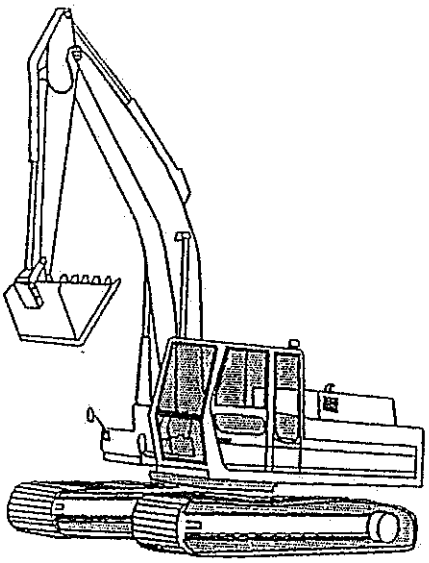
503 Boora

SILT CONTROL



REPORT

FOR

PEAT ENERGY DIVISION

BOOR
BLACKWATER
DERRYGREENAGH
MOUNTDILLON
OWENINNY

by JIM HARKINS

BORDNAMÓNA

April 1991

SUMMARY

A study was carried out at three works Boora, Mountdillon and Oweninny to assess the quantity of silt run-off from our bogs. These bogs are representative of Works attached to the Peat Energy Division. The findings show that the silt run-off is substantially less than previous reports indicate. All standards, silt control ponds, plant and labour are based on findings. The estimated cleaning costs for the Division is £425,000 per annum.

Following this, an audit was carried out at each works to quantify the size and number of Silt Control Ponds already constructed. From this, we know the number and capacity of Silt Control ponds outstanding to cater for run-off from bogs. This will cost £324,000 for the Peat Energy Division. An assumption is made that existing draglines will excavate and extend ponds. Depreciation of plant and acquisition of bog for siting silting ponds is not included.

The report has a two-pronged approach to the Silt Control problem:-

(a) Provision of silt control ponds to clean effluent from the bogs.

(b) Ways of minimising silt run-off at operations stage.

Following discussions with works personnel practical measures are outlined to minimise silt run-off. These measures are based on good husbandry and are the most cost effective method for dealing with part of the silt control problem. A system is recommended to control the cleaning and inspection of silt control ponds.

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1.0 INTRODUCTION.

There is a drive within Bord na Mona to establish an "Environmentally friendly" ethos and protect the environment in all our operations. To that end our long term objective is that all effluent from the bog will be controlled, monitored and conform to a satisfactory standard. In future, we may have to conform with environmental protection laws meeting rigorous standards.

Many good technical reports have been written on silt control. This report forms an addendum to these reports dwelling on a Peat Energy Divisional Environmental control plan to limit the external impact of peat silt.

The report outlines:-

(a) Study to establish standards for sizing silt control ponds and frequency of cleaning same.

(b) Data on silt control at works at present.

(c) Plant to achieve standards.

(d) Practical measures to be adopted to minimise silt run-off.

The project is an overview of the silt control problem in the division on which decisions for the future can be made.

2.0 QUANTITY OF SUSPENDED SOLIDS AND SETTLED SLUDGE.

2.1 Before an investigation can be concluded as to the feasibility of solving the silt control problem, it is necessary to quantify the silt run-off from bogs. To this end, a study was carried out on two silt control ponds at three works Boora, Mountdillon and Oweninny to ascertain the quantities of silt run-off from bogs. For silt control pond characteristics (see appendix No. 4). This study was carried out with data taken on a daily basis except weekends for a calender year.

The following data from each silt control pond was monitored:

(a) Rainfall.

(b) Silt quantity at inlet to ponds.

(c) Silt quantity at outlet from ponds.

(d) Run-off flow quantities using a V-notch.

(e) Operation in progress within the catchment area.

(f) Saturated sludge samples from ponds were tested.

The gross and nett catchment areas for each silt control pond was measured. We interpolated on existing data to ascertain weekend data.

2.2 From the above data, tables were drawn up for each silt pond location under the following headings see appendix No. 1 for Boora Wooks, Appendix No. 2 for Mountdillon Works and Appendix No. 3 for Oweninny Works.

(1) Date.

(2) Height over weir from V-notch reading.

(3) Flow from catchment area in cu.m. per sec.

(4) Flow from catchment area in cu.m. per day.

(5) Cumulative flow in cu.m. from start of monitoring.

(6) Silt quantity in parts per million (p.p.m.) at inlet to silt pond.

(7) The quantity of anhydrous peat silt in kg. per day at inlet to silt pond.

(8) Silt quantity in parts per million (p.p.m.) at outlet from the pond.

(9) The quantity of anhydrous peat silt in kg. per day at outlet from pond.

(10) Silt quantity in parts per million (p.p.m.) retained in the silt control pond.

(11) The quantity of anhydrous peat silt in kg. per day retained in silt pond.

(12) Cumulative quantity of anhydrous peat silt in kg. retained in silt ponds since commencement of monitoring.

(13) Rainfall in m.m.

(14) Date.

(15) Ditching operations.

2.3 From the above tables of information the following graphs were produced. (see appendix No. 4)

(a) Monthly rainfall.

(b) Anhydrous silt in kgs. at inlet **V** Anhydrous silt in kgs. at outlet

(c) Charts showing data from silt control ponds.

2.4 Silt run-off per acre per annum for the Silt ponds under test (see appendix No. 5)

Sludge tests from silt control ponds (see appendix No. 5).

2.5 The rainfall for each works over the past five years is shown in appendix No. 6. The average rainfall for each works is also shown, so it is safe to conclude that the period of study represents average conditions.

2.6 EFFECTIVENESS OF SILT PONDS.

Silt control ponds do not remove all silt. They have limitations. Extensive research has been carried out on drop velocities of peat particles of different sizes and concentrations. 72% of peat silt particle sizes are less than 50 microns. Particle grain size of less than 15 microns do not settle out. The only effective means of removing these particles is filtration. This is not practical with the quantities of run-off waters we are dealing with. (See report 'Decantation of Peat Bog residue' by Laborataire central D'Hydraulique de France and 'Development of methods for purifying run-off water from peat production areas' by Raimo Ihme, Esko Lakso and Kaisa Heikinin).

2.7 NUTRIENT AND B.O.D. COMPOSITION OF RUN-OFF WATERS.

Exhaustive chemical monitoring programmes have been carried out on the river Suck over the past ten years by Bord na Mona and the Central Fisheries Board. Detailed nutrient analysis was carried out by the Central Fisheries Board. Water samples were analyses at inlets and outlets of silt ponds with further samples taken on the main river Suck channel both upstream and downstream of the silt pond outfalls.

From these analyses it is safe to conclude that effluents from bogs do not contribute to nitrification of water, nor do they increase the B.O.D. of receiving waters.
(See reports on River Suck survey by Central Fisheries Board).

