Dúchas The Heritage Service *Uiscebhealaí* Waterways

An Roinn Ealaíon, Oidhreachta, Gaeltachta agus Oileán
Department of Arts, Heritage, Gaeltacht and the Islands

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Mr. Jonathan Derram,
Chief Inspector,
Environmental Protection Agency,
P.O. Box 3000,
Johnstown,
Co. Wexford.

Ref: JOS01EPA ***By Registered Post*** **27th September 1999**

Dear Sir,

Please find attached submission relating to the application by Bord Na Mona for an Integrated Pollution Control Licence for the Allen Group of bogs. The reference number for this application is Ref. No. 503.

It is our wish that the Grand Canal should not be exposed to the significant risk of the adverse effects on the ecology and function of the canal which appear to be posed by the emissions from Bord Na Mona production bogs. In our submission, we outline our concerns based on the information submitted by Bord Na Mona in their application together with other information in the public domain.

We are available to meet and discuss with you any issues arising from this submission at your convenience.

Please acknowledge receipt of this submission.

Yours Sincerely,

Joe O'Sullivan

Joe O'Sullivan,
Regional Engineer,
Waterway Services.

Encl. Copy of Submission with Respect to Application No. 503.

C.C. Mr. John McKeown, (Senior Engineer)
Mr. Martin Dennany (APO, Waterways)

Submission by Dúchas Waterways to the Environmental Protection Agency

Introduction.

This submission is being made by Dúchas Waterways to the Environmental Protection Agency objecting to the granting of an Integrated Pollution Control Licence for any emission from Bord Na Mona's milled peat production areas into the Grand Canal, particularly with reference to the application, Ref. No. 503, pertaining to the Allen Group.

Background Information.

The management and responsibility for the Grand Canal lies with Dúchas Waterways under the control of the Minister for Arts, Heritage, Gaeltacht and the Islands.

The canal itself is largely unchanged since it came into use approximately 200 years ago as a trade route from Dublin to the River Shannon. It is a still water canal with its principle source of water emanating from the Pollardstown Fen via the Milltown feeder at the Summit Level at Lowtown, Co. Kildare. Still water canal systems are artificial and are not designed to carry water but rather retain it for the purposes of navigation and therefore differ greatly from river navigation systems. The western section of the Grand Canal falls through 18 locks from Lowtown via Edenderry, Daingean and Tullamore to the River Shannon. This section of the canal is built on embankments for approximately 80% of its length. These embankments can be prone to leaks and breaches and many have been repaired over the years. When the canal was originally constructed, there were many other canal supplies or feeders supplementing the principle feeder. However, many of these supplies have been taken

out of use principally due to drainage works or pollution. In some cases, pumps are being currently used to supply sufficient water to maintain the depth of water needed to allow the canal to be navigated. Otherwise, from an engineering perspective, the canal system is predominantly unchanged in the last 200 years.

Since the canal system became the responsibility of the Office of Public Works and later Dúchas Waterways, much expense has been incurred in the maintenance and enhancement of the canal as a national resource. Irish waterways have become an important source of relaxation with pleasure boats, walkers and course fishermen using the canal increasingly. Boat hire companies, angling clubs and some community groups are now based on and rely on these waterways for their survival.

Dúchas Waterways are currently charged with the upkeep of Irish waterways including the Grand Canal. Under the Canal Bye Laws, (S.I. No. 247, 1988), Dúchas Waterways have the powers to prevent any public or private organisation from discharging or extracting water from the canal system. It is the policy of Dúchas Waterways not to grant any licence or permission for any public or private organisations to allow runoff, effluent, or any other emission into the canal system.

Bord Na Mona and Application Reg. No. 503.

In their application for an Integrated Pollution Control Licence, Bord Na Mona state that they intend to produce milled peat to supply the power station currently being constructed near Clonbulogue. The production process, detailed in their licence application, consists of air drying a pulverised peat surface to produce small peat particles and the eventual collecting and stockpiling of these peat particles for transportation to the power station. Rainfall causes significant quantities of these peat particles to enter the internal drainage system and subsequently outfall from the production bog area into outfalls, drains, streams and other watercourses. Bord Na Mona currently use a silt pond system to reduce the quantity of peat particles reaching external water courses. According to Bord Na Mona literature, silt ponds are designed

to operate by slowing the flow of water, retaining it for a specified period of time and thereby allowing any suspended solids to precipitate out.

