludge bleed run offs are sent to a picket fence thickener; to a centrifuge and then to land fill.
3.	<p>Filtration</p> <ul style="list-style-type: none"> a. CCC stated that the sand within the filter is topped up regularly within the filter and was last replaced in 2001. No sand depth gauge was observed within the filter. b. Backwash cycles are initiated manually every day. A backwash cycle was observed in filter no 1. c. The backwash rate was unknown by CCC; the filtration rate was stated to be 3.67 m³/m²/hr.

	<ul style="list-style-type: none"> d. Mudballing and cracking was observed in the filter; (see photograph 3). e. The backwash cycle appeared to be even across the filter. f. Some sand was observed within the filter channel. g. The length of the backwash cycle is determined by visual observations and is not based on turbidity. Turbidity readings are not taken following the cycle and the monitors are not connected to SCADA and are not linked to a dial out alarm. The turbidity reading on the filter following backwashing was observed by the auditor to be 0.3 NTU. h. The turbidity readings on the other filters were observed to be 4.16 and 0.01 NTU, i. CCC stated that the filters following backwash are brought back into service with a slow start. j. The walls of the filter were observed to be stained and did not appear to be recently washed. k. Wash water from the filters is sent to a settling chamber; decanted water is sent to river and sludge is sent to landfill.
4.	<p>Chlorination and Disinfection</p> <ul style="list-style-type: none"> a. There are duty standby chlorine dosing pumps in place and are automatically set to change over every day and on a low chlorine reading of 0.5 mg/l. The pumps are next due for calibration on the 17/04/2015. b. CCC stated that the chlorine monitor is not linked to SCADA and that there are no dial out alarms on the chlorine monitor. c. Chloros is supplied by Chemifloc; who are not on the list of authorised suppliers of biocides http://www.pcs.agriculture.gov.ie/biocides/Biocidal%20Product%20Register%20-%2012%20May%202014.pdf and therefore IW are not in compliance with the EU Biocidal Products Regulations (528/2012) and associated Irish regulations (the <i>European Union (Biocidal Products) Regulations, 2013</i>). d. The chlorine sampling points were observed not to be secure from accidental damage.
5.	<p>Treated Water Storage</p> <ul style="list-style-type: none"> a. There is a 2,000 m³ reservoir on site, which according to CCC equates to approximately 6-18 hours storage, depending on demand. b. There are level indicators within the reservoir but these are not alarmed. c. CCC stated that the reservoir was last cleaned on the 5th June. d. The vents on the reservoir were observed in some instances to be cracked and not to have mesh to prevent insect access. e. Manhole covers were observed not to be locked or sealed against surface water ingress.
6.	<p>Exceedances of the Parametric Values</p> <ul style="list-style-type: none"> a. On the 25th July 2014 the EPA received a notification from IW of a coliform bacteria exceedance on the 23/03/2014. It also stated in the notification that <i>E.coli</i> 21/100 ml had been detected in a hotel in Doolin and that a boil water notice (BWN) had been place on the hotel. CCC stated that the HSE had taken this sample. b. CCC carried out follow up sampling which returned clear results. CCC stated that they sampled on the 23rd, 24th and 25th of July and that all samples returned clear results. The BWN was lifted on the 28th July. According to CCC the exceedance seemed to be localised to the hotel. c. CCC stated that chlorine levels within the vicinity of the exceedance were low, 0.03 mg/l; and that prior to the exceedance chlorine levels were not checked within the network, but chlorine levels are now checked daily within the network, with levels of 0.1 mg/l at the end of the network. d. CCC stated that they had flushed the lines in the vicinity of the hotel on 21st May.
7.	<p>Chemical storage and bunds</p> <ul style="list-style-type: none"> a. Covers on the ferric bulk storage tank were observed not to be sealed properly and staining was observed around the cover; (see photograph 4). b. Cracks were observed in the ferric storage tank; (see photograph 5). There was no spill tray or lock observed on the ferric delivery point; (see photograph 6).