2.8 The following findings can be drawn from above study.

(1) (a) One net acre produces 20 cu.m. of sludge annually in Midlands bogs.

(b) One net acre produces 30 cu.m. of sludge annually at Oweninny works.

This is at variance with recommendations of 'Silt Control Study' carried out by Mr. G. Hannon in 1983. That study recommends silt control systems to cater for 60 cu.m. of sludge per acre per annum. I have had discussions with Mr. G. Hannon on our findings. His study was carried out over a period of 3 months, the primary thrust of his project was to devise a mathematical formula, taking all variables in account, to assess silt run-off. However, if the previous report is right then there would be a run-off of 741 p.p.m. suspended solids on average at inlet to silt control ponds assuming there was complete run-off of rainfall for the year. The silt quantities in p.p.m. at inlets to silt ponds are mostly substantially less than 741 p.p.m. as obtained by our study.

(2) Oweninny has a higher silt run-off than midlands bogs for the following reasons:-

(a) Substantially higher rainfall on average than midland bogs.

(b) The gradient to field drains and outalls are greater than midland bogs - thereby giving faster run-off.

(3) Concentration of suspended solids varies with rainfalls. If the rainfall is high then the silt run-off is high, if the rainfall is low then the silt run-off is low.

(4) There is significant silt run-off during ditching operations in October at all bogs.

(5) Periods of highest silt run-off are:-

(a) High rainfall.

(b) Weather break in production. (Boora Works)

(c) Ditching in progress in catchment area.

(6) Peat sludge has no cohesion and re-entrainments occurs easily. Silt control ponds can increase the silt content at oultets during periods of high rainfall or when the suspended solids at inlet are small with pond partially full.

(7) 57% of year with suspended solids less than 30 p.p.m. at inlet for Midland bogs.

(8) 81% of year with suspended solids at inlet less than 100 p.p.m. for Midland bogs.

(9) 80% of year with suspended solids at outlet from silt pond less than 30 p.p.m. for Midland bogs.

(10) 98% of year with supsended solids at outlet from silt pond less than 100 p.p.m. for Midland bogs.

(11) 49% of year with suspended solids less than 30 p.p.m. at inlet for Oweninny Works.

(12) 74% of year with suspended solids at inlet less than 100 p.p.m. for Oweninny Works.

(13) 61% of year with suspended solids at outlet from silt pond less than 30 p.p.m. for Oweninny Works.

(14) 86% of year with suspended solids at outlets from silt pond less than 100 p.p.m. for Oweninny Works.

(15) 63% effectiveness of silt control ponds in Midland Bogs in removing silt.

(16) 47% effectiveness of silt control ponds at Oweninny Works in removing silt.

(17) There is a run-off of 21,000 tonnes peat at 55% moisture content at average suspended solids contentration of 30 p.p.m. at outlets from bogs attached to the Division.

(18) There is a run-off 71,000 tonnes peat at 55% moisture content at average suspended solids concentration of 100 p.p.m. at outlets from bogs attached to the Division.

(19) The frequency of cleaning ponds determines its effectiveness and reduces re-entrainment.

(20) The silt deposited out in silt control ponds starting at pond inlet and filling up to surface of pond and carried on filling to outlet.

(21) Silt control ponds will not produce acceptable levels of suspended solids in effluent when subjected to intense rainfall.

(22) Silt control ponds will not produce effluent to a standard of say 100 p.p.m. suspended solids at all times.

3.0 DATA ON SILT CONTROL AT WORKS.

3.1 In the Peat Energy Division production related operations are carried on 74,000 net acres. The surface is milled to a depth of 8-10 m.m, twelve times per year. With field drains at 15m. centres some milled peat will be deposited into the drains by various means:-

(a) Wind blowing dry peat of the fields.

(b) Rains washing peat of the fields into drains.

(c) Milling machines and harrows inadvertently depositing peat into drains.

At the end of the production season field drains are ditched, some of the ditched peat gets washed back into the drains.

Again some peat gets deposited into drains during rail bed preparation of Peco piles and during the loading out operations.

The above are the main sources of generating silt.

3.2 Silt control ponds have been constructed at all works to trap silt and to keep it within confines of works. They are the only practical way of slowing down the rate of flow of an outfall enabling the silt particles to settle out.

3.3 A survey has been carried out at works giving details of all silt control ponds (see appendix Nos. 7-11) under the following headings:-

(a) Gross catchment area (acres): Land area within confines of watershed - this may include private property, upland etc.

(b) Net catchment area (acres): The area of bog from which silt run-off can occur, i.e. sum of net production area, pile fields and turing grounds.

(c) Storage capacity of silt control pond required in cu.m. to conform with recommendations of study.

(d) Storage capacity of silt control pond provided in cu.m. is the volume of the existing pond below invert level or weir level of outlet to pond.

(e) The percentage coverage is the ratio of storage provided over storage required.

(f) By-pass - status of silt ponds with by-passes.

(g) Pond location: this gives the location of the silt control pond relative to flood plain of receiving rivers or lakes.

(h) The remaining headings are self-explanatory.

3.4 CLEANING OF SILT CONTROL PONDS.

Cleaning of silt control ponds and the construction of more silt ponds was carried out during 1990. A table showing the frequency of cleaning of ponds is outlined in appendix No. 12.

3.5 MANAGEMENT CONTROL OF CLEANING AND INSPECTING SILT PONDS.

There is not a comprehensive control system to monitor frequency of cleaning and condition of ponds at works with the exception of perhaps Oweninny Works.

I recommend that an inspection be carried out on all silt ponds at regular intervals by the supervisor in a bog area. This information is to be logged onto computer giving all relevant data on silt control. See appendix No. 13 giving details of cleaning and Inspection sheet.

Dedicated plant for silt control to have a modified log sheet (see appendix No. 13 showing modified log sheet).

3.6 PEAT SILT RELATED CLAIMS.

Peat siltation can cause interference with normal farm drainage and livestock drinking facilities. It can also affect spawning beds and general water quality for leisure and other uses. Peat silt related claims for the works are listed in appendix No. 14. The monetary settlements are small, this does not reflect the true cost, in practice the silting problems are rectified on the ground by our personnel.

3.7 ACCEPTABLE SUSPENDED SOLIDS CONCENTRATION.

Following the 1977 Water Pollution Act threshold values for maximum allowable suspended solids concentration are left by and large to the discretion of the local authorities involved.

The "Eight Report of the Royal Commission on Water and Sewage" (1912) recommended that "maximum suspended solids concentration" be regarded as 30 p.p.m. (in the case of peat solids = 30 mg/1) assuming an outfall to receiving water flow rate ratio of 1:8.

Although the situation is not clarified, it is reasonable to assume that suspended solids concentration of the order of 100mg/1 should be deemed acceptable by the authorities where the outfall to receiving water flow rate ratio is more that 1:25.

3.8 DESTINATION OF OUTALLS FROM BOGS.

As shown in appendix Nos. 7-11, outfalls from our bogs discharge into tributaries of main rivers.