Bord Na Mona Allen Peat Limited have applied a licence for many emission points, two of which eventually discharge via the Ballymullen Supply to the Grand Canal. These two points, SW8 and SW10 are detailed in Table 11A(i), Emissions to Surface Waters, in their application. Silt ponds have been constructed at both of these emission points.

Dúchas Waterways will in their submission show that this silt pond system is inadequate for the protection of the canal system from long term exposure to significant sedimentation caused by effluent from Bord Na Mona milled peat production bogs.

Peat Siltation.

In their application, Attachment No. 11B, Bord Na Mona acknowledge that the discharge of suspended solids to freshwater systems is the most significant environmental effect of milled peat production. Bord Na Mona also acknowledge the environmental effects of sod peat (turf) production are relatively minor with respect to milled peat production. Therefore, the change in use of the canal feeder catchment area of virgin bog and minor localised domestic turf production to a large scale milled peat production bog will generate a significant threat to the ecologically sensitive environment of the canal.

The recent report by the Lough Derg & Lough Ree Catchment Monitoring & Management System indicated that downstream of Ferbane on the River Brosna *"there is however a noticeable increase in suspended solids level along this stretch of river (18mg/l average) which is most likely associated with peat milling operations in the surrounding area."* This relatively large suspended solids value for a major river would seem to indicate that cumulative effects of large scale milled production on the

river catchment are serious. Suspended solids levels of greater than 50mg/l have also been recorded in minor tributaries of the River Brosna.

The information that exists in the public domain appears to indicate that milled peat production generates large quantities of small peat particles that are easily carried by flowing water. Significant quantities of these peat particles can be washed from the production bog area via the drainage system into the local watercourses. Bord Na Mona use a system of large settling ponds, (silt ponds) as a protective measure to reduce the quantity of suspended peat particles escaping on many of their emission points. This system is acknowledged by Bord Na Mona to be imperfect as it experiences extreme difficulty in operating under flood conditions. Even under average flow conditions, silt ponds do not achieve a complete reduction in the quantity of suspended solids emitting from the production area. This results in what is known as siltation where quantities of peat particles being deposited at varying locations, e.g. lakes, cattle drinking slips etc. along the watercourses.

Current Discharge Values for Emissions to Receiving Waters.

The BATNEEC Guidance Notes for the application for an Integrated Pollution Control Licence refer to the sensitivity of the receiving waters for Nitrogen and Phosphorous only. Historically, a suspended solids concentration of 30mg/l in effluents was generally considered acceptable provided the effluent was adequately diluted, (usually by a factor of 8:1), by the receiving waters. The BATNEEC Guidance Notes now quote a figure to 35mg/l as a maximum permitted emission value for suspended solids but make no reference to the dilution or to the sensitivity of the receiving waters.

A still water canal system is not a drain, stream or river. It receives its water supplies through special controlled feeders. Almost all water entering the system is then lost through seepage through old embankments, minor leaks, evaporation and the use of the locks. Therefore, since its hydrology differs greatly from free flowing river systems, it should be treated and examined under parameters and emission limit values differing from those applied to rivers and streams.

Effectiveness and Performance of Silt Ponds.

Silt ponds generally retain approximately 90% of suspended solids entering the ponds (ref: Bord Na Mona paper titled "Control of Silt in Peatland Waters" by Hannon, G. P., & Coffey, P. J. c.1983). This paper analyses the efficiency of a typical silt pond, 183m long, 8m wide pond and 2.3m deep. (This pond is almost identical in size to the typical silt pond shown by Bord Na Mona in their licence application, Attachment 11B, Drg. No. CW-M-289.) The performance of the pond was monitored over a 94 week period with samples being taken at the inlet and outlet of the pond 6 days per week. The results of the test programme over the test period showed that the mean suspended solids influent level was 773 PPM and the mean effluent level was 68 PPM. This represents a 91% retention of peat solids by the pond. Annual average rainfall was a typical 870mm for the midlands. In a recent article in the Tullamore Tribune, week ending 25th September 1999, Mr. Paddy Hughes, Managing Director of Bord Na Mona acknowledged that 95% of suspended peat solids are currently being retained by the silt pond system.