8.	<p>Hygiene and Housekeeping</p> <p>a. The plant is generally clean but old pipes and waste was being stored on the reservoir; (see photograph 7).</p>
9.	<p>Management and Control</p> <p>a. CCC stated that the sign off procedure consists of signing the delivery docket; and that all chemical deliveries are supervised.</p> <p>b. CCC stated that the caretaker is on site seven days a week. The caretaker is also responsible for a waste water treatment plant; there is no procedure in place for visiting a waste water plant and then a drinking water plant.</p> <p>e. No calibration stickers were observed on the turbidity monitors.</p> <p>f. The chemical certification sheets were observed to be out of date; (see photograph 8).</p>
10.	<p>Monitoring and Sampling Programmes for Treated Water</p> <p>a. The final water turbidity was observed to be 0.7 NTU.</p>
11.	<p>Sludge Management</p> <p>a. Sludge from the settling tanks is removed to landfill once a year.</p>

3. AUDITORS COMMENTS

This plant is not in operated and managed in accordance with the EPA Advice Note No. 3 – *E. coli* in Drinking Water. The fact that the turbidity monitors and the chlorine monitor do not have dial out alarms in place and are not connected to SCADA is a matter of serious concern to the EPA. The effective operation of the plant along with quick and timely responses of the caretaker staff to issues such as high turbidity and low chlorine levels cannot be guaranteed due to the lack of adequate control measures, which puts the health of consumers at risk. These items must be addressed by Irish Water as a matter of urgency.

During the audit it was also noted that turbidity readings on the final water and on one of the filters were 0.7 NTU and 4.16 NTU respectively. IW water must ensure that the turbidity readings after each filter and on the final water leaving the plant does not exceed 0.5 NTU and should put measures in place to ensure this.

This plant was according to Clare County Council designed to treat 4,800 m³/day and is being operated above design capacity. Irish Water must put measures in place to ensure that the treatment plant operates within its design capacity at all times and that treatment at the plant is not compromised.

4. RECOMMENDATIONS

Management and Control

1. The Water Services Authority should ensure that all monitors especially the turbidity and the chlorine monitors are linked to recording devices and, where appropriate, are fitted with dial out alarms to ensure that any deviation from the acceptable operating range is quickly detected and responded to. A procedure should also be put in place defining the actions to be taken in response to the different levels of alarm.
2. The Water Services Authority should conduct a process optimisation audit of this plant to ensure that all monitor; alarms; systems and procedures are being operated and implemented as per EPA guidance documents.

3. The Water Services Authority should develop proposals, with timeframes, to ensure that the plant operates within its capacity at all times. The Water Services Authority should submit these proposals to the Agency.

Source Protection

4. The Water Services Authority should submit a revised *Cryptosporidium* risk assessment for this supply.
5. The Water Services Authority should put procedures in place to ensure that the Local Authority is informed of any forestry activities that may impact on water quality.

Disinfection

6. The Water Services Authority should ensure that chlorine sampling is regularly carried out at various points within the network and that chlorine residuals at the extremities of the networks are maintained above 0.1mg/l.
7. The Water Services Authority should review use of disinfectants at the Enistymon PWS and all other public water supplies to ensure that all disinfectants are authorised in accordance with the EU Biocides Products Regulation (528/2012) and associated Irish regulations (*European Union (Biocidal Products) Regulations, 2013*).

Coagulation, Flocculation and Clarification

8. The Water Services Authority should review the operation of the clarifier to ensure that the clarifiers are not being operated under conditions above their design capacity.
9. The Water Services Authority should review the mixing chamber to ensure that there is adequate mixing and contact time of the coagulant/coagulant aids prior to entry into the clarifier.
10. The Water Services Authority should ensure that all the chemical certifications are within date.

Filtration (General)

11. The Water Services Authority should investigate the cause of the mud balling /cracks in the filter media and should take appropriate action to optimise the operation of the filter and should review the operation and condition of the sand filter and ensure that any of the abnormal operating conditions (as outlined on pages 43 to 45 of the EPA publication "*Water Treatment Manual on Filtration*") are urgently rectified.
12. The Water Services should examine the turbidity levels following back wash cycles and adjust backwash cycle time accordingly, as per section 11 of the EPA Drinking Water Handbook.
13. The Water Services Authority should ensure that sand within the filters is regularly replaced and that a sand depth gauge is place within the filter so as to clearly indicate the level of sand within the filter; and should investigate the cause of the loss of filter media from the filters into the filter channel and take appropriate action to prevent this loss of media.
14. In relation to the observations above on filtration the Water Services Authority should follow the guidance as specified in the EPA publication "*Water Treatment Manual on Filtration*" and in particular the following action is required as a priority;
 - i. Ensure that the minimum depth of filter media (excluding the gravel layer) is no less than 800 mm ;
 - ii. Review the filter backwash process to ensure that the maximum backwash water flow rate does not exceed 20 m³/ m²/hour ;
 - iii. Review the operation of the filters to ensure that the levels of turbidity in the filtered

water are as low as possible and no greater than 0.5 NTU. If the plant is a high risk *Cryptosporidium* plant then the turbidity of the filtered water should not exceed 0.25 NTU.