The dry weather flow of some of these rivers was obtained from the Office of Public Works. We have compiled data on catchment areas of tributaries. See appendix No. 15.

3.9 The following conclusions can be drawn from above

(1) The percentage coverage for each works to proposed standard:

Boora	35.8%
Blackwater	57.3%
Derrygreenagh	62.8%
Mountdillon	41.0%
Oweninny	50.3%

There is insufficient coverage and many outfalls from bogs have no silt control ponds.

(2) The frequency of cleaning ponds is inadequate relative to recommendations. This is because there is old and insufficient plant at the works. Silt control is also the first casualty in times of financial cutbacks.

(3) Each works has different priorities and silt control is more sensitive at some works.

(4) More by-passes to silt control ponds are required for periods of heavy rainfall. If this is not possible a piped outlet to silt ponds should be installed.

(5) Gross catchment area is high relative to net catchment area.

(6) There are not comprehensive silt pond cleaning records at works with the exception of Oweninny Works.

(7) Acceptable suspended solids in run-off from bogs depends on dilution of receiving waters. This may be different for receiving tributaries.

(8) Silt control ponds should be constructed as large as conditions will allow in keeping with previous technical reports to minimise frequency of cleaning.

(9) Net catchment acres for silt ponds may not include turning grounds and pile fields at some works.

(10) Silt Related Claims are low relative to proposed costs of construction and maintainance of silt ponds.

4.0 CLEANING OF SILT CONTROL PONDS.

4.1 Cleaning of silt control ponds is carried out at all works either by dragline excavator or conventional hydraulic excavator. The dragline excavators are old, there is difficulty in getting replacement parts. The conventional hydraulic excavators have limitations in reach and are more suitable for other bog operations.

4.2 Studies were carried out on pumping sludge from silt control ponds on Clooneeny Bog. The object of the exercise was to study pumping as an alternative system for cleaning silt ponds.

A hydrostatically - driven transfer tube piston pump from Putzmeister Ltd. was tested. The findings were as follows:-

(a) Output was low at 13 cu.m. of sludge per hour.

(b) It was capable of pumping sludge, however, it had to be moved to other locations in the silt pond to operate efficiently. The re-location of the pump was labour intensive with discharge pipes having to be moved, the pump itself was moved by a dragline.

(c) Cost of pump £20,500 punts. ex. works. In conclusion, it is not a satisfactory alternative to our present system of cleaning ponds.

4.3 Recently, a long reach hydraulic excavator (VC-15) was purchased by each works in the Peat Energy Divisions. Studies have been carried out on the capabilities of the VC-15 by our Industrial Engineers. Comparisons with our existing machines along with specifications are listed in tables (see appendix No. 16).

It must be remembered that silt control is not just confined to cleaning silt ponds at works. All works clean open outfalls and small rivers on an annual basis. Hy-macs carry out other operations as well as silt cleaning.

4.4 Based on the findings of the study, a table has been drawn up showing the content of work required for a VC-15 hydraulic machine to clean silt control ponds and conform with proposed standards.

A further table has been drawn up showing the content of work required for a dragline to excavate and extend silt control ponds. An assumption is made that half the volume of excavation is above the water level of the silt control ponds.

Further tables show the cost of cleaning Silt Control Ponds for Division at £425,000 per annum.

Cost of excavation and extension of ponds to conform with proposed standard is £324,000. This does not include depreciation of plant or acquisition of bog for silt control ponds. These tables serve as a guide only (see overleaf).

WORK CONTENT FOR CLEANING SILT CONTROL PONDS.

WORKS	BOORA	BLACKWATER	DERRYGREENAGH	MOUNTDILLON	OWENINNY
REQUIRED NO. OF PONDS IN TOTAL	83	171	52	95	118
TOTAL QUANTITY OF SILT (CU.M.)	301,400	366,480	306,960	311,380	290,040
WORK CONTENT (VC 15) CLEANING HOURS	3173	3858	3231	3278	2417
PREPARE/FINISH	83	171	52	95	118
IDLE TRAVEL	83	171	52	95	118
TOTAL STD. HOURS	3339	4200	3335	3468	2653
NO. OF WEEKS 48 HOUR/WEEK	70	88	70	73	56
56.75 HOUR/WEEK	59	74	59	62	47

COST OF REMOVING SILT WITH A VC-15.

	YEAR										
	1	2	3	4	5	6	7	8	9	10	TOTAL
Cost of Machine	92000										
Repayments incl. Interest	16955	16955	16955	16955	16955	16955	16955	16955	16955	16955	169550
Wages	16640	17301	17998	18718	19466	20245	20155	22897	22773	23684	199777
Fuel	4888	5084	5280	5498	5718	5947	6185	6432	6680	6957	58686
Maintenance	5564	5787	6018	6259	6509	6769	7040	7322	7615	7919	66802
Residual Value										(1500)	(15000)
Total Cost	44047	45127	46258	47430	48468	49916	51235	52606	54033	40515	479815

Total cost per year 1 to 10 = £479,815

cost per year = £ 47,982

Cost per Weel (48 Hr.) = £ 923

COST OF CLEANING SILT PONDS WITH A VC-15.

WORKS	BOORA	BLACKWATER	DERRYGREENAGH	MOUNTDILLON	OWENINNY
CUBIC METRES OF SILT	301,400	366,480	306,960	311,380	290,040
MAN HOURS OF WORK	3,339	4,200	3,335	3,468	2,653
COST OF CLEANING @ £923/WK.	£64,206	£80,763	£64,129	£66,687	£51,015
DOZING @ 30% OF VC-15 COST	£19,262	£24,229	£19,239	£20,006	£15,304
TOTAL COST	£83,468	£104,992	£83,368	£86,693	£66,319

Total £424,840

NOTES:-

1. A week is taken as 48 hours.
2. A year is taken as 48 weeks.
3. The costs include repayment plus interest on the VC-15.

EXCAVATE NEW SILT CONTROL PONDS.

WORKS	BOORA	BLACKWATER	DERRYGREENAGH	MOUNTDILLON	OWENINNY
NO. OF NEW PONDS REQUIRED AND EXTENSION TO EXTISING PONDS	59	64	20	57	58
STORAGE NEEDED (CU.M.)	97,410	78,258	75,063	97,740	51,261
WORK CONTENT (DRAGLINE) EXCAVATE HOURS	2,435	1,956	1,427	2,444	1,282
PREPARE/FINISH AT 12 HOURS/POND	708	768	240	648	696
IDLE TRAVEL AT 4 HOURS/POND	236	256	80	228	232
TOTAL STD. HOURS	3,379	2,980	1,747	3,356	2,210
NO. OF WEEKS 48 HOUR/WEEK	71	63	37	70	46

COST OF EXCAVATING NEW SILT PONDS.