Bord Na Mona literature suggests that the effective operation of silt ponds entails slowing the water to less than 0.15m/s and a retention time of 6 hours is desirable. The retention time depends on the capacity of the pond. In this literature, a figure of $48m^3$ of sludge is generated annually per hectare of catchment. (A figure of $50m^3$ per nett acre of production bog is also quoted.) Currently ponds appear to be designed to provide storage for the equivalent of a half years sludge. Ponds would then be cleaned when full, approximately twice a year. However, as ponds fill, storage and retention time is reduced. The system of pond design appears to be incorrect in that it allows the capacity of the pond (which is required to allow the minimum 6 hour retention) to be filled with the retained peat solids before cleaning takes place. Using the information that silt ponds are between 90% and 95% efficient in retaining peat solids together with the figure that each hectare of bog produce $48m^3$ of peat sludge, the quantity of sludge escaping through the silt ponds is estimated to be between $2.4m^3$ and $4.8m^3$ per hectare annually. Over a 20 year life of a 250 hectare production bog this would lead to a total of between $12,000m^3$ and $24,000m^3$ of sludge entering the canal system provided the silt ponds were properly maintained at all times.

According to Bord Na Mona in their licence application, (Attachment 11B), the effluents from silt ponds, when properly maintained, for production bogs is less than 30mg/l for 80% of the time, less than 100mg/l for 98% of the time. Under the BATNEEC Guidance Notes, the emission limit for discharge to water is less than 35mg/l.

The critical time is when periods of heavy rainfall are experienced when as Bord Na Mona state *"effective control of sedimentation ponds during periods of heavy rainfall is extremely difficult"*. It is possible during periods of heavy flow for peat particles previously retained to be re-suspended. It is highly probable that during these periods of heavy flow the suspended solid concentrations are at their highest. Therefore, the quantities of suspended solids not being retained during high flow periods is very significant in the manner in which siltation of the watercourse occurs.

The maximum daily run-off from emission points SW8 and SW10 is stated by Bord Na Mona to be 100,000m^3 for each point for a catchment of 125 hectares. To allow a retention time of a minimum of 6 hours for all conditions, (assuming an empty pond), the minimum pond length for a 125 hectare catchment, based on 12m^2 cross section, should then be over 2,000m. The retention time for ponds on emission points SW8 and SW10 is a maximum of 15.5 minutes and 46.6 minutes respectively during peak flows as opposed to the recommended 6 hours. According to these criteria, the silt ponds at SW8 are undersized by a factor 23.2 and at SW10 by a factor of 7.7 for peak flows.

Bord Na Mona state the capacity of a pond is based on the catchment area and is sized at 50% of the volume of sludge generated annually. Both SW8 and SW10 have 125 hectare catchments giving a volume of peat sludge of 6,000m^3 per annum. The total pond capacity according to Bord Na Mona should then be 3,000m^3 for each emission point. In the case of SW8, the pond capacity is under sized by a factor of 2.48.

In some catchments, runoff from non-production bogs can be allowed to flow through the silt pond system. This reduces the effectiveness of the pond. Bord Na Mona has stated the total catchment leaving the Bord Na Mona area in correspondence to us to

include an additional 50 hectares, giving a total of 310 hectares. The combined catchment in the licence application is 250 hectares. It would therefore appear that runoff from non-production areas may be entering and reducing the effectiveness of the silt ponds being used at emission points SW8 and SW10 even further.

Dúchas Waterways would therefore, draw the attention of the Environmental Protection Agency to the stated excess of the recommended emission values into receiving waters by Bord Na Mona. Dúchas Waterways would suggest that any suspended solids concentrations should be examined together with the flow rates for each sample point, thus allowing a total volume of suspended solids to be evaluated. Dúchas Waterways would also suggest that the design and use of silt ponds to extract peat solids from water be examined independently to assess any limitations which may be present and any improvements which may be made.

Effects of Siltation on the Canal System.

Siltation affects the physical requirements of the canal for navigation and also aversely affects its ecology.

Both Bord Na Mona's emission points enter an outfall known locally as the Ballymullen Supply. This supply discharges to one of the longest single level sections of canal in Ireland, approximately 19.5 miles long. This section of the canal acts a perfect large settlement lagoon, and consequently almost all suspended solids entering the canal system will eventually settle in the canal. Our calculations and estimates, based on the information supplied by Bord Na Mona as part of their licence application, indicates that under current best practice approximately 1,500m^3 to 2,000m^3 of peat sludge will enter the canal annually, (assuming peat sludge is 98% water). This is equivalent to completely filling the canal with silt for an average of approximately 100m per year. This quantity of peat sludge will eventually cause serious reductions of the canal navigation channel in the short term.