Chemical Dosing

15. The Water Services Authority should carry out an integrity assessment of the ferric bulk storage tank.
16. The Water Services Authority should ensure that the water is removed from the ferric dosing chamber so that the dosing points can be inspected.

Hygiene and Housekeeping

17. The Water Services Authority should ensure that the clarifier and the filters are cleaned on a regular basis to prevent build-up of algae and residue on the walls and that rust on the weirs is removed.
18. The Water Services Authority should undertake a complete review of housekeeping and waste storage at the plant and take measures to ensure that the plant is kept well maintained, clean and tidy and that the pipes and the waste material are removed from the reservoir.
19. The Water Services Authority should ensure that sealed and lockable hatches are installed on all inspection points and valve access points where there is access to treated water (after filtration and before the final treated water is distributed). The Water Services Authority should also ensure that all vents and manhole covers are secured against ingress of animals or deliberate introduction of any contaminant or acts of vandalism or against surface water ingress
20. The Water Services Authority should ensure that where caretakers have a dual role between water and waste water treatment plants that those caretakers attend the WSNTG Drinking Water Hygiene Training Course.
21. The Water Services Authority should ensure that calibration stickers are placed on the monitors following calibration.

FOLLOW-UP ACTIONS REQUIRED BY IRISH WATER

During the audit the Water Services Authority representatives were advised of the audit findings and that action must be taken as a priority by the Water Services Authority to address the issues raised. This report has been reviewed and approved by Mr Darragh Page, Drinking Water Team Leader.

The Water Services Authority should submit a report to the Agency within one month of the date of this audit report detailing how it has dealt with the issues of concern identified during this audit. The report should include details on the action taken and planned to address the various recommendations, including timeframe for commencement and completion of any planned work.

The EPA also advises that the findings and recommendations from this audit report should, where relevant, be addressed at all other treatment plants operated and managed by Irish Water.

Please quote the File Reference Number DW2014/277 in any future correspondence in relation to this Report.

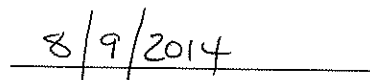
Report prepared
by:



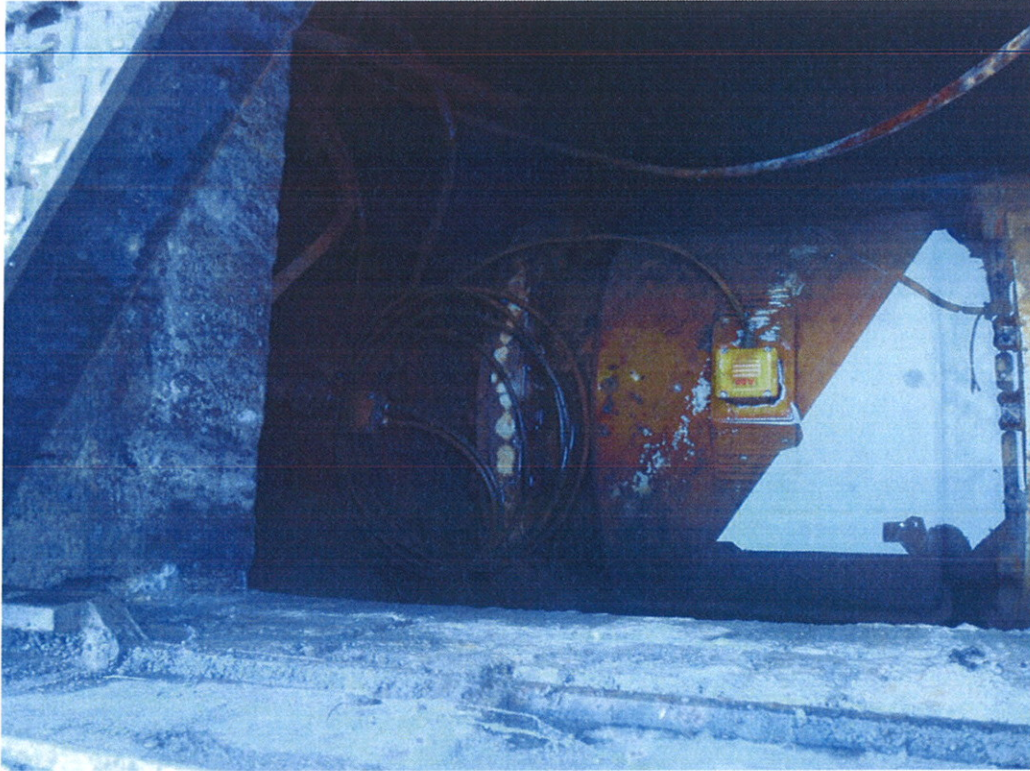
Niall Dunne

Inspector

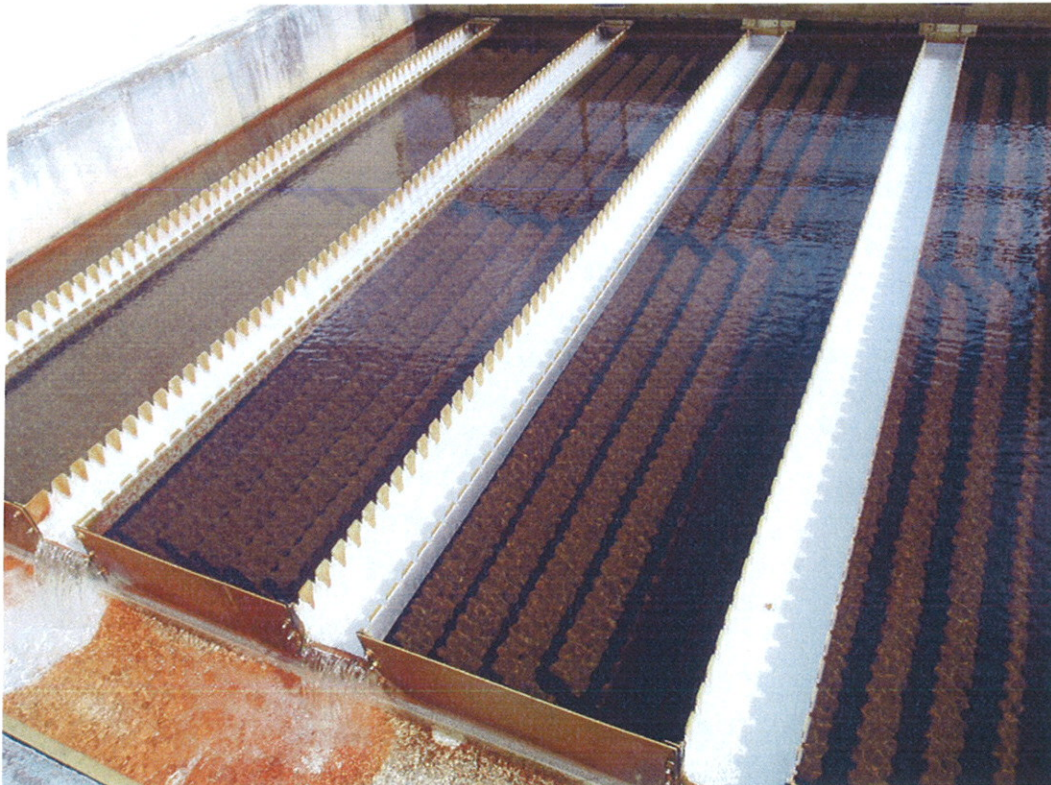
Date:



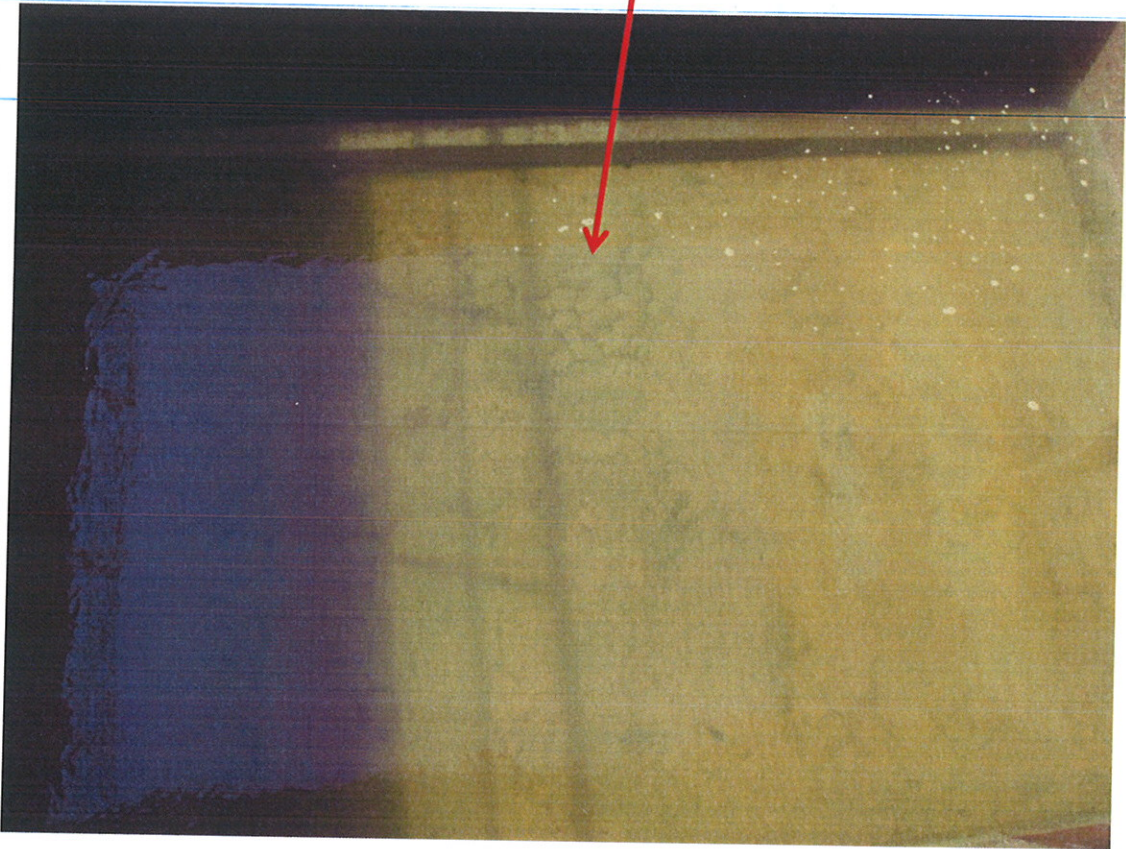
Photograph 1: Ferric dosing point submerged.



Photograph 2: Channels in clarifier showing signs of rust.



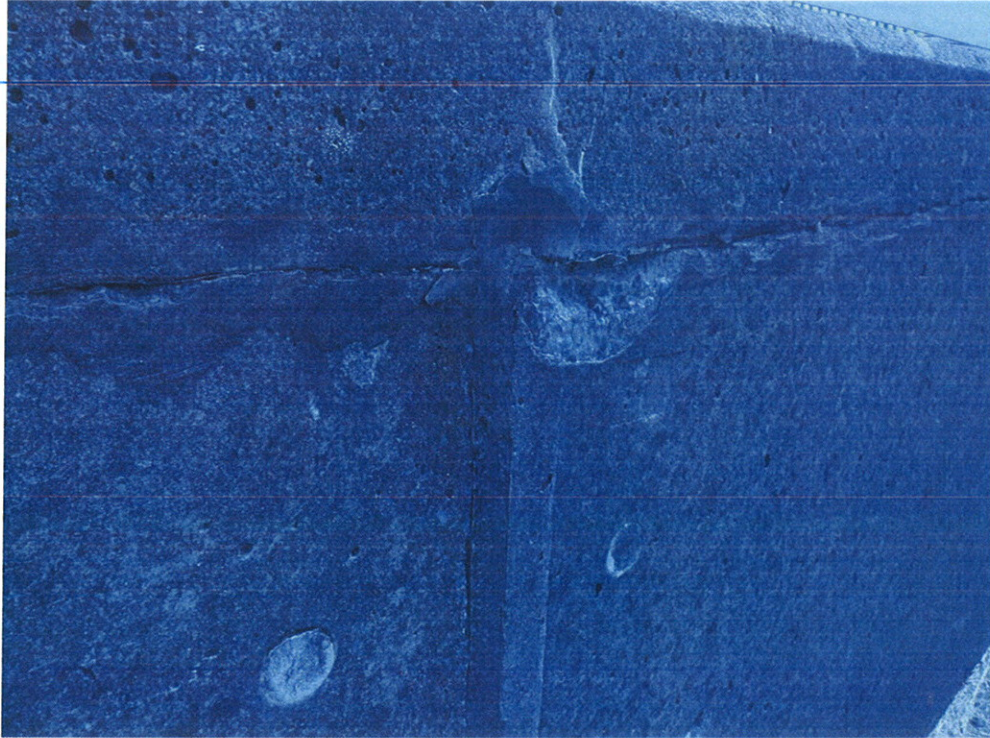
Photograph 3: Mudballing and cracking in the filter.



