Comhairle Chontae Mhuineacháin
Monaghan County Council

Report on Contamination of Drinking Water Supply at Glaslough/Tyholland GWS Co. Monaghan, 2007

Monaghan County Council
Comhairle Chontae Mhuineacháin

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Executive Summary

This report describes the background to, and the actions taken during the course of, the contamination incident at Glaslough/Tyholland Group Water Scheme (GWS) from April to July 2007. It also provides analysis and recommendations aimed at prevention of a recurrence of this type of incident.

The report deals primarily with the Local Authority's role in this incident - it does not include an evaluation of the possible health concerns raised during and following the incident resulting from consumption of the contaminated water. For details of this, reference should be made to the Health Service Executive, Dublin - North East's report on the same incident.

The Treatment Plant for Glaslough/Tyholland GWS was upgraded in 2005. It is operated under a Design, Build, Operate (DBO) contract, on behalf of the members of the GWS, by Veolia Water Ireland Ltd, as part of the Cavan East DBO Bundled Contract. Monaghan County Council is the Sanitary Authority.

On 16th April 2007, Monaghan County Council received a complaint from a consumer regarding the quality of the water at Glaslough/Tyholland GWS. The Council arranged testing of three bacteriological and chlorine residual samples immediately. Further complaints were received on 17th April and, due to the creosote-like odour detected on the previous day's samples, the Council decided to carry out sampling with specific analysis for phenols and polycyclic aromatic hydrocarbons (PAHs).

On 18th April, consultations were arranged with Veolia Water Ireland Ltd. At this meeting, Veolia informed Monaghan County Council that complaints were received from a number of other Group Water Schemes included in the Cavan East DBO Bundled Contract the week before. Veolia personnel had identified a potential link to a delivery of polyaluminum chloride (PAC) coagulant to these plants, that batches of suspect coagulant had been removed from other GWS sites in Co. Cavan and that it was planned to remove the replacement (PAC-2) coagulant from the Glaslough/Tyholland site the next day – 19th April 2007. The original PAC-1 had been replaced on April 17th. Monaghan County Council later ascertained that the removal of the coagulant (PAC-1) from GWS sites in Co Cavan commenced on 11th April 2007.

On the basis of the suspicion that there was some form of contamination of the coagulant used in the treatment of the water at the Glaslough/Tyholland plant, Monaghan County Council and Glaslough/Tyholland GWS held discussions with Health Service Executive (HSE) Dublin – North East. Following the discussions, a Notice under Article 9 of the European Communities (Drinking Water Regulations) 2007 (SI 106 of 2007) was issued, by Monaghan County Council, to the Secretary, Glaslough/Tyholland GWS on 19th April. The Notice stated that the supply of water intended for human consumption constituted a potential danger to human health and instructed the Secretary to advise all of the group scheme consumers not to use the water for drinking purposes or for the preparation of food until further notice.

On 20th April the Glaslough/Tyholland GWS treatment plant was shut down and alternative water supplies were put in place.

During the period from 19th April 2007 until 23rd July 2007, a programme of measures was pursued with collaboration between Glaslough/Tyholland GWS, Monaghan County Council, Cavan County Council, the National Federation of Group Water Schemes (NFGWS), Veolia Water Ireland Ltd and the HSE. The main issues dealt with were as follows:

1) Establishing the cause for the bad taste / foul odour and contamination of the drinking water supply
2) Restoring the supply after verifying compliance with the European Communities (Drinking Water Regulations) 2007 (SI 106 of 2007)
3) Establishing a protocol for the removal of the Notice.
4) Verifying the correct execution of the protocol.

It was established that a contaminated batch of coagulant used in five group schemes, four in Cavan and Glaslough/Tyholland GWS in Monaghan, was the cause of the taste and odour problem and the original basis for the consumer complaints. While it is known that the contamination was of a phenolic nature, the exact source and how it came to be in the coagulant is the subject of ongoing investigation. The supply chain for the coagulant is detailed in section 4.2 of this report.

Following consultation with the HSE, a protocol for the removal of the Article 9 Notice was agreed. This involved verification that the water in the treatment plant, and subsequently the distribution network, was of good quality. This verification process required the taking of water samples from agreed strategic locations within the plant and on the distribution network and obtaining clear analysis results on three consecutive days from these samples.

Progress of the verification of compliance of the supply with the requirements of the protocol was delayed by subsequent developments. An unrelated pollution incident was reported on 12th May and consequently tests for cryptosporidium had to be carried out. On 18th May, aluminium levels exceeding the maximum levels outlined in the European Communities (Drinking Water Regulations) 2007 (SI 106 of 2007) were identified in the results of the tests of samples taken on 9th, 10th and 11th May. This was attributed to the fact that the coagulant dosing pump at the Treatment Plant had not been recalibrated when repositioned to the temporary coagulant storage tank which was being used during the implementation of protocol.

Following analysis of samples, the water produced in the Treatment Plant was deemed clear on 8th June 2007.

Further delays occurred as a result of the necessity to repeat the analysis of samples taken on 14th to 18th June, in accordance with the protocol, from agreed points located at the extremities of the distribution network. Interim results had indicated an excessive total phenols and total cresols, findings which conflicted with the results of testing of split samples taken at exactly the same locations and times. The advice obtained from the testing laboratory was that the analysis machines may have been contaminated during the course of the analysis, providing a possible reason for the non-compliant results. Validated results of the repeat analysis showed that all samples were clear. All elements of the results of the repeat analysis were not, however, received until 11th July.

Due to the uncertainty of the initial interim results, Monaghan County Council decided

that resampling should take place and the samples should be sent for analysis. This Day 4 Sampling was additional to what had been included in the protocol. When analysis results for the samples taken on 11th July 2007 were returned on 23rd July 2007 and all were shown to be compliant, it was deemed that the protocol for the removal of the Article 9 Notice had been satisfied. With the agreement of the HSE, Monaghan County Council advised the Glaslough/Tyholland GWS that the Article 9 notice could be removed on 23rd July 2007.

Monaghan County Council makes the following recommendations, arising from the incident:

- **Consideration should be given to amending the EU Drinking Water Regulations 2007 to require operators/contractors communicate directly with Supervising Authorities and/or the HSE, immediately, in the event of a water quality incident that potentially affects human health.**

- **Direction and standards are needed regarding the procurement and use of chemicals intended for use in the treatment of water intended for human consumption.**

- **There is a need for the development of adequate accredited laboratory capacity, which is accessible to Local Authorities for immediate response during water quality incidents.**

- **Future guidelines should consider the diverse contractual arrangements that currently exist throughout the country, where water production may be contracted to private operators extending across more than one Sanitary Authority area.**

- **The Precautionary Principle should apply in all cases where doubt exists over the quality of the drinking water supply. Guidelines should require water suppliers and treatment plant operators to take appropriate action at the earliest possible stage to protect public health.**

- **A review of staffing resources should be undertaken to determine what additional resources are needed by local authority Water Services Departments to deal with the important day-to-day duties while simultaneously implementing the requirements of new legislation and guidelines.**

- **There is a need to ensure that all water suppliers avail of appropriate training for all employees engaged in the treatment and supply of drinking water.**

- **It is critical that all water suppliers have in place a well-managed complaints handling system.**

Monaghan County Council welcomes any comment on the content of this report. Comment should be directed by email to glasloughtyholland@monaghancoco.ie

Acknowledgements

Monaghan County Council wishes to acknowledge the assistance, support, advice and co-operation of the following in the lead up to, during and after, the drinking water contamination incident at Glaslough/Tyholland GWS during April to July 2007:

- Cavan County Council
- T.J. O'Connor & Associates
- Glaslough/Tyholland Group Water Scheme Personnel
- National Federation of Group Water Schemes Personnel
- Health Service Executive, Dublin - North East
- Veolia Water Ireland Ltd
- Local print and radio media

Glossary

Calibration: Calibration refers to the act of evaluating and adjusting the precision and accuracy of measurement equipment

Chlorine: A chemical used for disinfection and other water treatment applications

Chlorophenol: Chemical resulting from interaction between phenol and chlorine

Clostridia Perfringens: A potentially harmful bacteria which can contaminate water supplies

Coagulant: A chemical used to cause agglomeration of fine particles to facilitate their removal

Cresols: Organic compounds which are categorized as phenols and have an odour reminiscent, to some, of a "medicine" smell

Cryptosporidium: Cryptosporidium is a protozoan parasite found in man, many other mammals and also in birds, fish and reptiles. The only species known to infect both man and livestock is Cryptosporidium parvum.

Dissolved Air Flotation (DAF): Solid–liquid separation process utilizing small air bubbles

Faecal Coliform: A bacteria which can cause serious illness or death

Floc: The particles that form in coagulated water

Gas Chromatography Mass Spectrometry (GCMS): Special analysis/testing method used in which all components of a sample are separated and the results provided in the form of a representative spectral output.

High Performance Liquid Chromatography (HPLC): Special analysis/testing method used for the separation of complex mixtures of molecules found in chemical and biological systems

Intake: The point at which water first enters the treatment plant

Intake screen: A barrier to remove the larger debris from water before it is treated

NaOH: Sodium hydroxide

Polyaluminium Chloride (PAC): A chemical used to bind tiny particles in water together to facilitate removal in subsequent treatment

Polycyclic Aromatic Hydrocarbon (PAH): One of the class of chemical compounds which are known as organic pollutants, and which occur in creosote, crude oil, tar etc.

pH: A scale which indicates whether water is acid (0 -7) or alkali (7 – 14). Drinking water must be between 6.5 and 9.5 under EC Drinking Water Regulations

Phenol: A caustic, poisonous, white crystalline compound, derived from benzene and used in resins, plastics, and pharmaceuticals

Polymer: A coagulant used to increase the effectiveness of particle removal from water

TCP: A commonly used antiseptic

Total coliform: A non-faecal bacteria, generally less harmful than faecal coliform

List of Abbreviations

DBO: Design, Build, Operate

DoEHLG: Department of the Environment, Health and Local Government

EC: European Community

EHO: Environmental Health Officer

EPA: Environmental Protection Agency

GWS: Group Water Scheme

HSE: Health Service Executive, Dublin - North East

IBC: Intermediate Bulk Container (a 1000 litre transportable container)

NFGWS: National Federation of Group Water Schemes

WSNTG: Water Services National Training Group

Section 1 - Introduction

1.1 Purpose of this Report

The purpose of this report is to:-

- Detail and describe the background to, and the actions taken during the contamination incident at Glaslough/Tyholland Group Water Scheme from April to July 2007.

- Describe and review the management of and response to the incident by Monaghan County Council and the Health Service Executive, Dublin - North East.

- Provide advice and information to Sanitary Authorities, Health Services and other interested parties based on the experience of Monaghan County Council.

- Make recommendations for consideration by all bodies involved in the provision of drinking water in order to reduce the risk of a reoccurrence of this type of contamination incident.

- Provide information to the public in County Monaghan and environs.

1.2 Preparation and Approval of Report

This Report was prepared by:
Vincent McKenna, Assistant Engineer, Water Services, Monaghan County Council.

This Report was reviewed by:
Paul Clifford, Director of Services, Housing & Corporate Affairs, Monaghan County Council.
Dan Doody, Senior Engineer, Water Services & Planning, Monaghan County Council.
John Quinn, Environmental Health Officer, Monaghan County Council.

This Report was approved by**:**
David Fallon, Director of Services, Water Services, Monaghan County Council.

1.3 Overview of Glaslough/Tyholland Group Water Scheme (GWS) Treatment Plant

Glaslough/Tyholland GWS Treatment Plant is located on the southern shore of Emy Lough in the townland of Derrygasson Lower, Emyvale, Co. Monaghan. Raw water is abstracted from the lake, treated in the treatment plant, disinfected, and pumped to a treated water reservoir located two kilometers south of the plant.

Ensuring the water is fit for human consumption involves the following processes:

- coarse screening of the water on the intake from Emy Lough, using a static or passive intake screen.
- addition of a coagulant - polyaluminium chloride (PAC) - to the incoming water to remove colour and suspended particles, such as silt, sand etc. (This binds the particles together and allows them to settle out in a suspension know as a "floc blanket" – a process known as flocculation)
- addition of polymer to the incoming raw water to aid flocculation
- use of dissolved air flotation (DAF) for the removal of the "floc blanket"
- addition of powdered activated carbon (when necessary) following the DAF process. (This is used to deal with occasional, potentially unpleasant, tastes and odours which can be caused by algae and other plants. These can be present if there are excessive nutrients such as nitrogen and phosphorus resulting from pollution of the Lough.)
- passage of the water through sand filters to remove any residual suspended particles
- pH adjustment by dosing with alkali (NaOH), followed by the addition of chlorine for disinfection. (Maximum disinfection is ensured by allowing thirty minutes contact time so the chlorine will deal with any bacterial issues before the water is released for consumption.)

Following completion of these processes, water is pumped to the treated water reservoir for distribution to consumers.

There are approximately 1038 connections supplied with water from the Glaslough/Tyholland GWS:

670 domestic connections
305 agricultural connections
63 other (commercial/industrial) connections.

The distribution network serves consumers in a rural area to the north-east of Monaghan town. The location and extent of the Glaslough/Tyholland distribution is detailed on the map shown in Appendix 1.1.

Over the period Jan to Dec 2006, the production of treated water from the Glaslough/Tyholland treatment plant was approximately 1100 m^3/day [242,000 gallons/day]. The design capacity of this plant is 2200 m^3/day.

The Treatment Plant was upgraded in 2005. It is operated under a Design, Build, Operate (DBO) contract, on behalf of the members of the GWS, by Veolia Water Ireland Ltd, as part of the Cavan East DBO Bundled Contract. Bundled DBO contracts

are the National Rural Water Monitoring Committee's preferred method of procurement for the provision of upgraded treatment facilities to group water supply schemes throughout the country. This approach aims to upgrade plants ensuring compliance with water quality parameters under the European Communities (Drinking Water Regulations) 2007 (SI 106 of 2007), which replaced the 2000 Regulation (SI 439 of 2000), whilst providing value for money in the shortest possible timeframe.