WORKS		BOORA	B/WATER	D/GREENAGH	MT.DILLON	OWENINNY
CUBIC METRES OF BOG		97401	78258	57063	97740	51261
STD. HOURS OF WORK		3379	2980	1747	3356	2210
DRAGLINE	LABOUR @ £6.67/HR.	22,538	19,877	11,652	22,385	14,741
	FUEL: 3 GALS/HR @ £.82.GAL	2,771	2,444	1,433	2,752	1,812
	MAINTENANCE	6864	6053	3549	6817	4,489
SUB-TOTAL		32,173	28,374	16,634	31,954	21,042
DOZING @ 30% OF DRAGLINE COST		9,652	8,512	4,990	9,586	6,313
FENCING @ £300/POND		17,700	19,200	6,000	17,100	17,400
PIPES @ £300/POND		17,700	19,200	6,000	17,100	17,400
TOTAL COST		£77,225	£75,286	£33,624	£75,740	£62,155

TOTAL £324,030

NOTES:-

1. DEPRECIATION IS NOT ALLOWED FOR.
2. MAINTENANCE IS £4680 P.A. AND BASED ON DRAGLINE COSTS OVER 4 YRS.
3. A YEAR IS TAKEN AS 2304 HOURS.

5.0 PRACTICAL MEASURES TO MINIMISE SILT RUN-OFF FROM BOGS.

This is an area that can greatly assist in reducing costs associated with silt control. Peat silt is an asset in the form of milled peat and an expensive problem when it leaves our bogs in the form of silt.

Our employees have a big contribution to make in reducing silt run-off from our bogs. The items listed will help to reduce silt run-off as they address the source of the problem, they are as a result of discussions with management at works, the benefits are obvious and are not quantified scientifically.

(1) Harrow spoons are properly handed so that peat during production operations does not enter field drains.

(2) Drivers of millers and harrows do not turn short at turning ground.

(3) New outfalls and manholes to be set 50 m. back from turning ground.

(4) Ridging all fields that have been milled at end of production season.

(5) Ditching operations to be carried out as much as possible during anti-cyclonic weather.

(6) Setting of disc of standard ditcher to match profile of drain.

(7) Clean all silt ponds in an area prior to commencemen of ditching.

(8) Offset peco pile in field for rail bed.

(9) Reduce flooding in bog areas - pumps in working order.

(10) Weirs or piped outlets to all silt ponds maintained.

We propose developing a drain cleaner for cleaning silt during production. This will reduce necessity for ditching bog on an annual basis.

6.0 RECOMMENDATIONS.

(1) (a) That a figure of 20 cu.m. per acre per year be taken as quantity of sludge for design purposes at Midland Bogs.

(b) A figure of 30 cu.m. per acre per year be taken as quantity of sludge for design purpose at Oweninny Bog.

(2) (a) That each silt control pond be designed to cater for 10 cu.m. per acre per annum for Midland bogs.

(b) That each silt control pond be designed to cater for 15 cu.m. per acre per annum for Oweninny bog.

(3) That silt control ponds be cleaned twice per year to cater for production and ditching.

(a) Before production so that the pond is available to cater for run-off during production.

(b) Before ditching. Before moving in to ditch a bog area, all control ponds should be cleaned.

(4) Silt control ponds located in flood plains to be cleaned for a third time prior to river rising in late part of November or early par of December. Otherwise, an embankment should be constructed around silt control area with a piped outlet.

(5) A phased programme be adopted by each works to construct silt control ponds on all bog outfalls within a specified time limit. This will give consistency throughout the works.

(6) As peat silt is more sensitive at some works, greater emphasis should be placed on getting an agreed plan in place more quickly.

(7) All employees to be informed of methods of reducing silt run-off from bogs. Great emphasis is to be placed on this as it can reduce silt control costs.

(8) Introduce a uniform system of controlling and recording cleaning of silt control ponds at all works.

(9) Construct by-passes to all silt control ponds where practical. This is very essential as at times some ponds will be full, we may not be in a position to clean it immediately. During periods of heavy rainfall, silt ponds can disimprove effluents.

(10) Upland catchment areas to silt control ponds should be diverted away so that run-off amounts during periods of high rainfall will be lessened.

(11) A silt pond should be deemed full when peat silt is visible on 75% of surface area of pond.

(12) Long reach hydraulic excavator (VC-15) is only suitable for cleaning ponds and not excavating new ponds.

(13) If legislation is introduced on acceptable effluents from our bogs, silt control ponds cannot conform with standards at all times. Part of the legislation should include achieving standards 90% to 95% of the time.

(14) Acceptable effluents from our bogs is based on dilution of receiving waters. O.P.W. have some information on tributaries into which our bog outfalls flow. More information is required to ascertain dilution rates.

7.0 REFERENCES

(1) Mr. G. Hannon, Bord na Mona, Civil Engineering Division 1983. : Silt Control Study No. 1.

(2) Mr. P. Coffey, Bord na Mona, Scientific Office, Newbridge, 1980. : Water Pollution Report.

(3) Mr. J. Feely, Bord na Mona, Civil Engineering Division : Environmental Aspects of Peat Production.

(4) Mr. L. Byrne, Bord na Mona, Boora Works 1989 : Milled Peat Silt Control.

(5) Mr. J. M. Caffrey and J. J. King, Central Fisheries Board, Glasnevin : Report on the Affects of Peat Bog Development on the River Suck Fishery.

(6) Labaratoire Central D'Hydraulique De France, France 1969 : Decantation of Peat Bog Residue.

(7) Esko Lakso, Raimo Inme, Kaisa Heikinen, University of Oulu, Finland : Development of methods of Purifying run-off water from Peat Production Areas.