Photograph 4: Cover on ferric bulk tank not sealed and showing signs of spillage.



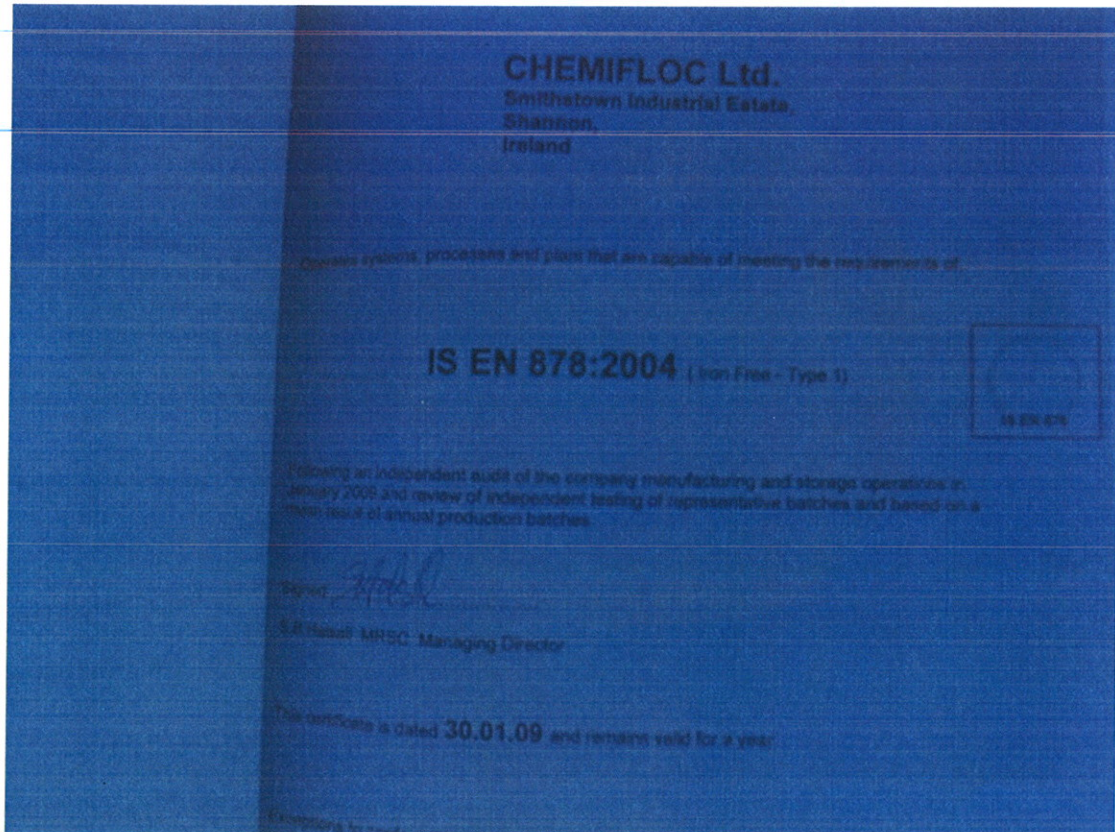
Photograph 5: Crack in the ferric bulk storage tank.



Photograph 6: Ferric delivery point; no cover or spill tray in place.



Photograph 7: Chemical certificate out of date.



Photograph 8: Pipes and waste material stored on reservoir;