Monaghan County Council is the water authority for County Monaghan, in which Glaslough/Tyholland GWS is located. In accordance with Article 3 of the European Communities (Drinking Water Regulations) 2007 (SI 106 of 2007) Monaghan County Council is the Supervisory Authority designated under this regulation.

Further information on the roles of Veolia Water Ireland Ltd, the Glaslough/Tyholland Group Water Scheme (GWS), and Monaghan County Council in relation to the Treatment Plant is provided in Appendix 1.2

Section 2 - Contamination Incident at Glaslough/Tyholland GWS Treatment Plant Day-to-Day Summary of Events and Responses Implemented

Monday 16th April 2007

A complaint was received on 16th of April 2007 by Monaghan County Council Water Services Office regarding the quality of the Glaslough/Tyholland GWS water from a consumer in Mullaghmore, Tyholland. In response to the complaint, Monaghan County Council requested the Environmental Health Officer (EHO) to carry out tests immediately. Within hours, three bacteriological and chlorine residual samples were taken and tested. (These types of samples are regularly taken to ensure that water is safe to drink. Bacteria levels should be zero and there should be enough chlorine residual in the water to ensure this.)
Results showed that there was no bacteriological contamination and that the disinfection was satisfactory. (Results are at Appendix 2 – reference 16th April 2007.)

It was noted by the Environmental Health Officer, when sampling, that there was a "creosote-like" odour from the water.

Tuesday 17th April 2007

On 17th of April, Peter Sherry, Chairperson, Glaslough/Tyholland GWS met directly with Paul Clifford, Director of Water Services, Monaghan County Council, regarding ongoing problems with taste and odour in the water. Five complaints from consumers of Glaslough/Tyholland GWS water were received by Monaghan County Council Water Services Office regarding the quality of their water supply on 17th April 2007.

Due to the creosote-like odour detected on the previous day's samples, it was decided to carry out sampling with specific analysis. Water from the treated water reservoir was sampled and sent for analysis for phenols and polycyclic aromatic hydrocarbons (PAHs). (Results are at Appendix 2 – reference 17th April 2007.)

Wednesday 18th April 2007

Monaghan County Council personnel met with Matt Kelly, Veolia Water Ireland Ltd Operations Manager on 18th April 2007.

Mr Kelly explained that, following receipt of complaints from Glaslough/Tyholland GWS consumers over the previous two weeks, Veolia personnel had examined the raw water and plant processes first to find the cause of the complaints. He stated that as taste and odour complaints may result from algal bloom occurrences in the raw water, it is common practice to investigate the raw water source on foot of such complaints. It was only when similar complaints were received from a number of other Group Water Schemes in the East Cavan bundle, the week before, that Veolia personnel had identified a potential link to a delivery of polyaluminum chloride (PAC) coagulant to these plants. Batches of suspect coagulant had been removed from other GWS sites in Co. Cavan and it was planned to remove the replacement (PAC2) coagulant from the Glaslough/Tyholland site the next day – 19th April 2007.

The information provided at the meeting with Veolia on 18th April 2007 was the first communication Monaghan County Council had received about Veolia's concerns about the possibility of contamination of coagulant used in water treatment plants.

Following later queries, Monaghan County Council ascertained that the date of removal of the (PAC1) coagulant from GWS sites in Co Cavan was commenced on 11th April.

Thursday 19th April 2007
Monaghan County Council consulted with the HSE about the suspicion that there was possible contamination of treated water. The primary concern was the protection of human health and a decision was taken to issue a notice under Article 9 of the European Communities (Drinking Water) Regulations 2007 (SI 106 of 2007).

A notice was issued to the Secretary of Glaslough/Tyholland GWS stating that the supply of water intended for human consumption constituted a potential danger to human health and required her to advise all consumers on the scheme not to use the water for drinking purposes or for the preparation of food until further notice. (Copy of Notice at Appendix 1.3)

A Public Notice advising consumers not to use the water for drinking purposes or for the preparation of food was relayed frequently (initially hourly) on the local radio station, Northern Sound Radio, from 5pm on 19th April 2007.

An information letter from the Secretary of the Glaslough/Tyholland GWS advising consumers of the measures taken was sent out to every member/consumer of the GWS on 19th April 2007. Monaghan County Council posted the letter on behalf of the GWS (copy of letter at Appendix 1.4).

In order to maintain a supply of water to the Glaslough/Tyholland GWS distribution network, Monaghan County Council offered the use of a borewell, one of seven wells used to supply Crosses Treatment Plant for Monaghan Town Public Water Scheme, as a possible emergency alternative supply for the Glaslough/Tyholland GWS. This borewell, located at Silverstream, on the Armagh Road out of Monaghan Town, was used to provide a raw water supply to the GWS during the upgrading of the Treatment Plant in 2005 and could be connected directly to the Glaslough/Tyholland distribution network. It was determined that this alternative supply could provide water to satisfy basic sanitation needs throughout the scheme, but that the Article 9 Notice would still remain in place.

Friday 20th April 2007
On the morning of 20th of April 2007, the Glaslough/Tyholland GWS treatment plant was shut down and the treated water reservoir was drained down and cleaned. All residual solids were removed from the bottom of the reservoir and it was disinfected with chlorine.

Monaghan County Council installed a sodium hypochlorite (chloros) dosing facility at the Silverstream borewell which was then connected to the Glaslough/Tyholland GWS distribution network. Pumping of the borewell water into the GWS network was then commenced. This connection remained in place until 8th June 2007.

An Incident Team was set up in Cavan Town in order to determine the cause of the contamination of the five schemes and to establish a protocol for the removal of the Article 9 notice. The Incident Team comprised staff from Monaghan County Council, Cavan County Council, the HSE, Veolia Water Ireland Ltd, T.J. O'Connor &

Associates, the NFGWS and members of the affected GWSs. Incident Team members are listed in Appendix 1.5.

The Group Scheme commenced provision of bottled water supplies to members on 20th April 2007.

Saturday 21st April 2007
Three public water taps, supplied by water from public water supplies, were erected by Monaghan County Council to provide free potable drinking water at well-known, local landmarks. The taps were located at:

- Enterprise Centre, Emyvale Village
- The Monument, Main Street, Glaslough Village
- Fire Station, Plantation Road, Monaghan Town

Radio notices on Northern Sound radio publicised the availability of the contingency drinking water sources and large conspicuous placards were placed at each tap location to provide easy recognition of the free emergency supplies. An information letter was distributed at all Church services in the serviced area of the GWS that weekend and the National Federation of Group Water Schemes (NFGWS) provided significant support for the communication process.

Photographs of the three temporary Public Water Supply taps and placards are included in Appendix 1.6. These taps remained in place until 23rd July 2007.

Tuesday 24th April 2007
An email communication was received by Paul Clifford, Director of Water Services, Monaghan County Council from Matt Crowe, EPA, confirming contamination of the coagulant with phenol and detailing the possible supply chain. A copy of this email is included in Appendix 1.7.

Tuesday 1st May 2007
The Incident Management Team formed a Response Action Team, membership of which is detailed in Appendix 1.8, with responsibility for agreeing the final Protocols for Removal of the Article 9 Notice at each GWS in accordance with the order issued under Section 10 (remedial action) of the Drinking Water Regulations. There were variables in the schemes that meant that one Protocol would not be suitable for all five affected schemes.

In accordance with Article 10 of the European Communities (Drinking Water) Regulations, 2007, Monaghan County Council formally directed Glaslough/Tyholland GWS Ltd to prepare an action plan and to submit it for the approval of Monaghan County Council within 60 days and to implement such action plan for the improvement of the quality of the water so as to secure compliance with the European Communities (Drinking Water) Regulations, 2007 as soon as possible and not later than 1 September 2007. (A copy of the written confirmation of this formal direction is included at Appendix 1.9).

On 1st May, T.J. O'Connor & Associates (on behalf of the GWS) submitted a protocol, or action plan, to Monaghan County Council to restore normal supply to the GWS. The plan involved extensive testing of the treatment plant and the distribution network over the coming weeks to verify that all non-compliant water had been expelled from the

system. This action plan was approved by Monaghan County Council together with the Health Services Executive in accordance with the E.U. (Drinking Water) Regulations 2007. The normal drinking water supply could only be restored upon successful implementation of the action plan.

The action plan involved the following:

- cleaning out and disinfecting the treated water reservoir
- flushing out the complete distribution network with clean water
- replacing the suspected coagulant
- operating the treatment plant, with the treated water running to waste, for a period of time while treated water samples were taken each day and analyzed
- directing the output from the treatment plant to the treated water reservoir, once the treatment plant was verified to be producing acceptable quality water, and, at the same time, turning off the temporary borewell supply.
- identifying three locations at the extremities of the distribution network where sampling would be carried out for three consecutive days after the distribution network was filled with water from the treated water reservoir

While it was acknowledged that Veolia Water Ireland Ltd would also sample at the same agreed locations to verify that the water in the treatment plant and subsequently the distribution network was of good quality, the verification of the compliance of the supply would be based solely on the results of samples carried out by the Monaghan County Council Environmental Health Officer and analyzed by approved laboratories on behalf of the Council.

Wednesday 2nd May 2007

A written copy of a program of works that complied with the agreed protocol was received on Wednesday 2nd May by Monaghan County Council from Veolia Water Ireland Ltd. A decision was taken to commence running the treatment plant the following week as a neutralising agent would be required for chlorinated water returning to source, and this had yet to be procured.

Friday 4th May 2007

On 4th May 2007, Veolia Water Ireland Ltd put in place an ongoing free bulk bottled water supply to three designated locations in the GWS community. This arrangement remained in place until the lifting of the notice issued under Article 9 of the European Communities (Drinking Water Regulations) 2007 (SI 106 of 2007) on 23rd July 2007. In total there were about 30 deliveries – approx 64,000 litres.

Tuesday 8th May 2007

On Tuesday the 8th of May the Glaslough/Tyholland GWS Treatment Plant was restarted. The output of treated water was discharged back into Emy Lough to dispose of stagnant water that had been standing in the treatment plant, storage tanks, and pipework since the Treatment Plant was last operated.

Wednesday 9th May 2007 [Day 1 Sampling]

The Treatment Plant was operated in accordance with the agreed Protocol. Sample No 1 was taken by the Monaghan County Council EHO on the 9th May at the Treatment Plant, and sent for testing. The treated water was discharged back to Emy Lough.

Members of the County Rural Water Monitoring Committee and Monaghan County Councillors were furnished with an update report, copy included in Appendix 1.10.

Thursday 10th May 2007 [Day 2 Sampling]
The Treatment Plant was operated in accordance with the agreed Protocol. Sample No 2 was taken by the Monaghan County Council EHO on the 10th May at Treatment Plant, and sent for testing. The treated water was discharged back to Emy Lough.

An update letter was issued to all consumers of water by Glaslough/Tyholland GWS to advise of progress to date, copy included in Appendix 1.11.

Friday 11th May 2007 [Day 3 Sampling]
The Treatment Plant was operated in accordance with the agreed Protocol. Sample No 3 was taken by the Monaghan County Council EHO on the 11th May at Treatment Plant, and sent for testing. The treated water was discharged back to Emy Lough.

Saturday 12th May 2007
On Saturday 12th May 2007, Monaghan County Council Environment Department advised staff in the Water Services Department that a very serious pollution incident was reported in north Co. Monaghan adjacent to the Mountain Water stream. This stream is the main feeder for Emy Lough, the source for the Glaslough/Tyholland GWS supply. Polluting matter had entered the stream and was flowing towards the lake. Discolouration of the water and fish kill upstream of Emy Lough was evident. This pollution incident was completely unrelated to the contamination incident at the Glaslough/Tyholland GWS treatment plant but was significant in that it could have implications for the quality of the raw water entering the treatment plant.

Tuesday 15th May 2007
Monaghan County Council Environment Department had continued to monitor the progress of the pollution incident and noted that it had reached Emy Lough on 15th May 2007.

Wednesday 16th May
Monaghan County Council's EHO carried out sampling (two samples of raw - untreated - water) from Emy Lough on Wednesday 16th May at two sample points. Both samples showed satisfactory results.

Test results are at Appendix 2 – reference 16th May 2007.

Thursday 17th May 2007
On Thursday 17th May, Monaghan County Council decided to carry out cryptosporidium sampling on raw water in Emy Lough and on the treated water produced by the Treatment Plant. This decision was taken as it was believed that the pollution matter discharged to the Mountain Water stream was animal slurry or animal waste based. This pollution incident was so serious as to warrant grave concern over the quality of the water in Emy Lough and justified the decision to carry out additional testing of the raw water source and treated waters. Arrangements were made to install the required sampling equipment.

Friday 18th May 2007
Results were received from the testing of samples taken at the treatment plant from 9th to 11th May 2007 (results at Appendix 2, reference 9th, 10th, 11th May). The samples did not return any non-compliant results for either total phenols or total cresols. However, aluminium levels exceeded the maximum levels outlined in the European Communities (Drinking Water Regulations) 2007 (SI 106 of 2007) for all three days.

When Monaghan County Council discussed the results with Veolia Water, the operator of the plant, it was explained that the original coagulant dosing pump, which had been calibrated in its original location on the large 6,000 litre storage tank, had not been recalibrated when repositioned to the temporary coagulant storage tank which was being used to supply the treatment plant during the implementation of this Protocol. When the calibration was subsequently checked it was found to be pumping incorrectly.

Veolia Water commenced work on the readjustment and recalibration of coagulant dosing pump.

Tuesday 22nd May 2007
From Tuesday 22nd May 2007 to Wednesday 23rd cryptosporidium sampling was carried out on both raw and treated water.

Thursday 24th May 2007
On Thursday 24th May 2007, cryptosporidium results were returned and all samples for both treated water and raw waters were clear.

Test results are at Appendix 2 – reference 22nd/23rd May 2007.