Appendix No. 1

BOORA WORKS

TABLE ON MONETTIA SILT POND

DATE 1	Height Over Weir 2	Flow M/sec 3	Flow M/day 4	Cumulativ Flow 5	Part/Mil Influent 6	KG.INF 7	Part/Mil Effluent 8	KG.EFF 9	Part/Mil Retained 10	CUM. Retained. 10A	KG.Silt per day 11	CUM KG.silt 12	Rainfall. 13	DATE 14
01-Apr-90		.0000000	.00	2151	86.89	.00	47.07	.00	39.83	1074.00	.00	.0	0.00	1
02-Apr-91		.0000000	.00	0	86.89	.00	47.07	.00	39.83	79.65	.00	.0	0.00	2
03-Apr-91		.0000000	.00	0	94.13	.00	47.07	.00	47.07	126.72	.00	.0	0.00	3
04-Apr-90		.0000000	.00	0	100.17	.00	47.07	.00	53.10	179.82	.00	.0	0.00	4
05-Apr-90		.0504482	4358.72	4359	106.20	462.91	47.07	205.15	59.14	238.96	257.76	257.8	2.50	5
06-Apr-90		.0000000	.00	4359	112.24	.00	47.07	.00	65.17	304.13	.00	257.8	0.00	6
07-Apr-90		.0000000	.00	4359	182.24	.00	37.41	.00	144.82	448.95	.00	257.8	0.00	7
08-Apr-90		.0000000	.00	4359	182.24	.00	37.41	.00	144.82	593.77	.00	257.8	0.00	8
09-Apr-90		.0000000	.00	4359	182.24	.00	37.41	.00	144.82	738.60	.00	257.8	0.00	9
10-Apr-90		.0100896	871.74	5230	182.24	158.86	37.41	32.61	144.82	883.42	126.25	384.0	.50	10
11-Apr-90		.0050448	435.87	5666	66.38	28.93	10.86	4.73	55.52	938.93	24.20	408.2	.25	11
12-Apr-90		.0100896	871.74	6538	83.27	72.59	9.65	8.42	73.62	1012.55	64.18	472.4	.50	12
13-Apr-90		.0302689	2615.23	9153	4.83	12.62	10.86	28.41	-6.03	1006.52	-15.78	456.6	1.50	13
14-Apr-90		.0000000	.00	9153	55.52	.00	7.24	.00	48.27	1054.79	.00	456.6	0.00	14
15-Apr-90		.0000000	.00	9153	9.65	.00	7.24	.00	2.41	1057.20	.00	456.6	0.00	15
16-Apr-90		.0000000	.00	9153	9.65	.00	10.86	.00	-1.21	1056.00	.00	456.6	0.00	16
17-Apr-90		.1563893	13512.03	22665	9.65	130.46	10.86	146.76	-1.21	1054.79	-16.31	440.3	7.75	17
18-Apr-90		.1008963	8717.44	31383	4.83	42.08	8.45	73.64	-3.62	1051.17	-31.56	408.7	5.00	18
19-Apr-90		.0605378	5230.46	36613	3.62	18.94	9.65	50.50	-6.03	1045.14	-31.56	377.2	3.00	19
20-Apr-90		.0000000	.00	36613	15.69	.00	12.07	.00	3.62	1048.76	.00	377.2	0.00	20
21-Apr-90		.0000000	.00	36613	32.59	.00	8.45	.00	24.14	1072.89	.00	377.2	0.0	21
22-Apr-90		.0000000	.00	36613	6.03	.00	8.45	.00	-2.41	1070.48	.00	377.2	0.0	22
23-Apr-90		.0000000	.00	36613	3.62	.00	8.45	.00	-4.83	1065.65	.00	377.2	0.00	23
24-Apr-90		.0000000	.00	36613	14.48	.00	9.65	.00	4.83	1070.48	.00	377.2	0.00	24
25-Apr-90		.0000000	.00	36613	4.83	.00	9.65	.00	-4.83	1065.65	.00	377.2	0.00	25
26-Apr-90		.0151344	1307.62	37921	9.65	12.62	2.41	3.16	7.24	1072.89	9.47	386.6	.75	26
27-Apr-90		.0302689	2615.23	40536	15.69	41.03	13.28	34.72	2.41	1075.31	6.31	392.9	1.50	27
28-Apr-90		.0100896	871.74	41408	6.03	5.26	6.03	5.26	.00	1075.31	.00	392.9	.50	28
29-Apr-90		.0000000	.00	41408	12.07	.00	7.24	.00	3.00	1078.31	.00	392.9	0.00	29
30-Apr-90		.0000000	.00	41408	22.93	.00	10.86	.00	12.07	1090.38	.00	392.9	0.00	30
			41407.84			986.31		593.37					23.75	

DATE	Height Over Weir	Flow M/sec	Flow M/day	Cumulativ Flow	Part/Mil Influent	KG.INF	Part/Mil Effluent	KG.EFF	Part/Mil Retained	CUM. Retained.	KG.Silt per day	CUM KG.silt	Rainfall.	DATE	KM. DITCHED
01-May-90		.0000000	.00	41408	121.89	.00	12.07	.00	109.82	1200.20	.00	392.9	0.00	1	6.27
02-May-90		.0000000	.00	41408	53.10	.00	9.65	.00	43.45	1243.65	.00	392.9	0.00	2	6.27
03-May-90		.0000000	.00	41408	477.91	.00	9.65	.00	468.26	1711.91	.00	392.9	0.00	3	7.95
04-May-90		.0000000	.00	41408	24.14	.00	9.65	.00	14.48	1726.39	.00	392.9	0.00	4	7.95
05-May-90		.0000000	.00	41408	16.90	.00	7.24	.00	9.65	1736.04	.00	392.9	0.00	5	7.95
06-May-90		.0000000	.00	41408	14.48	.00	8.45	.00	6.03	1742.08	.00	392.9	0.00	6	7.95
07-May-90		.0050448	435.87	41844	13.28	5.79	8.45	3.68	4.83	1746.91	2.10	395.1	.25	7	7.95
08-May-90		.1008963	8717.44	50561	96.55	841.65	12.07	105.21	84.48	1831.39	736.45	1131.5	5.00	8	7.95
09-May-90		.0403585	3486.98	54048	319.82	1115.19	10.86	37.87	308.95	2140.34	1077.32	2208.8	2.00	9	7.95
10-May-90		.1412548	12204.42	66253	27.76	338.77	8.45	103.10	19.31	2159.65	235.66	2444.5	7.00	10	0.00
11-May-90		.0050448	435.87	66688	60.34	26.30	14.48	6.31	45.86	2205.51	19.99	2464.5	.25	11	0.00
12-May-90		.0000000	.00	66688	243.78	.00	12.07	.00	231.72	2437.23	.00	2464.5	0.00	12	0.00
13-May-90		.0000000	.00	66688	120.63	.00	60.34	.00	60.34	2497.57	.00	2464.5	0.00	13	0.00
14-May-90		.0000000	.00	66688	59.14	.00	106.20	.00	-47.07	2450.50	.00	2464.5	0.00	14	0.00
15-May-90		.0605378	5230.46	71919	25.34	132.56	61.55	321.93	-36.21	2414.30	-189.37	2275.1	3.00	15	0.00
16-May-90		.1917030	16563.14	88482	67.58	1119.40	190.68	3158.31	-123.10	2291.20	-2038.91	236.2	9.50	16	0.00
17-May-90		.0100896	871.74	89354	25.34	22.09	143.62	125.20	-118.27	2172.93	-103.10	133.1	.50	17	11.17
18-May-90		.0000000	.00	89354	27.76	.00	22.93	.00	4.83	2177.75	.00	133.1	0.00	18	11.17
19-May-90		.0000000	.00	89354	26.55	.00	15.69	.00	10.86	2188.61	.00	133.1	0.00	19	11.17
20-May-90		.0000000	.00	89354	22.93	.00	14.48	.00	8.45	2197.06	.00	133.1	0.00	20	11.17
21-May-90		.0000000	.00	89354	19.31	.00	13.28	.00	6.03	2203.10	.00	133.1	0.00	21	11.17
22-May-90		.0000000	.00	89354	20.52	.00	16.90	.00	3.62	2206.72	.00	133.1	0.00	22	11.17
23-May-90		.0000000	.00	89354	18.10	.00	15.69	.00	2.41	2209.13	.00	133.1	0.00	23	11.17
24-May-90		.0000000	.00	89354	789.28	.00	19.31	.00	769.97	2979.10	.00	133.1	0.00	24	5.87
25-May-90		.0000000	.00	89354	19.31	.00	8.45	.00	10.86	2989.97	.00	133.1	0.00	25	5.87
26-May-90		.0000000	.00	89354	133.96	.00	12.07	.00	121.89	3111.86	.00	133.1	0.00	26	5.87
27-May-90		.0000000	.00	89354	60.34	.00	60.34	.00	.00	3111.86	.00	133.1	0.00	27	5.87
28-May-90		.0000000	.00	89354	27.76	.00	242.58	.00	-214.82	2897.04	.00	133.1	0.00	28	5.87
29-May-90		.1109859	9589.18	98943	86.89	833.24	26.55	254.60	60.34	2957.38	578.64	711.7	5.50	29	5.87
30-May-90		.1816133	15691.39	114634	21.72	340.87	27.76	435.56	-6.03	2951.35	-94.69	617.0	9.00	30	5.87
31-May-90		.0000000	.00	114634	8.45	.00	19.31	.00	-10.86	2940.48	.00	617.0	0.00	31	0.00
			73226.50			4775.87		4551.77					42.00		