The increase in siltation of the canal will have an adverse effect on the ecology of the canal, particularly fish and plant life. Coarse fish breed by laying their eggs on the sticky stems of the plants growing in the canal. In a paper titled "The Impact of Peat Siltation On Macrophyte Communities in the River Suck, 1986, Caffery, J. M., Central Fisheries Board, studies carried out on the River Suck showed that the heavy levels of peat siltation caused peat solids to adhere to the plane stems preventing the coarse fish from breeding. More sensitive plants will be unable to survive in waters where siltation occurs.

The above paper by Dr. Caffery showed that heavy peat siltation significantly inhibits aquatic plant growth. This damage can be reversed in river systems if the suspended solids loading to the river is returned to normal values. However, the cumulative effects of siltation would not be easily reversible due to the non-flushing hydrological system in a still water canal. The reduction in quantity of aquatic plants then adversely affects the local animal life, especially coarse fish. Aquatic plants at the edge of the canal are used and transplanted to protect the canal banks from boat wash. A reduction in these plants would expose the canal banks to erosion.

In order to develop the canal for angling tourism, between 1990 and 1995 a total of 4.8 tonnes of coarse fish have been successfully stocked into the Grand Canal. The 19.5 mile long level of the Grand is now recognised as a prime coarse fishery with major national and international angling competitions being held annually. Coarse angling guide books have being launched by Dúchas Waterways as a guide to the many angling tourists to be found using the canal. Any siltation in this 19.5 mile section of the Grand Canal would adversely affect this prime coarse fishery.

Dúchas Waterways currently employ the Central Fisheries Board to monitor and assess the quality of the canal supplies including the Ballymullen Supply. Recent reports from the Central Fisheries Board indicate that the quality of the supply has deteriorated.

The life of the production bog is over 20 years but within a short term, major sections of the canal could be environmentally damaged.

Alternative Solutions to Discharging into the Canal.

The existing silt pond system is not adequate to protect the canal system from the adverse environmental effects of peat siltation. There is a very low tolerance in the canal system to a persistent and long term exposure to suspended solids due to the cumulative effects of sedimentation. Alternative layout and increase in silt pond sizes to greater than Bord Na Mona's recommended values will in all probability still result in levels of suspended solids which will cumulatively result in damage to the ecology of the canal.

In a paper titled "Optimising the Removal of Suspended Solids from Aquacultural Effluents in Settlement Lakes, (Henderson, J. P., Bromage, N. R.), the results showed that it is difficult to achieve solids concentrations of less than 6mg/l through simple settlement without slowing the mean fluid velocity below 4m/min (6.67cm/sec). Bord Na Mona use a design figure of 15cm/sec in sizing their silt ponds. This information would appear to indicate that flow rates must be reduced significantly to allow precipitation of suspended solids with removal of peat solids probably more difficult due to the lighter density of peat particles. At present, samples taken fortnightly by Bord Na Mona at the "Rathdrum Canal" over a period of 12 months are showing an average of approximately 11mg/l. This is pre-production data and the concentration of suspended solids will increase post-production. Therefore, the only feasible and acceptable solution to safeguard the navigation and ecology of the canal is to divert any discharge from the canal.

Dúchas Waterways are not aware of the drainage layout within the bog area currently discharging to the Grand Canal. However, it is technically possible to divert the emissions from the production bog away from the canal. We are aware that one possible alternative which needs to be investigated is to discharge under gravity to a drain parallel to canal and eventually via a culvert under the canal to a tributary of the Tullamore River. Other possible alternatives such as pumping could also be examined.

Summary

Milled peat production causes siltation to watercourses. Silt ponds are relatively effective in reducing suspended solids under average conditions provided they are properly sized and maintained. The efficiency of the silt ponds is reduced under heavy flow conditions where Bord Na Mona state *"effective control of sedimentation ponds during periods of heavy rainfall is extremely difficult"*

The effects of any siltation on the canal system will be cumulative rather than a one step reduction in the quality of the canal water system. Therefore, Dúchas Waterways would contend that the Emission Limit Value of 35mg/l for suspended solids be re-evaluated for emissions to sensitive waters and particularly areas such as still water canal.

Under the BATNEEC Guidance Notes for an Integrated Pollution Control Licence, the applicant needs permission from the local authority to discharge to certain areas such as public sewers. As stated earlier, under the Canal Bye Laws, (S.I. No. 247, 1988), no public or private organisation may discharge to the canal system without the permission of Dúchas Waterways. Bord Na Mona have not been granted permission to discharge to the Grand Canal for emission points SW8 and SW10.

In summary, Dúchas Waterways contend that no organisation should be issued with any form of licence to discharge any form of emission that could cause serious environmental damage to the Grand Canal.