Friday 8th June 2007
Following confirmation with Veolia Water that the readjustment and recalibration of coagulant dosing pump had been completed, output from the Treatment Plant water was redirected to the GWS Treated Water Reservoir at 13.00hrs on Friday 8th of June 2007. The temporary borewell supply was then switched off and isolated from the GWS network. Filling of the reservoir and distribution network continued over the next five days, as agreed in the action plan.

Thursday 14th – Monday 18th June 2007
Following the filling of the reservoir and distribution network with treated water from the treatment plant, three consecutive samples were taken from agreed points located at the extremities of the distribution network on the 14th, 15th and 18th June in accordance with the agreed protocol. Locations of sample points are shown in Appendix 1.12.

The initial interim results for samples taken on 14th and 18th June were non-compliant, indicating an excessive total phenols and total cresols for two of the three samples taken on 14th June, and excessive total phenols for all three samples taken on 18th June.

Veolia Water Ireland Ltd advised Monaghan County Council that the analysis of the samples they had carried out on 14th, 15th and 18th June 2007 were compliant. The samples analysed by Veolia Water Ireland Ltd were split samples taken at exactly the same locations and times as the samples taken by Monaghan County Council's EHO.

When the high interim results were received for the samples taken on the 14th and 18th June, the EHO from Monaghan County Council contacted the testing laboratory - ALControl Laboratories Ireland. (The samples had been sent to this laboratory by the Environmental Protection Agency (EPA) for the completion of tests which the EPA laboratory in Monaghan was not accredited to do.) The EHO was advised, by telephone, that the analysis machines may have been contaminated during the course of the analysis, providing a possible reason for the non-compliant results. (A written confirmation of this was requested from the laboratory, but was not received.)

Monaghan County Council was advised by the testing laboratory that there was sufficient quantity of the three water samples remaining to repeat the analysis on these samples. The Council requested the EPA to arrange that this be done. Parts of the samples were sent by the EPA to a laboratory in the UK for the testing of specific parameters, the remainder of the testing was carried out in Ireland.

Wednesday 4th July 2007
On 4th July 2007, validated results were received for the repeat analysis for the parts of the samples which was carried out in the UK. All three samples returned clear results. These results are at Appendix 2 – reference 14th, 15th and 18th June 2007.

Tuesday 10th July 2007
Monaghan County Council communicated with the Veolia Water Ireland Ltd regarding the possibility of one further day of sampling at the end of pipe locations.

Wednesday 11th July 2007
On 11th July 2007, validated results were received for the repeat analysis, for the remaining parts of the samples, which was carried out by a Dublin laboratory. All three samples returned clear results. These results are at Appendix 2 – reference 14th, 15th and 18th June 2007.

Monaghan County Council decided that, due to the uncertainty of the initial interim results obtained from the samples of the 14th and 18th June, resampling at the three locations should take place and the samples should be sent for analysis (Day 4 Sampling).

Wednesday 11th July 2007 [Day 4 Sampling]
Samples were taken at all three locations on 11th July 2007 [Day 4 Samples].

Monday 23rd July 2007
Analysis results for the samples taken on 11th July 2007 were returned on 23rd July 2007 and were all compliant.

Test results are at Appendix 2 – reference 11th July 2007.

On the basis of these results it was deemed that the protocol for the removal of the Article 9 Notice had been satisfied.

Monaghan County Council consulted with the Health Services Executive (copy of the letter from Monaghan County Council to the Health Services Executive, Dublin - North East included in Appendix 1.13) . The HSE responded by email confirming that the Do

Not Consume or Use for Food Preparation Notice on the Glaslough/Tyholland Group Water Scheme could be removed. (Copy of email from HSE at Appendix 1.14).

Monaghan County Council notified the Glaslough/Tyholland GWS that the treated water supply was now compliant with the European Communities (Drinking Water) Regulations 2007 and the Article 9 Notice could be removed. Public notices to this effect were placed in local newspapers and announced on the local radio station.

Section 3 – Issues in Relation to Sampling and Analysis which Arose During this Incident

Extensive sampling and analysis of treated water, raw water and coagulant (polyaluminium chloride - PAC) was carried out by Monaghan County Council during the course of this incident. Extensive testing was also carried out by and on behalf of both Cavan County Council and Veolia Water Ireland Ltd also. The results included in Appendix 2 of this report relate only to the analyses carried out on behalf of Monaghan County Council.

Monaghan County Council carried out sampling and analysis in three distinct phases:
1) to ascertain the nature of the contamination
2) to verify the quality of treated water leaving treatment plant (pumped to waste)
3) to verify the quality of treated water at the consumer point of the distribution network

This section of the report outlines some of the issues which arose in relation to the sampling and analysis.

3.1 Length of time required for the return of validated results

Most of the sampling analysis carried out on behalf of Monaghan County Council was coordinated through the local EPA testing laboratory. Routine analysis was carried out at this laboratory but some of the more sophisticated analysis was sent to other laboratories in both Dublin and the UK.

Interim results were usually reported as soon as they were available, and were communicated by either phone or email. Validated results were reported once all analysis had been completed and the required quality control checks on the analysis process had been confirmed. Validated reports were issued in hard copy only.

Consequently, while the response time for interim results was usually short, it was often lengthy for full validated results.

3.2 Sourcing of laboratories

Initially, it was not known what the cause of the reported taste and odour problem was, other than the reference to a “disinfectant” or “TCP-like” taste from the drinking water, as reported by consumers and committee members of Glaslough/Tyholland GWS. Following extensive sampling and analysis carried out by Veolia Water Ireland Ltd, Cavan County Council and Monaghan County Council, it was determined that the coagulant polyaluminium chloride (PAC) was contaminated with a product that resulted in a residual of phenols and cresols to remain in the treated water.

During the early stages of the incident, the focus was on analysing for phenols in the drinking water. Phenols are made up of many different constituents that, in contact with chlorine, can combine to form further compounds. Sourcing a laboratory accredited to test for the possible constituents and further compounds took some time and, in the end, necessitated the use of laboratories in both Dublin and the UK.

Problems arose with cross-contamination of the analysis machines during some of the testing and this necessitated re-analysis of the samples – thereby adding to the delay in the receipt of a number of the full validated results.

3.3 Delays arising from requirements for additional testing

The Protocol for the Removal of the Article 9 Notice was approved by Monaghan County Council together with the Health Services Executive on 1st May 2007. Because the network had been supplied with an alternative borewell source of water it was deemed that the most logical approach for verifying the performance of the treatment plant with the new coagulant was to run the treatment plant and discharge the treated water to waste with sampling being carried out on the discharged treated water. This approach removed the uncertainty that existed in relation to possible contamination of the pipework in the distribution network. This was the reason for this approach being included in the Protocol. This sampling was carried out at the discharge of the contact tank, which was directed to overflow instead of to the treated water reservoir, on the following dates:

Day 1 – 9th May 2007
Day 2 – 10th May 2007
Day 3 – 11th May 2007

Special analysis carried out on these samples included:

HPLC – High Performance Liquid Chromatography: Special analysis/testing method used for the separation of complex mixtures of molecules found in chemical and biological systems

GCMS – Gas Chromatography Mass Spectrometry: Special analysis/testing method used in which all components of a sample are separated and the results provided in the form of a representative spectral output.

Additional analysis carried out on these samples included:

- Aluminium
- Bacteriological (Total Coliform, Faecal Coliform & Clostridia Perfringens)
- Taste
- Odour

The samples taken at the treatment plant from 9th to 11th May 2007 did not return any non-compliant results for either total phenols or total cresols. Further progress with the verification of compliance of the supply with the requirements of the Protocol was, however, delayed by subsequent developments (details of these developments are in Section 2, under headings from 12th May 2007 onwards).

A pollution incident was reported on 12th May and consequently tests for cryptosporidium had to be carried out. On 18th May, aluminium levels exceeding the maximum levels outlined in the European Communities (Drinking Water Regulations) 2007 (SI 106 of 2007) were identified in the results of the tests of samples taken on 9th, 10th and 11th May. This was attributed to the fact that the coagulant dosing pump at the Treatment Plant had not been recalibrated when repositioned to the temporary coagulant storage tank which was being used during the implementation of Protocol.

Further delays occurred as a result of the necessity to repeat the analysis of samples taken on 14th to 18th June. Interim results had indicated an excessive total phenols and total cresols, findings which conflicted with the results of testing of split samples taken at exactly the same locations and times. The advice obtained from the testing laboratory was that the analysis machines may have been contaminated during the course of the analysis, providing a possible reason for the non-compliant results. Validated results of the repeat analysis showed that all samples were clear. All elements of the results of the repeat analysis were not, however, received until 11th July.

Due to the uncertainty of the initial interim results, Monaghan County Council decided that resampling should take place and the samples should be sent for analysis. This Day 4 Sampling was additional to what had been included in the Protocol. When analysis results for the samples taken on 11th July 2007 were returned on 23rd July 2007 and all were shown to be compliant, it was deemed that the Protocol for the Removal of the Article 9 Notice had been satisfied.

Section 4 - Investigations in Relation to the Source of Contamination of the Coagulant used at the Glaslough/Tyholland GWS Treatment Plant

4.1 The Coagulant Used

A coagulant is a salt, usually iron or aluminium, that is added to the incoming raw water to help form solid precipitates, termed floc, which contain the impurities that are in the water. The formed floc can then be removed from the water, relatively easily, by mechanical means and with them are removed the fine water impurities. These impurities are very finely divided material and are not easy to remove from the water by other means. The coagulant used in the treatment process at the Glaslough/Tyholland GWS treatment plant, polyaluminium chloride, is commonly referred to as PAC.

4.2 Supply of the Coagulant

Monaghan County Council understands the supply chain for the coagulant to be as follows:

Cognis Ireland Ltd, Little Island, Co. Cork [Cognis]
Aluminium chloride is a by-product of a chemical process carried out by Cognis in the manufacture of chemicals for the copper-extraction industry. This by-product is sold to Enva.

Enva Ireland Ltd, Ringaskiddy, Co. Cork [Enva]
Enva handle/process the aluminium chloride to produce Envirofloc CL1000 which is sold, as a liquid inorganic coagulant, to CCS.

Central Chemical Supplies Ltd, Craigavon, Co. Armagh [CCS]
CCS process the Envirofloc CL1000 by dilution to produce PAC which is then sold to Veolia.

Veolia Water Ireland Ltd [Veolia]
Veolia use the PAC as a coagulant in the water treatment process.

Central Chemical Supplies Ltd, Craigavon, Co. Armagh [CCS Ltd] supplied PAC to Veolia Water Ireland Ltd for all water treatment plants in the East Cavan bundle since they started operation of these plants. Several deliveries of PAC were made to the Glaslough/Tyholland GWS treatment plant prior to and during this incident. The individual deliveries around this time have been uniquely identified as follows:

Date	Source	Mode	Quantity	Report Name
28th Mar 2007	C.C.S.	3 x IBC	3,000 litres	PAC-1
11th Apr 2007	C.C.S.	2.5 x IBC	2,500 litres	PAC-1
17th Apr 2007	C.C.S.	8 x IBC	8,000 litres	PAC-2
03rd May 2007	Albion Chemicals Ltd	Tanker	3,000 litres	PAC-3

(IBC is the industry term used for a 1000 litre Intermediate Bulk Container)

Veolia Water Ireland Ltd stated that the original batches of polyaluminium chloride, PAC-1, had been in use at the treatment plant up to 17th April 2007. Veolia Water Ireland Ltd arranged for the removal of 8,750 litres of PAC from Glaslough/Tyholland GWS treatment plant by CCS Ltd and storage at its depot, in Craigavon, on 17th April

2007. 8,000 litres of replacement polyaluminium chloride (PAC-2) was supplied by Central Chemical Supplies Ltd on 17th April 2007.

CCS Ltd forwarded details of all deliveries, sales specifications and technical data for the PAC-2 to Cavan County Council, with copies to Monaghan County Council on 28th May 2007. The accompanying technical data sheet states that "*Envirofloc CL 1000 is excellent for the coagulation of fine suspended matter both waste and potable water treatment plants. Envirofloc CL 1000 is renowned for phosphate removal in waste-water treatment plants"*. Copy of data sheet included in appendix 1.7.

The email received from Matt Crowe, EPA, on 24th April 2007 was accompanied by a copy of a technical data sheet from Enva Ireland Ltd stating that "*Envirofloc CL 1000 is excellent for the coagulation of fine suspended matter in waste treatment plants. Envirofloc CL 1000 is renowned for phosphate removal in waste-water treatment plants"* The email was also accompanied by a copy of a letter dated 18th April 2007, addressed to CCS Ltd stating *"Please note that this product is not approved for potable water use, and is intended for sludge or wastewater use only. As you may be aware, if you wish to use any product for potable water use you must get the equivalent of DWI (Drinking Water Inspectorate) approval, which this product would not have. It is suitable for sludge treatment in water plants and for wastewater applications, but not for direct potable water treatment"*. Copies included in appendix 1.7**.**

There is a clear conflict in relation to the documentation provided to Monaghan County Council by Enva Ireland Ltd (via the EPA) and CCS Ltd. The exact nature or cause of contamination of the coagulant remains to be established.

Following the issue of the Article 9 Notice, Veolia Water Ireland Ltd secured a new supplier of PAC, Albion Chemicals Ltd, who sourced this product from Water Treatment Solutions Ltd in the UK. 3,000 litres of replacement polyaluminium chloride (PAC-3) was supplied by Albion Chemicals Ltd on 3rd May 2007. A sales specification for this Albion Chemicals supplied product is included in Appendix 1.15.

4.3 Testing of the Coagulant

On 10 May 2007 Veolia Water Ireland Ltd invited the GWS's and local authorities to take joint samples of the suspect PAC, which was stored at the CCS depot. On Friday the 18th May 2007, Monaghan County Council's Environmental Health Officer took samples of some of the original PAC in storage at the CCS depot in Craigavon, Co. Armagh, previously used at the Glaslough/Tyholland GWS. Analysis showed excessive levels of phenols. Results of the analyses are included in Appendix 2 – reference 18th May 2007.