DATE	Height Over Weir	Flow M/sec	Flow M/day	Cumulativ Flow	Part/Mil Influent	KG.INF	Part/Mil Effluent	KG.EFF	Part/Mil Retained	CUM. Retained.	KG.Silt per day	CUM KG.silt	Rainfall.	DATE	KM. DITCHED
01-Jun-90		.0403585	3486.98	118121	12.07	42.08	20.52	71.54	-8.45	2932.04	-29.46	587.6	2.00	1	0.00
02-Jun-90		.1008963	8717.44	126839	33.79	294.58	42.24	368.22	-8.45	2923.59	-73.64	513.9	5.00	2	0.00
03-Jun-90		.0000000	.00	126839	60.34	.00	38.62	.00	21.72	2945.31	.00	513.9	0.00	3	0.00
04-Jun-90		.0000000	.00	126839	120.69	.00	36.21	.00	84.48	3029.79	.00	513.9	0.00	4	0.00
05-Jun-90		.1412548	12204.42	139043	214.82	2621.75	38.62	471.33	176.20	3205.99	2150.43	2664.4	7.00	5	0.00
06-Jun-90		.0353137	3051.10	142094	9.65	29.46	35.00	106.78	-25.34	3180.65	-77.33	2587.0	1.75	6	0.00
07-Jun-90		.0151344	1307.62	143402	14.48	18.94	24.14	31.56	-9.65	3170.99	-12.62	2574.4	.75	7	0.00
08-Jun-90		.1008963	8717.44	152119	9.65	84.17	25.34	220.93	-15.69	3155.31	-136.77	2437.6	5.00	8	0.00
09-Jun-90		.0958515	8281.57	160401	32.59	269.86	31.38	259.86	1.21	3156.51	9.99	2447.6	4.75	9	0.00
10-Jun-90		.0000000	.00	160401	28.96	.00	31.38	.00	-2.41	3154.10	.00	2447.6	0.00	10	0.00
11-Jun-90		.0000000	.00	160401	26.55	.00	27.76	.00	-1.21	3152.89	.00	2447.6	0.00	11	0.00
12-Jun-90		.0000000	.00	160401	76.03	.00	25.34	.00	50.69	3203.58	.00	2447.6	0.00	12	0.00
13-Jun-90		.0000000	.00	160401	494.81	.00	32.59	.00	462.23	3665.80	.00	2447.6	0.00	13	0.00
14-Jun-90		.0000000	.00	160401	6.03	.00	19.31	.00	-13.28	3652.53	.00	2447.6	0.00	14	0.00
15-Jun-90		.0000000	.00	160401	55.52	.00	25.34	.00	30.17	3682.70	.00	2447.6	0.00	15	0.00
16-Jun-90		.0000000	.00	160401	7.24	.00	19.31	.00	-12.07	3670.63	.00	2447.6	0.00	16	0.00
17-Jun-90		.0000000	.00	160401	15.69	.00	26.55	.00	-10.86	3659.77	.00	2447.6	0.00	17	0.00
18-Jun-90		.0908067	7845.70	168247	24.14	189.37	33.79	265.12	-9.65	3650.12	-75.75	2371.9	4.50	18	0.00
19-Jun-90		.0605378	5230.46	173477	8.45	44.19	37.41	195.68	-28.96	3621.15	-151.50	2220.4	3.00	19	0.00
20-Jun-90		.0706274	6102.21	179579	133.96	817.46	7.24	44.19	126.72	3747.87	773.27	2993.7	3.50	20	0.00
21-Jun-90		.0000000	.00	179579	72.41	.00	36.21	.00	36.21	3784.08	.00	2993.7	0.00	21	5.56
22-Jun-90		.3228682	27895.81	207475	48.27	1346.65	26.55	740.66	21.72	3805.80	605.99	3599.7	16.00	22	5.56
23-Jun-90		.0201793	1743.49	209219	14.48	25.25	7.24	12.62	7.24	3813.04	12.62	3612.3	1.00	23	5.56
24-Jun-90		.0000000	.00	209219	22.93	.00	15.69	.00	7.24	3820.28	.00	3612.3	0.00	24	5.56
25-Jun-90		.0706274	6102.21	215321	31.38	191.48	28.96	176.75	2.41	3822.70	14.73	3627.0	3.50	25	5.56
26-Jun-90		.0100896	871.74	216193	54.31	47.34	20.52	17.89	33.79	3856.49	29.46	3656.5	.50	26	5.56
27-Jun-90		.0706274	6102.21	222295	28.96	176.75	12.07	73.64	16.90	3873.38	103.10	3759.6	3.50	27	5.56
28-Jun-90		.0000000	.00	222295	10.86	.00	12.07	.00	-1.21	3872.18	.00	3759.6	0.00	28	6.76
29-Jun-90		.0100896	871.74	223166	12.07	10.52	13.28	11.57	-1.21	3870.97	-1.05	3758.5	.50	29	6.76
30-Jun-90		.2724200	23537.09	246704	27.76	653.33	10.86	255.65	16.90	3887.87	397.68	4156.2	13.50	30	6.76
			132069.22			6863.17		3324.01					75.75		

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01-Jul-90		.0000000	.00	246704	16.90	.00	9.65	.00	7.24	3895.11	.00	4156.2	0.00	1	6.76
02-Jul-90		.0706274	6102.21	252806	6.03	36.82	9.65	58.92	-3.62	3891.49	-22.09	4134.1	3.50	2	6.76
03-Jul-90		.0403585	3486.98	256293	3.62	12.62	7.24	25.25	-3.62	3887.87	-12.62	4121.5	2.00	3	6.76
04-Jul-90		.2522408	21793.60	278086	323.44	7048.86	16.90	368.22	306.54	4194.41	6680.64	10802.1	12.50	4	6.76
05-Jul-90		.1816133	15691.39	293778	35.00	549.18	8.45	132.56	26.55	4220.96	416.62	11218.7	9.00	5	7.84
06-Jul-90		.0000000	.00	293778	13.28	.00	9.65	.00	3.62	4224.58	.00	11218.7	0.00	6	7.84
07-Jul-90		.0000000	.00	293778	12.07	.00	8.45	.00	3.62	4228.20	.00	11218.7	0.00	7	7.84
08-Jul-90		.0000000	.00	293778	12.07	.00	7.24	.00	4.83	4233.03	.00	11218.7	0.00	8	7.84
09-Jul-90		.1109859	9589.18	303367	12.07	115.73	6.03	57.86	6.03	4239.06	57.86	11276.6	5.50	9	7.84
10-Jul-90		.0403585	3486.98	306854	9.65	33.67	7.24	25.25	2.41	4241.47	8.42	11285.0	2.00	10	7.84
11-Jul-90		.0000000	.00	306854	13.28	.00	8.45	.00	4.83	4246.30	.00	11285.0	0.00	11	7.84
12-Jul-90		.0000000	.00	306854	24.14	.00	9.65	.00	14.48	4260.78	.00	11285.0	0.00	12	11.26
13-Jul-90		.0000000	.00	306854	55.52	.00	9.65	.00	45.86	4306.64	.00	11285.0	0.00	13	11.26
14-Jul-90		.0000000	.00	306854	26.55	.00	9.65	.00	16.90	4323.54	.00	11285.0	0.00	14	11.26
15-Jul-90		.0000000	.00	306854	15.69	.00	9.65	.00	6.03	4329.57	.00	11285.0	0.00	15	11.26
16-Jul-90		.0302689	2615.23	309469	6.03	15.78	9.65	25.25	-3.62	4325.95	-9.47	11275.5	1.50	16	11.26
17-Jul-90		.0000000	.00	309469	65.17	.00	14.48	.00	50.69	4376.64	.00	11275.5	0.00	17	11.26
18-Jul-90		.0000000	.00	309469	10.86	.00	22.93	.00	-12.07	4364.57	.00	11275.5	0.00	18	11.26
19-Jul-90		.0000000	.00	309469	12.07	.00	18.10	.00	-6.03	4358.54	.00	11275.5	0.00	19	7.86
20-Jul-90		.0000000	.00	309469	120.69	.00	10.86	.00	109.82	4468.36	.00	11275.5	0.00	20	7.86
21-Jul-90		.0000000	.00	309469	101.38	.00	14.48	.00	86.89	4555.26	.00	11275.5	0.00	21	7.86
22-Jul-90		.0000000	.00	309469	72.41	.00	12.07	.00	60.34	4615.60	.00	11275.5	0.00	22	7.86
23-Jul-90		.0000000	.00	309469	779.63	.00	10.86	.00	768.77	5384.37	.00	11275.5	0.00	23	7.86
24-Jul-90		.0000000	.00	309469	15.69	.00	15.69	.00	.00	5384.37	.00	11275.5	0.00	24	7.86
25-Jul-90		.0000000	.00	309469	15.69	.00	19.31	.00	-3.62	5380.75	.00	11275.5	0.00	25	7.86
26-Jul-90		.0000000	.00	309469	43.45	.00	16.90	.00	26.55	5407.30	.00	11275.5	0.00	26	10.26
27-Jul-90		.1109859	9589.18	319058	267.92	2569.15	14.48	138.87	253.44	5660.74	2430.28	13705.8	5.50	27	10.26
28-Jul-90		.3430474	29639.30	348698	852.04	25253.85	10.86	321.93	841.18	6501.91	24931.92	38637.7	17.00	28	10.26
29-Jul-90		.0000000	.00	348698	9.65	.00	9.65	.00	.00	6501.91	.00	38637.7	0.00	29	10.26
30-Jul-90		.1210756	10460.93	359159	4.83	50.50	8.45	88.37	-3.62	6498.29	-37.87	38599.9	6.00	30	10.26
31-Jul-90		.0000000	.00	359159	24.14	.00	13.28	.00	10.86	6509.15	.00	38599.9	0.00	31	10.26
			112454.98			35686.17		1242.49					64.50		