This PAC was stored in a large quantity of 1000-litre containers known as IBC's and during the visit on 18th May, only a selection of these IBC's was sampled. It was subsequently decided by Monaghan County Council that samples should be taken from all of the IBC's in storage at this depot. Therefore, on 25th May 2007, Monaghan County Council's Environmental Health Officer returned to CCS and took samples of the PAC from each of the remaining IBC's that had been originally delivered to Glaslough/Tyholland GWS treatment plant. These samples were initially put in storage and were subsequently sent for analysis on 24th July 2007. Results are included in Appendix 2, reference 24th July 2007.

Section 5 - Discussion

This report deals primarily with the Local Authority's role in this incident which does not include an evaluation of the possible health implications resulting from consumption of the contaminated drinking water. The Health Service Executive, Dublin - North East is preparing a report on this incident in which are considered the contaminants and their effects. For details of the possible health implications arising from this incident, reference should be made to the Health Service Executive, Dublin - North East's report.

The contaminated drinking water discharged from the Glaslough/Tyholland GWS treatment plant at the time of this incident was not fit for human consumption. The incident resulted in the loss of supply of drinking water for in excess of 1000 group scheme consumers for a period of 97 days.

It was determined that the treatment plant operator Veolia Water Ireland Ltd had already replaced a batch of coagulant (on 11th April 2007 in a Cavan GWS) in response to complaints and a suspicion that it was a contaminated batch. Veolia Water Ireland replaced a batch of coagulant at Glaslough/Tyholland GWS treatment plant on 17th April 2007, after Monaghan County Council became aware of this incident (on 16th April 2007). The delay in informing the Group Schemes and thereby the Sanitary Authority added a delay to the resolution of this incident.

This type of incident highlights the importance of a well managed complaints handling system so that appropriate action can be taken in the event of customer complaints.

Following the issue of the Article 9 Notice, there was some time spent in identifying the analysis required as the contaminants could potentially react with the normal disinfection products used in water treatment to create further undesirable products. Also, the identification of laboratories that were approved to carry out this testing to the required accuracy took some time.

The Glaslough/Tyholland GWS situation was different from the other affected schemes in East Cavan in that an alternative temporary supply was put in place at the time of the placing of the Article 9 notice. This resulted in a protocol or action plan that first of all proved that the treatment plant was producing good water prior to refilling of the distribution network with water from the treatment plant.

Once established, the public information/communication system worked well. (A copy of the correspondence register is included at Appendix 1.16). There were regular communications and updates from Monaghan County Council, the GWS and the National Federation of Group Water Schemes (NFGWS). Methods of communication included mailed letters, hand-delivered information leaflets and local radio updates. The NFGWS facilitated the communication process by setting up a dedicated hotline for consumers.

Following the issuing of the Article 9, notice there was excellent co-operation between the relevant parties – Monaghan County Council, Cavan County Council, HSE Dublin - North East, NFGWS, Veolia Water Ireland Ltd and TJ O'Connor & Associates and all the affected Group Water Schemes.

As supervisory authority, Monaghan County Council's role during this incident was prescribed under the European Communities (Drinking Water) Regulations 2007 (SI 106 of 2007). The Council's legal requirements, as set out in the Regulations, required it to act in accordance with Articles 9 and 10. Article 9 required the Council, subject to agreement with the HSE, to ensure that the supply of water was restricted or prohibited and to ensure consumes were informed promptly and given necessary advice. This was completed on 19 April 2007.

Article 10 of the Regulations places a number of specific legal obligations on the group water scheme including:

- Investigating the cause of the failure
- Carrying out remedial action
- Notifying the water services authority
- Preparing an action programme where directed by the water services authority
- Implementing the action programme and
- Ensuring that consumers are informed of the remedial action taken.

Article 10 requires the water services authority to:

- Ensure that the group water scheme takes remedial action as soon as possible
- Direct the group water scheme to prepare an action programme within 14 days of notification of the non-compliance and
- Review and amend as necessary the action programme.

The primary objective of Monaghan County Council throughout this incident, in partnership with all other parties, was to ensure that the public was made aware of the non-compliant water and to work to restore a good and wholesome supply. The Council worked with the GWS in providing information to its members and technical assistance and administrative support to the GWS and its consultants, T.J. O'Connor & Associates. Monaghan County Council participated with all parties in formulating the action programme. Throughout the investigation of this incident, Monaghan County Council conducted all water sampling and analysis until the Article 9 Notice was removed.

The action plan and protocol agreed with the HSE ensured that the water supply was restored only after it was proven safe and in compliance with the requirements of the European Communities (Drinking Water) Regulations 2007 (SI 106 of 2007).

The cause of the contamination was attributed to the coagulant used in the treatment process. Whilst this was identified by Veolia Water Ireland Ltd., the operator of the plant, as the cause of the contamination, it must be noted that, prior to the enactment of the Water Services Act, 2007, Monaghan County Council had limited legal powers to pursue, investigate or prosecute individuals or companies in relation to contamination of the water supply under the regulations. Monaghan County Council obtained samples of the contaminated coagulant only after having received the consent of the operators, Veolia Water Ireland Ltd and their suppliers, CSS Chemicals Ltd, who are based in Northern Ireland.

Whilst it is the responsibility of the GWS to investigate the cause of the failure, under the European Communities (Drinking Water) Regulations 2007 (SI 106 of 2007) , they had no legal powers to pursue suppliers, seize or retain evidence or complete an investigation.

There are currently no legislative controls, in Ireland, for the procurement and supply of chemicals used for the treatment of water used for drinking.

Section 6 - Recommendations

The following are recommendations from Monaghan County Council arising from this incident.

6.1 Treatment Process/ Monitoring

6.1.1 Early notification of non-compliance

Design, Build and Operate (DBO) contracts are the preferred procurement route for the delivery of new and upgraded water services infrastructure under the government's Water Services Investment Programme and Rural Water Investment Programme.

Water treatment plants are increasingly operated by contractors on behalf of water suppliers, in both public and private schemes. Notwithstanding this, responsibility for the quality of drinking water under the Water Services Act 2007 remains the responsibility of the water supplier.

There is no legislative requirement on operators of water treatment plants to communicate directly with Water Service Authorities or the HSE. Under current DBO contracts, the nature of the relationship between operators of treatment plants and water suppliers (both public and group water schemes) is contractual. In the event of a significant water quality incident, such as occurred here, the earliest possible notification to the Supervising Authority is required to address potentially serious health issues as soon as possible..

Consideration should be given to amending the EU Drinking Water Regulations 2007 to require operators/contractors communicate directly with Supervising Authorities and/or the HSE, immediately, in the event of a water quality incident that potentially affects human health.

6.1.2 Standards for use of chemicals

In the United Kingdom, all chemicals used in the treatment of water intended for human consumption must conform to a recognized standard or else be approved on the approved list which is maintained by the Drinking Water Inspectorate on behalf of the relevant Water Authorities. In Ireland, IS CR 14629:2001 "*Chemicals used for treatment of water intended for human consumption – Guidelines for the purchase* "is a guidance document issued by the National Standards Authority of Ireland for the procurement of chemicals to be used in the treatment of water for drinking purposes. However, there are no statutory requirements to ensure that standards are in place to control the uses or standards of chemicals used in water treatment plants. Indeed many contracts completed over recent years for the operation of new and upgraded water treatment plants do not include a requirement that the chemicals used in the process conform to the above guideline.

Direction and standards are needed regarding the procurement and use of chemicals intended for use in the treatment of water intended for human consumption.

6.2 Laboratory capacity

Monaghan County Council wishes to acknowledge the assistance of the local EPA Laboratory staff in Monaghan in sourcing laboratory capacity for specialised analysis and in processing the increased volume of samples required throughout the investigation. However in the event of a similar incident elsewhere in the country, laboratory capacity to deal with the volume of additional water samples and non-routine analysis may not be readily accessible. This point has been highlighted in previous incident reports in relation to cryptosporidium outbreaks.

In the early stages of this incident, Monaghan County Council, together with the local EPA laboratory staff spent considerable time sourcing accredited laboratories that were approved to analyse for the suspected contaminants down to the required level of precision.

There is a need for the development of adequate accredited laboratory capacity, which is accessible to Local Authorities for immediate response during water quality incidents.

6.3 Dealing with water quality incidents

Water Services National Training Group is providing a training package for Emergency Management/Response in Drinking Water Supply Systems and this initiative is welcomed.

Guidance for local authorities on Regulation 9 and Regulation 10 of the European Communities (Drinking Water) (No 2) Regulations 2007 (S.I. 278 of 2007) were issued by the EPA in November 2007 with instructions from the Agency that they should be applied also to local authority supervision of group scheme supplies. Consultations are ongoing between the DoEHLG, EPA, NFGWS and CCMA in relation to the issue of an edited version of the guidance notes specially tailored for the group schemes sector. Whilst the guidance notes are welcome and necessary, immediate emergency action may be necessary, on occasion, by water treatment plant operators, prior to the issue of an Article 9 notice and the precautionary principle should always apply where drinking water quality is at risk. The guidance notes for the group schemes should account for the new relationships that exist between private plant operators, private suppliers and the Supervising Authority.

Future guidelines should also consider the diverse contractual arrangements that currently exist throughout the country, where water production may be contracted to private operators extending across more than one Sanitary Authority area.

The Precautionary Principle should apply in all cases where doubt exists over the quality of the drinking water supply. Guidelines should require water suppliers and treatment plant operators to take appropriate action at the earliest possible stage to protect public health.

6.4 Resources

The changes in legislation in the past year have added greatly to the workload of local authority Water Services Departments. One example is the role of the Water Services Authority as Supervisory Authority with respect to private water supplies. Additional staffing resources are required to ensure that the legislative requirements are complied with. The current embargo on staff recruitment is a major impediment towards ensuring

that Supervising Authorities can fulfil their statutory requirements under the European Communities (Drinking Water) Regulations 2007

A review of staffing resources should be undertaken to determine what additional resources are needed by local authority Water Services Departments to deal with the important day-to-day duties while simultaneously implementing the requirements of new legislation and guidelines.

6.5 Management of Water Treatment Plants

The recent Water Services Act 2007 places significant responsibility on the providers of drinking water. It is important that all water suppliers are fully acquainted with their roles and responsibilities under the Act and the EU Drinking Water Regulations 2007. Whilst the role of the group water scheme sector has changed under the new DBO and Operation and Management contractual arrangements, Group Water Schemes retain responsibility for the quality of the water produced in their plants.

Local Authorities also have to carry out their duties in relation to this legislation. It is important, therefore, that all water suppliers are fully aware of their responsibilities and perform accordingly. It is equally important that water treatment plant operators are adequately trained and competent to perform their duties and responsibilities. Training leading to the FETAC/FÁS National Skills Certificate in Water Treatment is provided in the five Training Centres run by the Water Services National Training Group, and is also run in-house for local authority and staff of private companies. However, after 11 years in operation, this certification process needs to be reviewed in light of the changing roles in the sector. There is also a need, due to continuing technological change, to specify a five-year time limit after which the Certificate would have to be renewed.

Consideration should be given to the implementation of an updated certification system for all persons (employees) with responsibility for the treatment and delivery of drinking water.

There is a need to ensure that all water suppliers avail of appropriate training for all employees engaged in the treatment and supply of drinking water.

This incident first came to light as result of consumer complaints. It therefore highlights the importance of a well managed complaint handling system and a response system so that appropriate action can be taken in the event of complaints.

It is critical that all water suppliers have in place a well-managed complaints handling system.

Appendix 1

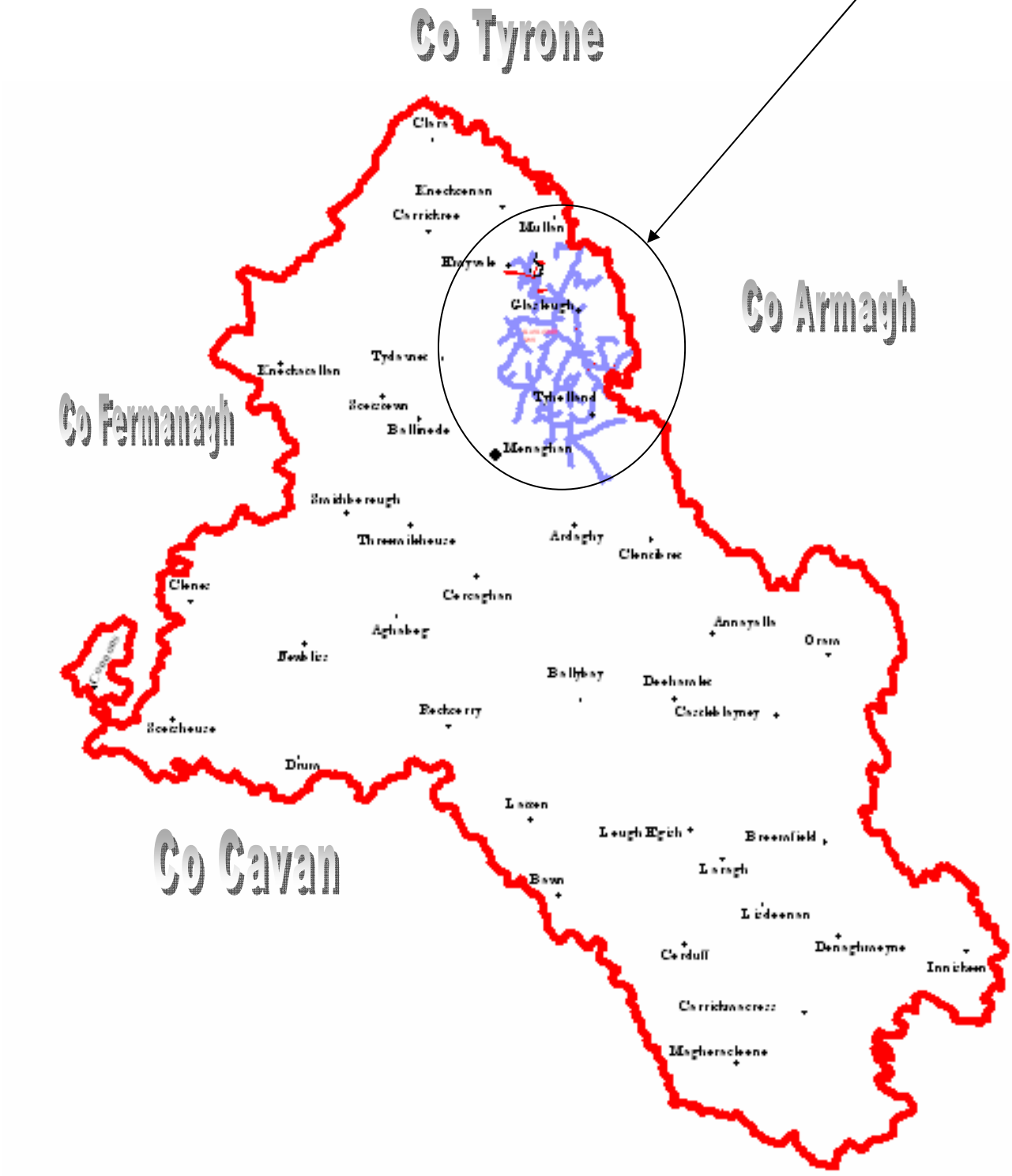
Supplementary Documents

Appendix 1
Supplementary Documents

1.1	Map of County Monaghan showing location of Glaslough/Tyholland GWS
1.2	Roles of Veolia Water Ireland Ltd, the Glaslough/Tyholland Group Water Scheme (GWS), and Monaghan County Council
1.3	Notice issued under Article 9 of the EC (Drinking Water) Regs, 2007
1.4	Do Not Consume Notice issued by Glaslough/Tyholland GWS
1.5	Incident Management Team Members
1.6	Photographs of temporary Public Water Supply taps
1.7	Copy of email from Matt Crowe, EPA to Paul Clifford, Monaghan County Council – 24 April 2007
1.8	Members of Response Action Team
1.9	Notice issued under Article 10 of the EC (Drinking Water) Regs, 2007
1.10	Update report to County Rural Water Monitoring Committee and Monaghan Co. Councillors - 9th May 2007
1.11	Update Letter issued by Glaslough/Tyholland GWS to Consumers
1.12	Location of points from which water samples taken on 14th, 15th, 18th June 2007
1.13	Letter to HSE advising that requirements for Lifting of Article 9 Notice had been satisfied
1.14	Copy of email from HSE to Monaghan Co. Council – 23 July 2007
1.15	Specification for Polyaluminium Chloride supplied by Albion Chemicals on 3rd May 2007
1.16	Correspondence register

Appendix 1.1

Map of County Monaghan showing location of Glaslough/Tyholland GWS



Appendix 1.2
Roles of Veolia Water Ireland Ltd, the Glaslough/Tyholland Group Water Scheme (GWS), and Monaghan County Council

Veolia Water Ireland Ltd

Veolia Water Ireland Ltd is contracted to produce up to a defined quantity of good and wholesome water in accordance with the European Communities (Drinking Water Regulations) 2007 (SI 106 of 2007).

In 2003, Cavan County Council, on behalf of ten group water schemes, appointed T.J. O'Connor & Associates – Consulting Engineers, Corrig House, Corrig Road, Sandyford, Dublin 18, as Client's Representative to procure water treatment services. The project was funded under the Rural Water Investment Programme and procured under a "bundled" Design, Build, Operate (DBO) contract, in accordance with government policy. Following a tender process, the successful contractor, Veolia Water Ireland Ltd, formerly known as Bowen Water Technology Ltd, was awarded the contract to design, build and operate (for a twenty year period) nine water treatment plants in East Co. Cavan and one treatment plant, for Glaslough/Tyholland GWS, in County Monaghan.

Bundled DBO contracts are the preferred procurement route of the Department of the Environment, Heritage and Local Government for the provision of upgraded treatment facilities to group water supply schemes throughout the country. This approach aims to upgrade plants ensuring compliance with water quality parameters under the European Communities (Drinking Water Regulations) 2007 (SI 106 of 2007), which replaced the 2000 Regulation (SI 439 of 2000), whilst providing value for money in the shortest possible timeframe.

Under the East Cavan DBO contract, work on the upgrading of the existing treatment plant at the Glaslough/Tyholland site was carried out during 2004 and 2005. Full operation of the upgraded plant by the DBO contractor was commenced on 1st December 2005.

Glaslough/Tyholland GWS

Glaslough/Tyholland GWS is the Water Supplier of the water produced, which is intended for human consumption, at the Glaslough/Tyholland GWS treatment plant.

Under the terms of the Drinking Water Regulations, the Water Supplier shall ensure that the water is wholesome and clean and meets the requirements of the Regulations. This responsibility extends from the point of abstraction, through treatment, through distribution to the point of compliance (the point at which the water emerges from the tap).

In accordance with the current Drinking Water Regulations, the Water Supplier is responsible for the following:

- keeping of records
- monitoring the quality of the drinking water
- advising customers of any problems re quality

- immediate investigation for the cause of any failure
- preparation of action programmes
- carrying out of remedial action as soon as possible
- notification of the Sanitary Authority where the Water Supplier becomes aware of a water quality failure
- implementation of action programmes
- ensuring consumers are notified of corrective action

Monaghan County Council - Sanitary Authority and Supervising Authority

The role of the Sanitary Authority is clearly defined in the European Communities (Drinking Water Regulations) 2007 (SI 106 of 2007) – later replaced by the European Communities (Drinking Water Regulations) (No. 2) 2007 (SI 278 of 2007). The regulations were enacted to give effect to the EU Drinking Water Directive 98/83/EC of 3 November 1998, and 200/60/EC of 23 November 2000. The regulations provide for a number of significant additional provisions to previous regulations. The European Communities (Drinking Water Regulations) 2007 (SI 106 of 2007) provide for the following:

- The Environmental Protection Agency (EPA) is the Supervisory Authority for sanitary authority water supplies, but sanitary authorities continue to supervise all other supplies.
- Actual monitoring of all supplies continues to be a function of sanitary authorities, but their monitoring programmes are subject to approval by the EPA.
- The EPA has powers of enforcement to ensure that sanitary authorities comply with their monitoring obligations.
- Supervisory authorities are required to undertake periodic audits of all water supplies to ensure compliance with the regulations (as carried out at present by the EPA on Sanitary Authority supplies).
- It is a duty of the Water Supplier to inform consumers of remedial action taken.
- Supervisory Authorities have powers of direct intervention to carry out necessary remedial works themselves if necessary, and to recover their costs from the Water Supplier.
- Intervention in the event of a health risk in a water supply is subject to agreement with the relevant Health Service Executive administrative area. (In the case of County Monaghan this is Dublin - North East, reflecting existing arrangements in practice).
  Supervisory authorities are required to keep a register of water suppliers under their supervision.
- Sanitary authorities are required to keep up to date records on monitoring results, and to make them available to the public.
- Registers/records may be kept in electronic format (such as on a website).
- Water suppliers are required to maintain records of any incidents, as directed by their Supervisory Authority, in relation to their operations generally, and make them available to their Supervisory Authority.
- Offence provisions now apply to all water suppliers.
- Additional offence provisions are included, in relation to:

failure to inform Supervisory Authorities of incidents or comply with directions,
failure to maintain records or inform consumers of incidents,
failure to keep the internal pipe network in premises supplying water to the public safe.

Article 7 of the European Communities (Drinking Water Regulations) 2007 (SI 106 of 2007) requires the Supervisory Authority to verify compliance with water quality in line with the parametric values set down in Part 1 of the schedule of the regulations and enforcement of compliance with the regulations. Article 9 of the regulations imposes a duty on a Supervising Authority to act, following consultation with the Health Service Executive, "*where it considers that a supply of water intended for human consumption constitutes a potential danger to human health*". The regulations also place responsibility on the Water Supplier to notify the Supervisory Authority of incidents in relation to water supply. Article 10 of the regulations requires the Supervisory Authority to ensure that any failure to meet specified parametric values is immediately investigated.

In June 2007, SI 206 of 2007 was replaced by the European Communities (Drinking Water Regulations) (No. 2) 2007 (SI 278 of 2007), however Articles 9 and 10 were unaffected.

Appendix 1.3
Notice issued under Article 9 of the EC (Drinking Water) Regulations, 2007

D.O.S 66/07

Subject: Notice To Glaslough/Tyholland Group Water Scheme

Order: I order, after having consulted with the Health Service Executive, that Monaghan County Council issue a notice in accordance with Article 9 of the European Communities (Drinking Water) Regulations, 2007 to Nuala Murphy, Secretary, Glaslough / Tyholland Group Water Scheme, Drumuck, Stranooden, Co. Monaghan instructing her that the supply of water intended for human consumption constitutes a potential danger to human health and to advise all consumers on the Glaslough/Tyholland Group Water Scheme not to use the water for drinking purposes or for the preparation of food until further notice.

Drafted By: PC/JC

Paul Clifford
Director of Water Services

Dated 19th April 2007

Appendix 1.4
Do Not Consume Notice Issued by Glaslough/Tyholland GWS

Glaslough / Tyholland Group Water Scheme

19 April 2007

Dear Member,

Over the past weeks a serious taste and odour problem has arisen with the water on Glaslough / Tyholland Group Water Scheme. This problem is totally beyond the control of the committee of Glaslough / Tyholland Group Water Scheme and it has emanated from the water treatment plant, which is operated on behalf of the scheme by Veolia Water Ireland. We the committee have been making every effort since the problem became apparent to establish the cause of the taste and odour and to have it rectified. At a meeting, which was attended by the treatment plant operator, Veolia Water Ireland, on 17th April we were assured that the cause of the problem had been identified and that the water would be back to full quality within a few days.

This evening we have been instructed by the Health Service Executive, Dublin & North East through Monaghan County Council to notify all consumers on the scheme that as a precautionary measure and until further notice the water on Glaslough / Tyholland Group Water Scheme is not to be used for drinking or for the preparation of food.

We regret any inconvenience this may cause. We would like to assure you that we are continuing to make every effort possible to have this problem rectified. We are also making every effort to put in place alternative drinking water supplies.

Information notices in relation to this issue will be broadcast on Northern Sound Radio.

Yours sincerely,

_____

Nuala Murphy,
Secretary
Glaslough / Tyholland
Group Water Scheme

Appendix 1.5
Incident Management Team Members

Incident Management Team

Cavan County Council
Frank Gibbons, Director of Services
Peter Gallagher, Senior Engineer, Water Services
John Denning, Senior Executive Engineer, Water Services
Colm O' Callaghan, Senior Executive Chemist, Environment
Tommy Costello, Administrative Officer, Rural Water Liaison Manager

Monaghan County Council
Paul Clifford, Director of Services, Water Services
Dan Doody, Senior Engineer, Water Services
Vincent McKenna, Assistant Engineer, Water Services
John D. Quinn, Environmental Health Officer

Group Schemes
Mary O' Reilly, Bunnoe GWS
Edmund McEntee, Bunnoe GWS
Michael Donohoe, Crosserlough GWS
Eamon O' Reilly, Dernakesh GWS
Barney Heery, Dernakesh GWS
Gerry McIntyre, Kill GWS

NFGWS
Sean Clerkin, National Co-ordinator
Colm Brady, Assistant National Co-ordinator
Jean Gibson, Quality Assurance Officer
Brian MacDomhnaill, Press Officer

Veolia Water Ireland Ltd
Richard Dujardin, Managing Director
Helen Clay – Chapman, Water Quality Advisor
Matt Kelly, Manager - Operations
Neasa Harmon, Process

T.J. O'Connor & Associates [Client's Representative, Cavan East DBO]
Paid Cassidy, Project Director
Niall McCaffrey, Project Engineer

HSE DUBLIN & NORTH EAST
Fergus Barry, Senior Environmental Health Officer, HSE Dublin & North East

Appendix 1.6
Photographs of temporary Public Water Supply taps

Temporary Public Water Tap – Emyvale Village

Temporary Public Water Tap – Glaslough Village

Temporary Public Water Tap – Monaghan Town Fire Station

Appendix 1.7a
Copy of email Matt Crowe, EPA to Paul Clifford, Monaghan Co. Council
24 April 2007

From: Matthew Crowe [mailto:m.crowe@epa.ie]
Sent: 24 April 2007 11:12
To: Clifford, Paul
Subject: RE: Further Update on Glaslough Tyholland GWS

Thank you Paul,

Here is a summary of the information available to the EPA based on enquiries made to date.

The product, Envirofloc CL 1000, is produced by ENVA Ireland Ltd., Cork. I am forwarding under separate email an email received from ENVA Ireland Ltd. which includes a copy of the Technical Data Sheet and a copy of a letter sent by ENVA to Central Chemicals in relation to the use of Envirofloc CL 1000. The product is manufactured for ENVA Ireland Ltd. by Cognis Ireland Ltd., Cork. Veolia Ltd. purchased the product from Central Chemicals Ltd., Armagh, who diluted it prior to supplying it to Veolia. As you can see from the email from ENVA, ENVA state that the product is not suitable for use in drinking water treatment. This is a serious issue, nothwithstanding the fact that the product appears to have become contaminated. I contacted Des Savage of Central Chemicals who confirmed for me that Veolia Ireland Ltd. was the only company in the Republic of Ireland supplied with the product that they had sourced from ENVA. He also mentioned that a sample of the 'concentrate' had been sent to Queens University for analysis and that the result showed a level of 12,000 ppm phenol. ENVA has been supplying Envirofloc CL 1000 to Central Chemicals for 2.5 to 3 years. Veolia has supplied me with a list of the schemes at which Envirofloc CL 1000 was used (one on Monaghan and eight in Cavan). I ahve passed on the details of the schemes in Cavan to Peter Gallagher.