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01-Aug-90		.0000000	.00	359159	42.24	.00	26.55	.00	15.69	6524.84	.00	38599.9	0.00	1	10.26
02-Aug-90		.0000000	.00	359159	21.72	.00	24.14	.00	-2.41	6522.43	.00	38599.9	0.00	2	8.88
03-Aug-90		.0000000	.00	359159	10.86	.00	12.07	.00	-1.21	6521.22	.00	38599.9	0.00	3	8.88
04-Aug-90		.0000000	.00	359159	42.24	.00	16.90	.00	25.34	6546.57	.00	38599.9	0.00	4	8.88
05-Aug-90		.0000000	.00	359159	60.34	.00	13.28	.00	47.07	6593.63	.00	38599.9	0.00	5	8.88
06-Aug-90		.0000000	.00	359159	438.09	.00	9.65	.00	428.43	7022.07	.00	38599.9	0.00	6	8.88
07-Aug-90		.0000000	.00	359159	279.99	.00	13.28	.00	266.71	7288.78	.00	38599.9	0.00	7	8.88
08-Aug-90		.0000000	.00	359159	596.19	.00	16.90	.00	579.29	7368.07	.00	38599.9	0.00	8	8.88
09-Aug-90		.0177698	1535.31	360694	483.95	743.01	7.24	11.12	476.71	8344.78	731.89	39331.8	1.00	9	8.07
10-Aug-90		.0266547	2302.97	362997	358.44	825.47	9.65	22.23	348.78	8693.56	803.23	40135.0	1.50	10	3.07
11-Aug-90		.0000000	.00	362997	545.50	.00	12.07	.00	533.43	9226.99	.00	40135.0	0.00	11	8.07
12-Aug-90		.0000000	.00	362997	965.48	.00	13.28	.00	952.21	10179.20	.00	40135.0	0.00	12	8.07
13-Aug-90		.0577518	4989.76	367987	1647.36	8219.91	14.48	72.26	1632.87	11812.08	8147.65	48282.6	3.25	13	8.07
14-Aug-90		.0266547	2302.97	370290	441.71	1017.24	16.90	38.91	424.81	12236.89	978.33	49261.0	1.50	14	8.07
15-Aug-90		.1110612	9595.69	379885	22.93	220.03	14.48	138.97	8.45	12245.34	81.06	49342.0	6.25	15	8.07
16-Aug-90		.0000000	.00	379885	15.69	.00	9.65	.00	6.03	12251.37	.00	49342.0	0.00	16	1.56
17-Aug-90		.0355396	3070.62	382956	8.45	25.94	7.24	22.23	1.21	12252.58	3.71	49345.7	2.00	17	1.56
18-Aug-90		.1332735	11514.83	394471	6.03	69.48	10.86	125.07	-4.83	12247.75	-55.59	49290.2	7.50	18	1.56
19-Aug-90		.0000000	.00	394471	12.07	.00	10.86	.00	1.21	12248.96	.00	49290.2	0.00	19	1.56
20-Aug-90		.2487771	21494.35	415965	15.69	337.23	12.07	259.41	3.62	12252.58	77.82	49368.0	14.00	20	1.56
21-Aug-90		.0000000	.00	415965	33.79	.00	7.24	.00	26.55	12279.13	.00	49368.0	0.00	21	1.56
22-Aug-90		.0000000	.00	415965	24.14	.00	1.21	.00	22.93	12302.06	.00	49368.0	0.00	22	1.56
23-Aug-90		.0222122	1919.14	417884	21.72	41.69	10.86	20.85	10.86	12312.92	20.85	49388.8	1.25	23	0.00
24-Aug-90		.0444245	3838.28	421722	10.86	41.69	9.65	37.06	1.21	12314.13	4.63	49393.5	2.50	24	0.00
25-Aug-90		.0000000	.00	421722	10.86	.00	9.65	.00	1.21	12315.33	.00	49393.5	0.00	25	0.00
26-Aug-90		.0000000	.00	421722	9.65	.00	8.45	.00	1.21	12316.54	.00	49393.5	0.00	26	0.00
27-Aug-90		.4087053	35312.14	457035	8.45	298.32	7.24	255.70	1.21	12317.75	42.62	49436.1	23.00	27	0.00
28-Aug-90		.0444245	3838.28	460873	8.45	32.43	7.24	27.79	1.21	12318.95	4.63	49440.7	2.50	28	0.00
29-Aug-90		.2665469	23029.66	483903	568.43	13090.72	7.24	166.76	561.19	12880.14	12923.96	62364.7	15.00	29	0.00
30-Aug-90		.0710792	6141.24	490044	27.76	170.47	20.52	126.00	7.24	12887.38	44.47	62409.1	4.00	30	0.00
31-Aug-90		.1599282	13817.79	503862	31.38	433.58	7.24	100.06	24.14	12911.52	333.52	62742.7	9.00	31	0.00
			144703.00			25567.20		1424.41					94.25		

APPENDIX NO. 14

PEAT SILT RELATED CLAIMS.

Appendix No. 14

1990 PEAT SILT RELATED CLAIMS.

WORKS	NO. OF CLAIMS RELATING TO PEAT SILT	SILTING FLOODING CLAIMS IR£
BLACKWATER	153	625
BOORA	113	1,170
DERRYGREENAGH	6	--
MOUNTDILLON	32	4,000
OWENINNY	10	9,750
TOTAL	314	17,299

These claims may not be a true reflection of actual claims as the area foreman may deal with some of the silt problems on the ground as they arise.

ACKNOWLEDGEMENT

I have drawn on many inputs on both a formal and informal basis and am thankful to all.

Studies on the Silt Control Project was carried out at three Works:- Boora, Mountdillon and Oweninny.

Special thanks to Pat Fitzgerald who devised the project, to Celine Robbins who analysed the samples, to Terry McGovern who set up computer programmes in compiling data, to the General Manager, Boora and his staff Aidan O'Hara and Patricia Fahy for their assistance and to the General Manager, Oweninny Works, in particular Gerry Loftus and Richard Cosgrove.

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Thanks to Eugene Dalton for taking the samples at Mountdillon Works, to Michael O'Sullivan for study on plant and finally thanks to Sharon Gray for her patience in typing and amending the report.

APPENDIX NO. 15

RIVER SHANNON

The net catchment area of bog for the Peat Energy Division is 50,000 acres. This does not include Derryfadda Works. The gross catchment area owned by Bord na Mona is 2.7% of total catchment area of River Shannon. The area of peat soils within catchment is 540,300 acres or 19.4% of total catchment. Bord na Mona operates on 13.95% of the peatland in the catchment (see Environmental aspects of Peat Production by J. Feely).

Lough Ree

Catchment Area	1,147,000 acres
Mountdillon bogs	16,600 acres
Catchment	1.45%
Volume	651 x 10 6 cu.m.
Water Residence time	80 days.

Appendix No. 15

CATCHMENT	RIVER	GUAGE PT.	DRY WEATHER FLOW (CU.M./SEC)	BORD NA MONA NETT ACRE	TOTAL CATCHMENT AREA OF RIVER IN ACRES
Boyne	Boyne	Trim	1.730	2,036	316,777
Barrow	Figile	Clonbullogue	0.230	5,328	70,916
	Cushina	Cushina	0.110	830	16,802
Camlin	Camlin	Mullagh	0.110	317	64,245
	Fallon	Kilmore	0.010	546	15,073
Brosna	Brosna	Ferbane		11,056	298,245
	Cladagh	Rahan	0.190	1,720	67,704
	Silver	Millbroke		1,430	40,771

APPENDIX NO. 16

Appendix No. 16

A study was carried out on the new long reach excavators (VC15's) to establish their output, and to compare them with a Hy-mac and Dragline.

The output of the machines were as follows:-

WORKS	MACHINE TYPE	BUCKET SIZE	CUBIC METRES /STANDARD HR.
Mountdillon	VC 15	.84 Cub. Metres	95
Oweninny	VC 15	.84 Cub. Metres	120
	Hy-Mac	.31 Cub. Metres	65
	19 RB	1 Cub. Metre	78

Appendix No. 16

MACHINE SPECIFICATIONS

	HY-MAC	19 RB	VC 15
Weight	13.2 Tonnes	19 tonnes	19.5 Tonnes
Bearing Pressure	2 lbs/sq. in	1.75 lbs/sq. in	2.15 lbs/sq.in
Idle travel Speed	2000 M/Hr.	2800 M/Hr.	2400 M/Hr.
Reach (from Centre of m/c)	7.46 M	12.2 M dropped	15 M
Max. Digging Depth	2.8 M	4.6 M	6 M
Max. Load		1.2 T @ 11.6 M	1.4 T @ 15 M
Pond Width (Max) Cleaning from both sides	8.00 m	22.5 m	19.00 m

Appendix No. 4

SILT CONTROL POND CHARACTERISTICS.

	STORAGE CAPACITY (CU.M.)	GROSS CATCHMENT AREA (ACRES)	NET CATCHMENT AREA (ACRES)
BOORA			
Monettia	3880	776	643
Noggus	2416	665	451
MOUNTDILLON			
Cloontagh	3762	401	137
Derryshannogue	3480	500	424
OWENINNY			
O'Connells	6285	274	243
Railway 100	330	68	50