Matt Crowe
Programme Manager
Office of Environmental Enforcement
Environmental Protection Agency
P.O. Box 3000
Johnstown Castle Estate
Wexford
Ph: 053 60657
Fx: 053 60699
email: m.crowe@epa.ie

Appendix 1.7b
Copy of letter from Enva Ireland Ltd to CCS Ltd

April 18th, 2007

Mr. Des Savage
Central Chemicals Supplies Ltd.
44 Hall Road
Donaghcloney
Craigavon
Co. Armagh
BT66 7LJ

Des,

It has recently come to our attention that one of the products you purchase from us, Envirofloc CL1000, is subsequently being supplied by you into a potable water treatment process.

Please note that this product is not approved for potable water use, and is intended for sludge or wastewater use only. As you may be aware, if you wish to use any product for potable water use you must get the equivalent of DWI (Drinking Water Inspectorate) approval, which this product would not have. It is suitable for sludge treatment in water plants and for wastewater applications, but not for direct potable water treatment.

We must therefore insist that you do not use this product in potable water use.

Some IBC's of the product were recently returned by you, and on inspection here were found to have an opaque colour which was not 'clear' as outlined in our product specification. All other tests were within specification. The colour is due to some carryover of activated carbon from the process we use to produce the product which should not have occurred. For that reason we have no problem in replacing these IBC's for you.

I trust that this is acceptable to you and if you have any further queries please contact either myself or Brian Magrane.

Yours Sincerely,

_____
Finbarr Pyne
Business Manager

cc. Brian Magrane, Enva
cc. Gavin Fitzimons, Central Chemicals

Appendix 1.7c

Copy of Technical Data Sheet from Enva Ireland (via EPA) to Monaghan Co Council

ENVA IRELAND LTD

Raffeen Industrial Estate, Ringaskiddy, Co. Cork
Phone: 021 4387200 Email: cork@enva.ie Fax: 021 4387299

Envirofloc CL 1000

Liquid inorganic coagulant

APPLICATION : ***Envirofloc CL 1000*** is an inorganic coagulant which is especially useful in the removal of colloidal material from waste streams. ***Envirofloc CL 1000*** functions by reacting with these materials to form charged complexes. ***Envirofloc CL 1000*** is excellent for the coagulation of fine suspended matter in waste treatment plants. ***Envirofloc CL 1000*** is renowned for phosphate removal in waste-water treatment plants.

ADVANTAGES :

* Wide variety of applications
* Convenient liquid form
* Reduction in solids in filter effluent
* Promotes faster settling floc
* Forms insoluble salts at neutral pH
* Increased filter yield

DOSAGE : ***Envirofloc CL 1000 dosage rates depend upon the system to be treated*** :

- Primary Coagulant - Can replace the use of traditional inorganic primary coagulants. Recommended dose rates 100-1000 ppm

- Phosphorus Removal- Dosages of approx. 12 Kg ***Envirofloc CL 1000*** per Kg P are recommended

Variations from the recommended dosage ranges may be expected depending on the type of waste. Most wastes respond readily to treatment at the recommended dosages. Exact dosage rates may be determined by laboratory jar tests or by plant trial.

FEEDING : ***Envirofloc CL 1000*** should be added continuously in proportion to the flow to be treated. Addition should be to a point of turbulence to ensure adequate dispersion. The product must be added in conjunction with sufficient alkalinity to neutralise the system in order to allow the formation of the precipitate/floc.

PRODUCT DATA :

- Free flowing clear liquid
- pH - approx 1.0 – 3.0
- Density 1.25- 1.35
- Chloride 16- 17%
- Aluminium 13- 15% as AL203

HANDLING & PACKAGING : Keep container closed if not in use. Store in a cool, dry place. Avoid contact with skin and eyes.Avoid contact with alkalis. Packaged in 25, 200 and 1000 Ltr containers.

Appendix 1.7d
Copy of Correspondence from CCS Ltd to Monaghan County Council

By hand from S. Quinn
29th May 2007.

CCS

Central Chemical Supplies Ltd.

John Denning
Cavan County Coucil

22/05/07

Dear Sir,

In response to your request for further clarification re: PAC10 and Envirofloc CL1000 I hope the following information will meet your requirements.

Dates, quantities, manner of supply and haulier of deliveries of Envirofloc CL1000 to CCS.

Date	Supplier	Product	Quantity	Manner	Haulier
22/01/07	Enva	CL1000	22x1300 Kg	IBCs	CCS
06/02/07	Enva	CL1000	6x1300 Kg	IBCs	CCS
26/02/07	Enva	CL1000	6x1300 Kg	IBCs	CCS
02/03/07	Enva	CL1000	12x1300 Kg	IBCs	CCS
02/04/07	Enva	CL1000	16x1300 Kg	IBCs	CCS
17/04/07	Enva	CL1000	21,600 Kg	Tanker	South Coast

Details of the above which had a hold put on them by CCS.

9 IBCs, Numbers 21 – 29, of unused CL1000 are held at CCS Ltd.

These are all Batch Number 19985.

Details of Deliveries of first and second batch of PAC 10

These are listed in Appendix 1.

Details of all returns of PAC10

First delivery - see Appendix 2.

Second delivery - there were no returns.

Details of Deliveries of Chemifloc to treatment works in Cavan and Monaghan

These are also listed in Appendix 1.

CL 1000 Dilution Rate

The dilution rate to convert Envirofloc CL1000 to PAC 10 is :

280 Lts of water to 720 Lts of CL1000.

Relevant Data sheets are included with this letter:

Envirofloc CL 1000 Material Safety Data Sheet and Technical Data sheet.

PAC 10 CCS Material Safety Data Sheet and Specification.

Chemifloc PAC 10 Material Safety Data Sheet and Specification.

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

Yours faithfully

Gavin FitzSimons

Appendix 1

Deliveries of PAC 10 to Veolia by CCS in 2007

Date	Quantity	To	Delivery Note Number
03/01/07	2 IBCs	Bunnoe	50187
03/01/07	2IBCs	Dernakesh	50185
03/01/07	2 IBCs	Mountain Lodge	50186
10/01/07	2 IBCs	Billis Lavey	49900
10/01/07	2 IBCs	Drumkeery	49899
10/01/07	3 IBCs	Crosserlough	49898
17/01/07	1 IBC	Mountain Lodge	50701
17/01/07	1 IBC	Kill	50702
17/01/07	5 IBCs	Glasslough	50703
24/01/07	4 IBCs	Billis Lavey	50398
24/01/07	2 IBCs	Drumkeery	50397
24/01/07	1 IBC	Bunnoe	50396
07/02/07	1 IBC	Dernakesh	50442
07/02/07	2.5 IBCs	Crosserlough	50440
07/02/07	4.5 IBCs	Glasslough	50441
15/02/07	2 IBCs	Dhuish	50835
15/02/07	2 IBCs	Drumkeery	50837
21/02/07	3 IBCs	Glasslough	50841
21/02/07	1 IBC	Kill	50843
21/02/07	2 IBCs	Mountain Lodge	50844
25/02/07	3 IBCs	Billis Lavey	50836
28/02/07	3 IBCs	Crosserlough	50593
28/02/07	2 IBCs	Dernakesh	50592
28/02/07	2 IBCs	Bunnoe	50591
06/03/07	3 IBCs	Billis Lavey	50797
06/03/07	2 IBCs	Drumkeery	50796
06/03/07	3 IBCs	Glasslough	50795
14/03/07	5 IBCs	Glasslough	51261
14/03/07	4 IBCs	Drumkeery	51260
14/03/07	1 IBC	Mountain Lodge	51262
28/03/07	1 IBC	Kill	52060
28/03/07	3 IBCs	Crosserlough	52061
28/03/07	1 IBc	Dernakesh	52062
28/03/07	3 IBCs	Glasslough	52063

Appendix 1 Cont'd

Date	Quantity	To	Delivery Note Number
04/04/07	4 IBCs	Billis Lavey	51471
04/04/07	1.5 IBCs	Bunnoe	51469
04/04/07	2.5 IBCs	Drumkeery	51470
11/04/07	2.5 IBCs	Glasslough	52118
11/04/07	2 IBCs	Crosserlough	52117
11/04/07	2.5 IBCs	Mountain Lodge	52116
11/04/07	2 IBCs	Bunnoe	51398
11/04/07	2 IBCs	Kill	51397
16/04/07	1 IBC	Bunnoe	52119
16/04/07	2 IBCs	Dernakesh	52120

Second Batch PAC 10 - Enva Material

17/04/07	8 IBCs	Glasslough	52263
17/04/07	2 IBCs	Crosserlough	52460
18/04/07	6 IBCs	Mountain Lodge	51437
18/04/07	4 IBCs	Billis Lavey	51438
18/04/07	7 IBCs	Drumkeery	51439

Chemifloc Material

23/04/07	6 IBCs	Crosserlough	52603

Appendix 2

Returns of First Batch PAC10

Full IBCs (1000 Lts) returned to CCS are available for inspection, with the exception of Numbers 1 – 8 which were subsequently forwarded to Enva.

From	Date	Numbers	Haulier
Kill/Bunnoe	12/04/07	1 – 4	CCS
Dernakesh	13/04/07	5 – 14	CCS
Crosserlough	16/04/07	15 – 20	CCS
Glasslough	17/04/07	31 – 40	CCS
Mountain Lodge	18/04/07	41 – 46	CCS
BillisLavey	19/04/07	47 – 54	CCS
Drumkeery	20/04/07	55 – 60	CCS
Envirofloc CL 1000 unused		21 – 29	

IBC Number 30 is a half full IBC, (site unsure).

Technical
Data
Sheet

Envirofloc CL 1000

Liquid inorganic coagulant

APPLICATION : *Envirofloc CL 1000* is an inorganic coagulant which is especially useful in the removal of colloidal material from waste streams. *Envirofloc CL 1000* functions by reacting with these materials to form charged complexes. *Envirofloc CL 1000* is excellent for the coagulation of fine suspended matter both waste and potable water treatment plants. *Envirofloc CL 1000* is renowned for phosphate removal in waste-water treatment plants.

ADVANTAGES :

- Wide variety of applications
- Convenient liquid form
- Reduction in solids in filter effluent
- Promotes faster settling floc
- Forms insoluble salts at neutral pH
- Increased filter yield

DOSAGE : *Envirofloc CL 1000 dosage rates depend upon the system to be treated* :

- Primary Coagulant - Can replace the use of traditional inorganic primary coagulants. Recommended dose rates 100-1000 ppm

- Phosphorus Removal - Dosages of approx. 12 Kg *Envirofloc CL 1000* per Kg P are recommended

Variations from the recommended dosage ranges may be expected depending on the type of waste. Most wastes respond readily to treatment at the recommended dosages. Exact dosage rates may be determined by laboratory jar tests or by plant trial.

FEEDING : *Envirofloc CL 1000* should be added continuously in proportion to the flow to be treated. Addition should be to a point of turbulence to ensure adequate dispersion. The product must be added in conjunction with sufficient alkalinity to neutralise the system in order to allow the formation of the precipitate/floc.

PRODUCT DATA :

- Free flowing clear liquid
- Specific gravity : 1.1 - 1.30
- pH - approx 1.0 - 2.0

HANDLING & PACKAGING : Keep container closed if not in use. Store in a cool, dry place. Avoid contact with skin and eyes. Avoid contact with alkalis. Packaged in 25, 200 and 1000 Ltr containers.

Central Chemical Supplies Limited.
Ref: CCS/PAC10
Issue Date: 01/09/05
Printed on: 28 September 2005

SALES SPECIFICATION

HARD COPIES OF THIS DOCUMENT
WILL NOT BE SERVICED.

PRODUCT: **PAC 10**

SPECIFICATION REFERENCE: CCS/PAC10

Specification

Polyaluminium chloride nominal concentration 10% w/w
Free flowing colourless to slightly hazy liquid
Specific gravity @ 20°C : 1.1 - 1.30
pH approx 1.0 – 3.0

COMMENT:
Information on this specification is believed to be accurate at time of print and is given in good faith. It is however for the customer/end user to satisfy themselves as to the suitability for their own particular use. Accordingly, Central Chemical Supplies Limited and its affiliated companies, give no warranty as to the fitness of the product for any particular purpose and any implied warranty or condition (statutory or otherwise) is excluded, except to the extent that such exclusions are prevented by law. Freedom under patent or copyright and designs cannot be assumed.

Signed on behalf of Central Chemical Supplies Limited (or affiliated companies):

M Doak

Position within organization:

Q-C.M.

Chemifloc Ltd.

Chemical Manufacturers.
Smithstown Industrial Estate, Shannon, Co. Clare, Ireland.
Telephone: +353 61 708699, Fax: +353 61 708698
e-mail: info@chemifloc.ie
Web: www.chemifloc.ie

CCS: I3400 1057
21/4/07

Product Specification:

PolyAluminium Chloride 10%

Parameter	Specification
Chemical Name	Polyaluminium Chloride Hydroxide
Synonym	PAC
Chemical Formula	$Al_n(OH)_mCl_{3n-m}$
CAS Number	1327-41-9
Appearance	Colourless Liquid, free from ppt
Concentration %w/w Al_2O_3	9.5-10.5
Specific Gravity @ 20°C	1.190-1.220
pH	0.5 to 1.0
Arsenic (As)	Less than 1.0 mg/Kg
Cadmium (Cd)	Less than 0.2 mg/Kg
Chromium (Cr)	Less than 2.0 mg/Kg
Mercury	Less than 0.2 mg/Kg
Nickel (Ni)	Less than 1.0 mg/Kg
Lead (Pb)	Less than 2.0 mg/Kg
Antimony (Sb)	Less than 1.0 mg/Kg
Selenium (Se)	Less than 1.0 mg/Kg

This product conforms to I.S.EN 883:2005 (Type 1)

By hand from S.Q.
29th May 2007

Material Safety Data Sheet **ENVIROTECH**

Envirofloc CL 1000

Rev No: 1 *Date: 30.08.04*

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND COMPANY/UNDERTAKING

A: **Product Name** : **Envirofloc CL 1000**

B: **Company** : **Environmental Technology Ltd**
Ballycurreen Ind. Estate
Kinsale Road
Cork
Ireland

C: **Telephone** : **(+353)21-4962554**
Telefax : **(+353)21-4962345**
Emergency Phone No : **(+353)86-2568258**

2. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical characterisation:

A: **Description:**
Aqueous blend of proprietary inorganic coagulants

3. HAZARDS IDENTIFICATION

A: **Description:**
Corrosive

B: **Hazardous components**

1. Description:	Highly Corrosive.	
2. Symbol:	Corrosive	
3. R-Phrases	R35	Causes Severe Burns
	R41	Risk of serious damage to eyes

4. FIRST AID MEASURES

A Eye Contact	(i)	Rinse well with water for at least 15 minutes - if irritation persists seek medical advice.
B Skin Contact	(i)	Wash with water. Remove contaminated clothing. If irritation persists seek medical advice.
C Ingestion	(i)	Do not induce vomiting. Wash out mouth with water. Seek immediate medical advice.
D Inhalation	(i)	Remove to fresh air and rest. If irritation persists seek medical advice.

5. FIRE-FIGHTING MEASURES

A Special Hazards	(i)	Not flammable
B Extinguishing media - Suitable	(i)	Use extinguisher suitable to cause of fire.
C Special protective equipment for fire fighter	(i)	Wear chemical resistant clothing.

6. ACCIDENTAL RELEASE MEASURES

A Personal Precautions	(i)	Avoid contact with skin and eyes.
	(ii)	Wear protective clothing.
B Environmental Precautions	(i)	Keep away from drains.
	(ii)	Avoid contact with surface water or groundwater.
	(iii)	Inform local authority in case of large spills.
C Methods for cleaning up	(i)	Collect with absorbent material such as sand or earth.
	(ii)	Flush small spills to drain using large amounts water.
	(iii)	Dispose of by following all local authority laws.

7. HANDLING AND STORAGE

A Handling

(i) Avoid contact with skin & eyes. Wear gloves and goggles.

B Storage

(i) Store in a cool area.
(ii) Store in a bunded area.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

A General Protection

(i) Do not allow material to enter drains.
(ii) Avoid spillages.

B Personal Protection

(i) Wear rubber gloves.
(ii) Wear PVC gloves.
(iii) Wear safety goggles.
(iv) Wear full protective suit.
(v) Wear boots.

9. PHYSICAL AND CHEMICAL PROPERTIES

(i)	Appearance:	Clear Liquid
(ii)	Odour:	Negligible.
(iii)	Specific Gravity:	1.25 – 1.35
(iv)	pH:	<1
(v)	Particulate matter	Negligible

10. STABILITY AND REACTIVITY

A Conditions to avoid

(i) Extreme temperature

B Materials to avoid

(i) Alkalis
(ii) Oxidising Agents

C Hazardous decomposition products:
Decomposition may lead to the formation of hazardous gases

11. TOXICOLOGICAL INFORMATION

(i) No experimental toxicity values available

12. ECOLOGICAL INFORMATION

(i) No experimental toxicity values available.
(ii) Care should be taken in water treatment not to overdose the system. Low pH of material may injure aquatic life in sufficient concentrations.

13. DISPOSAL CONSIDERATIONS

(i) Dispose of observing all local authority regulation to an authorised disposal facility.

14. TRANSPORT INFORMATION

(i) Primary Hazard – Corrosive
(ii) UN Number: 2581

15. REGULATORY INFORMATION

A Labelling	(i)	Symbols. Corrosive		
	(ii)	R-phrases	R35	Causes severe burns
			R41	Risk of serious eye damage
	(iii)	S-Phrases	S24	Avoid contact with skin
			S25	Avoid contact with eyes
			S36/37/39	Wear suitable protective clothing, gloves and eye/face protection.

16. OTHER INFORMATION

A **Recommended uses and restrictions.** This product is used in the treatment of water and wastewater. For correct dosing and application always consult with your Envirotech representative.

B **Training advice.** N/A

C **Further information.** N/A

D **The information given in this data sheet is based on our current knowledge and is given in good faith. However it should not be construed as a warranty for which Environmental Technology assumes legal responsibility.**

By hand from I.Q.
29th May 2007.

MATERIAL SAFETY DATA SHEET

According to EC directive 93/112/EC.

1. PRODUCT AND COMPANY IDENTIFICATION.

Trade Name:	**PAC10**
Synonyms:	Poly Aluminium Chloride 10%
Manufacturer/Supplier:	Central Chemical Supplies Limited 44 Hall Road Donaghcloney, Craigavon Co. Armagh, BT66 7LJ. Northern Ireland.
Telephone Number:	+44 (0) 28 38 881 936.
Fax Number:	+44 (0) 28 38 882 335.
Emergency Telephone Number:	+44 (0) 28 38 881 936.

2. COMPOSITION/INFORMATION ON INGREDIENTS.

Chemical characterisation:	Aqueous blend of proprietary inorganic coagulants.

Hazardous components

Description:	Highly corrosive.
Hazard symbol(s):	C – Corrosive
Risk phrase(s):	R35 – Causes severe burns. R41 – Risk of serious damage to eyes

3. HAZARD IDENTIFICATION.

Description:	Corrosive.

4. FIRST AID MEASURES.

First aid – Eye:	Rinse well with water for at least 15 minutes. If irritation persists seek medical advice.
First aid – Skin:	Wash with water. Remove contaminated clothing. If irritation persists seek medical advice.
First aid – Ingestion:	Do not induce vomiting. Wash out mouth with water. Seek immediate medical advice.
First aid – Inhalation:	Remove to fresh air and rest. If irritation persists seek medical advice.

5. FIRE FIGHTING MEASURES

Special hazards:	Not flammable.
Suitable extinguishing media:	Use extinguisher suitable to cause of fire.
Special protective equipment for fire fighters	Wear chemical resistant clothing.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions:	Avoid contact with skin and eyes. Wear protective clothing.
Environmental precautions:	Keep away from drains. Avoid contact with surface water or ground water. Inform local authority in case of large spills.
Methods for cleaning up:	Collect with absorbent material such as sand or earth. Flush small spills to drain using large amounts of water. Dispose of by following all local authority laws.

7. HANDLING AND STORAGE

Handling:	Avoid contact with skin and eyes. Wear gloves and goggles.
Storage:	Store in a cool area. Store in a bunded area.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

General protection:	Do not allow material to enter drains. Avoid spillages.
Personal protection:	Wear rubber gloves. Wear PVC gloves. Wear safety goggles. Wear full protective suit. Wear boots.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	Clear liquid.
Odour:	Negligible.
Specific gravity:	Approx. 1.20-1.30
pH:	approx. 1-3
Particulate matter:	Negligible.

10. STABILITY AND REACTIVITY

Conditions to avoid:	Extreme temperature.
Materials to avoid:	Alkalis. Oxidising agents.
Hazardous decomposition products:	Decomposition may lead to the formation of hazardous gases.

11. TOXICOLOGICAL INFORMATION

No experimental toxicity values available.

12. ECOLOGICAL INFORMATION

No experimental toxicity values available. Care should be taken in water treatment not to overdose the system. Low pH of material may injure aquatic life in sufficient concentrations.

13. DISPOSAL

Disposal:	Dispose of observing all local authority regulations to an authorised disposal facility.

14. TRANSPORT INFORMATION

ADR:

Primary hazard:	Corrosive.
Packing Group:	III
UN no:	2581
Proper shipping name	Aluminium chloride solution

15. REGULATORY INFORMATION

Hazard symbol(s):	C – Corrosive.
Risk phrase(s):	R34 – Causes burns. R41 – Risk of serious eye damage.
Safety phrase(s):	S24 – Avoid contact with skin. S25 – Avoid contact with eyes. S26 – In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S36/37/39 – Wear suitable protective clothing, gloves and eye/face protection

16. OTHER INFORMATION

Disclaimer

The information contained in this document is intended to describe the product only in terms of health, safety and environmental requirements for the purposes of its safe handling, use and disposal and is to the best of Central Chemical Supplies Limited knowledge and belief correct. Central Chemical Supplies Limited Technical Services will be pleased to give further advice and assistance, but customers must satisfy themselves (by appropriate testing if necessary) that the product is suitable for their purposes and conditions of use and that their facilities and arrangements are suitable for handling or using the product. Accordingly Central Chemical Supplies Limited disclaims any liability for loss, injury or damage which may result from the use of the product, this information or from such advice and assistance save as may be expressly agreed under its terms of sale. This information does not comprise a technical or performance specification for the product and customers are referred to any relevant product technical information or specification issued by Central Chemical Supplies Limited.

Customers are also reminded that there may be uses or application for the product which are protected by Central Chemical Supplies Limited or third parties' patent rights and nothing herein may be construed as an authority or encouragement to use or apply the product in contravention of such rights.

Appendix 1.8
Members of Response Action Team

Response Action Team

Matt Kelly, Veolia Water Ireland Ltd
Neasa Harmon, Veolia Water Ireland Ltd
Paid Cassidy, T.J. O'Connor & Associates
John Denning, Cavan County Council
Colm O' Callaghan, Cavan County Council
Tommy Costello, Cavan County Council
Vincent McKenna, Monaghan County Council
John D. Quinn, Monaghan County Council
Colm Brady, National Federation of Group Water Schemes

Appendix 1.9
Notice issued under Article 10 of the EC (Drinking Water) Regulations, 2007

1st May 2007

Nuala Murphy,
Secretary,
Glaslough / Tyholland Group Water Scheme Ltd.,
Drumuck,
Stranooden,
Co. Monaghan

Re: Glaslough / Tyholland Group Water Scheme - European Communities (Drinking Water) Regulations, 2007

A Chara,

I refer to the above and the measures taken by Monaghan County Council on 19 April 2007, in accordance with Article 9 of the European Communities (Drinking Water) Regulations, 2007, to prohibit the use of water for drinking purposes or for the preparation of food until further notice.

In accordance with Article 10 of the European Communities (Drinking Water) Regulations, 2007, Monaghan County Council directs Glaslough / Tyholland Group Water Scheme Ltd to prepare an action programme and to submit it for the approval of Monaghan County Council within 60 days and to implement such action programme for the improvement of the quality of the water so as to secure compliance with the European Communities (Drinking Water) Regulations, 2007 as soon as possible and not later than 1 September 2007.

Monaghan County Council is available to discuss with you or your consultants in relation to any aspect of this action programme. The notice issued on the 19 April 2007 must remain in place until the implementation of an approved action programme is completed.

Yours faithfully

Paul Clifford
Director of Water Services

Appendix 1.10

Update report to County Rural Water Monitoring Committee and Monaghan Co. Councillors - 9th May 2007

Update – 9th May 2007 – Glaslough / Tyholland GWS
Do Not Consume Notice

Summary

Following Taste & Odour complaints from several consumers on the Glaslough/Tyholland GWS supply, a decision was taken by Monaghan County Council to issue a "Do Not Consume or Use for Food Preparation" notice on the water supplied from the GWS. This notice was put in place on Thursday 19th April 2007. The decision for this notice was based on consultation with officials from the Health Service Executive, Dublin & North East plus information received from Veolia Water Ireland Ltd that a batch of Coagulant, recently delivered to the Treatment Plant may have been contaminated. A delivery of the potentially contaminated batch of coagulant was made to a number of locations in East Cavan also.

At present, a procedure is in place to verify the quality of the water being produced at the Treatment Plant and also at the Consumer end of the Network. Once all steps have been taken and verification complete, the Notice shall be lifted.

Ongoing Developments

Up to April 19th
Complaints were being received regarding poor Taste & Odour from the water. TCP-like odour.

Thursday 19th April 2007
Meeting of GWS, MCC & Veolia Personnel at Treatment Plant
Decision taken by MCC to issue Notice.
Treatment Plant Shut Down. Reservoir allowed to drain down.

Friday 20th April 2007
Reservoir cleaned by GWS personnel.
Alternative Borewell supply [Armagh Road Junction] connected to network by MCC.
Borewell put into operation.
Notice remained in place.

Monday 23rd April thru Wednesday 2nd May 2007
A series of meetings was held to discuss the many issues arising. In attendance were representatives from:
Veolia Water Ireland Ltd
NFGWS
Monaghan Co. Co.
Cavan Co. Co.
Each affected GWS
HSE
An Incident Room was set up by Veolia Water Ireland Ltd in the CITC building in Cavan.

Following a series of daily meetings, an action plan for the removal of the Notice for each scheme was derived and agreed upon. The Action Plan for Glaslough Tyholland was agreed in principle on Wednesday 2nd May 2007.

Action Plan for Glaslough/Tyholland GWS
In general, this plan sets out the steps to verify the quality of the water being produced by the Treatment Plant. Once verified OK, water will be directed to the TW Reservoir while at the same time the Borewell supply will be switched off and isolated from the network.

Once the good Treatment Plant water has filled the Reservoir and the distribution network a set of three consecutive samples will be taken at appropriate locations at the end of the network. Three consecutive clear samples from the end of the network will be required in order that the Notice may be lifted.

Current Status
Treatment plant was run over the past weekend and again yesterday (Tues 8th May) in order to get ready for sampling. Sampling should have commenced at midday on Tuesday but due to the late delivery of neutralising agent (to neutralise the chlorinated water going back to the lake) the sampling did not commence until today – Wednesday 9th May. First sample of treated water from the Treatment Plant was taken at 3pm.

Plant will continue to run, to waste, until three samples are taken.

Results from the Treatment Plant sampling are expected back on the 5-working day turnaround. However, recent samples from other locations are taking more than 5 days for results.

Appendix 1.11

Update letter(10th May) issued by Glaslough/Tyholland GWS to Consumers

Glaslough / Tyholland Group Water Scheme

Dear Member,
The committee of Glaslough / Tyholland Group Water Scheme wish to update members on the situation regarding the water supply in the area.

The instruction not to use the water for drinking purpose or for the preparation of food will remain in place until further notice, as a precautionary measure.

Richard Dujardin, Managing Director Veolia Water Operations Ireland Ltd. attended our A.G.M. on 3 May 2007 and apologised for their failure to operate the plant in accordance with our contract. As a consequence, G.W.S. committee agreed to extended its discount scheme to all members, as a result of the failure to supply potable water over the past month.

Action Plan for Glaslough/Tyholland GWS
Last week, T.J. O'Connor & Associates (on behalf of the G.W.S.) and Veolia Water prepared an Action Plan to restore normal supply to the G.W.S.. The Plan involves extensive testing of the treatment plant and the distribution network over the coming weeks to verify that all non-compliant has been expelled from the system. This Action Plan was approved by Monaghan County Council together with the Health Services Executive in accordance with the E.U. (Drinking Water) Regulations 2007. The normal drinking water supply can only be restored upon successful implementation of the Action Plan.

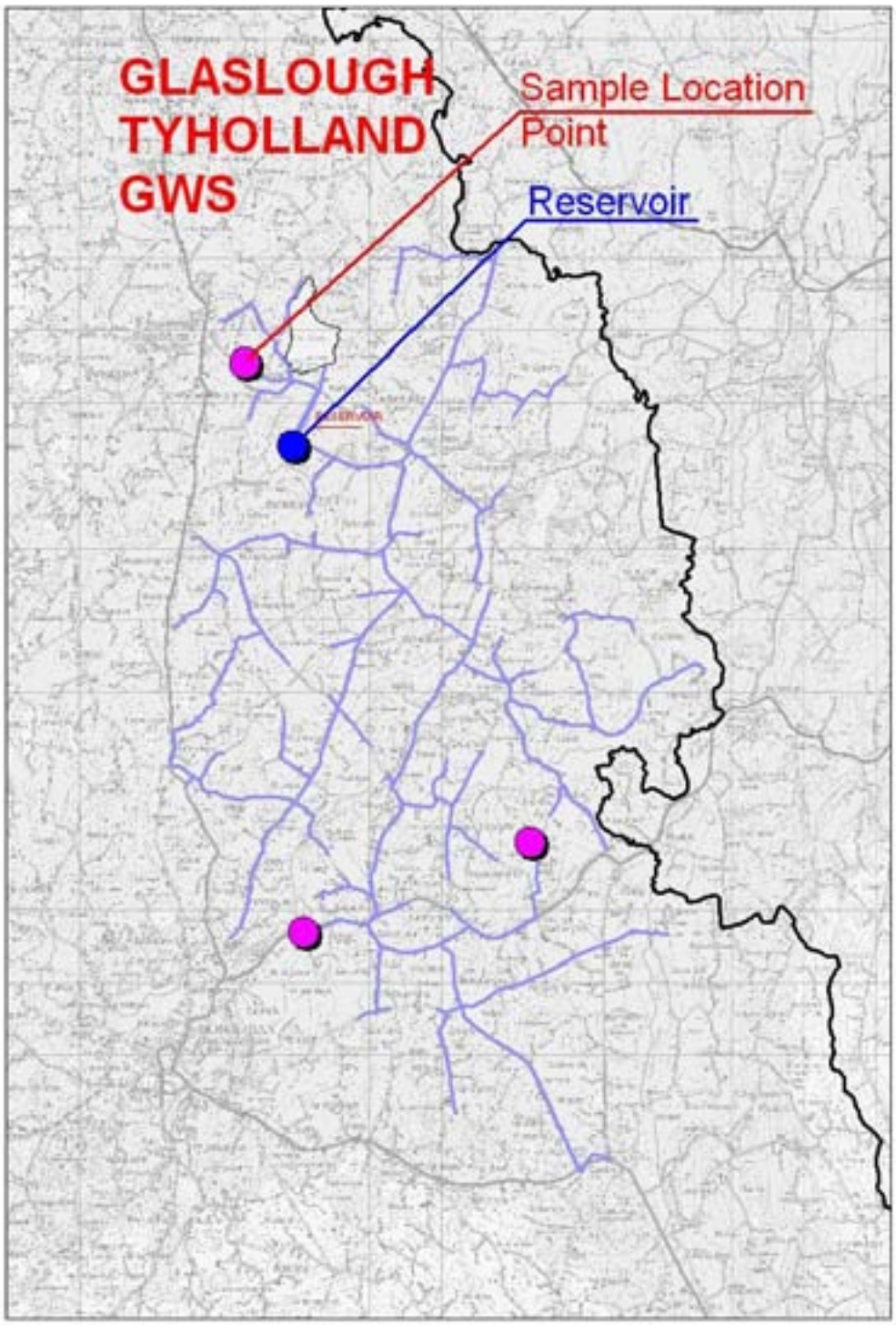
The plan sets out the steps to verify the quality of the water being produced by the Treatment Plant. After this water has been analysed and verified, it will be directed to the reservoir while at the same time the temporary borewell supply will be switched off and isolated from the network. A set of three consecutive samples will then be taken at appropriate locations at the end of the distribution network. Only when clear results are received from these three samples can the Prohibition Notice be lifted.

Sampling at the plant commenced on Wednesday 9 May 2007 and will continue through to Friday. Results from these samples take in excess of a week. Sampling of the network will commence next week.
We regret any inconvenience this may cause. We would like to assure you that we are continuing to make every effort possible to have this problem rectified.
Information notices and updates in relation to this issue will be broadcast on Northern Sound Radio.

Yours sincerely,
Nuala Murphy, Secretary.
Glaslough / Tyholland Group Water Scheme
10 May 2007.

Appendix 1.12

Location of points from which water samples taken on 14th, 15th and 18th June 2007



Appendix 1.13
Letter to HSE advising that requirements for lifting Article 9 Notice had been satisfied

Dear Dr Lynskey – HSE

A "Do Not Consume or use for Food Preparation" Notice was issued by Monaghan County Council on Thursday 19th of April 2007 on the Glaslough/Tyholland Group Water Scheme. The Notice was issued as a result of concerns regarding taste and odour which are believed to be as a result of contaminated process chemicals. The chemical in question is a coagulant – Polyaluminium Chloride, and may have been contaminated with phenols, toluene and ascetic acid. There may have been further multiple chemical contamination of this coagulant.

On 19th April, following the issuing of the Notice, the GWS Treatment Plant was shut down and the reservoir subsequently drained down.

On Friday 20th April 2007 the GWS cleaned out the Treated Water Reservoir. A temporary Borewell supply belonging to Monaghan County Council, which previously had been used on a temporary basis to supply this scheme during refurbishment of the treatment plant, was reactivated and connected into the distribution network. This temporary supply was dosed with a nominal amount of Sodium Hypochlorite to establish a residual in the network. However, the Do Not Consume Notice was left in place.

A series of meetings was held over the next number of days between all relevant parties and on Tuesday 1st May an Action Plan for the removal of the Notice for the Glaslough/Tyholland scheme was agreed. In summary, the plan was to replace the suspected coagulant and then run the Treatment Plant, with the treated water running to waste, for a period of time with a treated water sample being taken each day. On return of three clear consecutive samples, the treated water would then be directed to the Treated Water reservoir and at the same time the temporary Borewell supply turned off and isolated from the network. Three clear samples for the water leaving the Treatment Plant were achieved on Friday 8th June 2007.

The originally contaminated Poly Aluminium Chloride (PAC) was removed from the Glaslough/Tyholland plant on the 20th of April 2007. The replacement PAC (same product different batch number) was replaced by PAC from *Albion Chemicals* group by the 3rd of May, this product is classified as meeting the requirement of chemicals used for the treatment of water for human consumption.

The Treatment Plant water was redirected to the GWS Treated Water Reservoir at 13:00 hrs on Friday 8th June 2007 and the temporary Borewell supply was switched off and isolated from the GWS network. Filling of the reservoir and network continued over the next 5 days, as agreed in the Action Plan.

Following filling of the reservoir and network with treated water from the treatment plant, three further consecutive samples were taken from agreed extremities of the network End of Pipe sampling was carried out at these three agreed locations on the network and three consecutive clear samples were returned on **29th June 2007**

A further three samples were taken at the same locations on 11th July 2007 and clear results were returned on 23 July 2007.

We can confirm that

- Suspected coagulant has been replaced with new
- Three satisfactory sets of results for PAH EPA (16), Semi Volatile Organics plus TICS and Aluminium Residual have been obtained on 14/06/07, 15/06/07, and 18/06/07
- No evidence of taste and odour for water
- Networks have been scoured

Based on the above we propose to lift the Do Not Consume or Use for Food Preparation notice on the Glaslough/Tyholland Group Water Scheme - please advise accordingly in writing.

_____

John D. Quinn.
Env. Health Officer.
23/07/2007

cc. Fergus Barry – HSE

Appendix 1.14
Copy of email from HSE to Monaghan Co. Council – 23 July 2007

-----Original Message-----
From: Lucy.Adams@maile.hse.ie [mailto:Lucy.Adams@maile.hse.ie]
Sent: 23 July 2007 14:31
To: Quinn, John
Cc: Fergus.Barry@maile.hse.ie; Peter.Finnegan@maile.hse.ie
Subject: Glaslough / Tyholand G.W.S.

Dear John,

With regard to your email of this morning, 23/07/2007, to Dr. Imelda Lynskey, in relation to The Glaslough / Tyholland Group Water Scheme,
the H.S.E. can now advise that the warning notice issued on this scheme can now be removed.

Best Regards,

Lucy Adams.
Senior Medical Officer in Public Health.

Appendix 1.15
Specification for Polyaluminium Chloride supplied by Albion Chemicals on 3rd May 2007

water treatment solutions

albion CHEMICALS GROUP

WAC ®
WA10006 POLYALUMINIUM CHLORIDE HYDROXIDE SULPHATE SOLUTION

Issued November 1994
Revised January 2008

Appearance: Clear or slightly hazy colourless liquid

Property	Units	Specification Limits
Density	Kilogram per litre @ 20°	1.19 – 1.22
Aluminium Content	% as Al	5.0 – 5.6
Alumina Content	% as Al_2O_3	9.5 – 10.5
Chloride Content	% as Cl	10.0 – 12.0
Sulphate Content	% as SO_4	2.2 – 2.6

Impurities	Units	Specification Limits
Arsenic	mg/kg as As	<0.7
Cadmium	mg/kg as Cd	<0.15
Mercury	mg/kg as Hg	<0.2

Purity Standards

WAC meets the requirements of BS EN 883:2004 type 1

Methods of Analysis

Water Treatment Solutions Ltd. will be pleased to supply details of analytical methods on request

BRENNTAG

Water Treatment Services is a wholly owned subsidiary of Albion Chemicals Group which is a wholly owned subsidiary of Brenntag.

Appendix 1.16
Correspondence Register

List of Significant Correspondence in relation to Glaslough/Tyholland Incident

Date	From	To	CC	Re	Format
16 April 2007	NFGWS	TJO'C	MCC	Concern over taste	Email
16 April 2007	TJO'C	Veolia	MCC	Taste Odour Issue	Post Fax
19 April 2007	TJO'C	NFGWS	MCC	Taste & Odour East Cavan	Email
19 April 2007	TJO'C	Veolia	MCC	Aluminium Exceedances	Post Fax
19 April 2007	G/T GWS	Members		Info Notice re use	Post
19 April 2007	MCC	G/T GWS		MO Article 9	Post
19 April 2007	MCC	Cll RG		G/T GWS	Email
20 April 2007	MCC	DoEHLG		East Cavan Schemes	Email
20 April 207	DoEHLG	DoEHLG	MCC, EPA	East Cavan Schemes	Email
21 April 2007	G/T GWS	Members		Info Notice update	Post
23 April 2007	MCC	MCC	LA's	East Cavan Schemes	Email
23 April 2007	NFGWS	MCC	DoEHLG	East Cavan GWS DBO	Email
23 April 2007	MCC	MCC		Complaint	Email
23 April 2007	G/T GWS	Veolia	MCC	AGM invite	Post
24 April 2007	MCC	Press		Press release	Fax
24 April 2007	G/T GWS	Members		Info Notice update	Post
26 April 2007	TJO'C	Veolia	MCC	Taste Odour Issue	Post Fax
26 April 2007	G/T GWS	CCC	MCC	DBO Contract Docs	Post
27 April 2007	CCC	MCC		Lab results Alcontrol	Email
30 April 2007	Incident Team	NFGWS		Statement No 3	Hand
30 April 2007	MCC	G/T GWS		Water quality Complaint & DOS Order	Post

Date	From	To	CC	Re	Format
01 May 2007	Veolia	MCC		Draft Method Statement	Hand
01 May 2007	Veolia	NFGWS		Statement No 003b	Hand
02 May 2007	Veolia	MCC		Method Statement	H
02 May 2007	MCC	G/T GWS		Article 10 Notice DOS order	Post
03 May 2007	MCC	G/T GWS		Article 10 Notice	Post
08 May 2007	TJO'C	Veolia	MCC	Taste Odour Issue	Post
09 May 2007	Veolia	TJO'C		Recent Taste Odour Issue	Post
10 May 2007	NFGWS	MCC		Draft letter from GWS to Members	Email
10 May 2007	TJO'C	CCC	MCC	PAC Delivery & Removal	Fax
10 May 2007	TJO'C	CCC	MCC	Joint Sampling of PAC	Fax
22 May 2007	CCS Ltd	CCC		Re PAC & Envirofloc	Post
15 June 2007	Veolia	TJO'C		Copy of letter to HSE	Post Fax
23 June 2007	TJO'C	CCC	MCC	Copy of Letter from Veolia	Post
23 July 2007	MCC	HSE		Recommend lift Notice	Email
23 July 2007	HSE	MCC		Recommend lift Notice	Email
23 July 2007	MCC	G/T GWS		Removal of Notice	Post
23 July 2007	G/T GWS	Members		Info Notice update	Post
24 July 2007	MCC	Press		Public Notice Press Release	Email