

Office of Licensing & Guidance,
EPA Headquarters,
P.O. Box 3000,
Johnstown Castle Estate,
Co. Wexford.

20th September 2005

Our Ref: MGE0031LT0023GAL
File Ref: 340

Re: Killarney Waste Disposal – WL217-1

Dear Sir/Madam,

We refer to the above application for a Waste Licence for Killarney Waste Disposal and to EPA correspondence dated 27th July 2005 requesting additional information in accordance with Article 14(2)(b)(ii) of the Waste Management (Licensing) Regulations and our correspondence dated 17th June 2005 and 14th July 2005.

We now enclose information in the form of 1 no. original and 2 no. copies plus 2 no. CD-ROM digital copies.

We are currently waiting on the updated Drawing of the Site Layout Plan 02-034-J4-MCOS2F03 from Paudie O'Mahoney and Associates and this will be forwarded to the Agency when received.

We are providing this information on behalf of Killarney Waste Disposal.

We trust this is satisfactory, but please do not hesitate to contact the undersigned if you have any queries.

Yours sincerely,

Siobhan Aherne
Senior Project Scientist
For and on behalf of RPS Consulting Engineers

sa/wm

Encl. MGE0031RP0010F01

ENVIRONMENTAL PROTECTION
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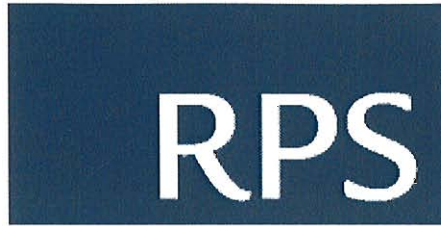


KILLARNEY WASTE DISPOSAL

ARTICLE 12 REQUIREMENTS WASTE LICENCE APPLICATION WASTE LICENCE 217-1

September 2005





DOCUMENT CONTROL SHEET

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Project Title	Killarney Waste Disposal Waste Licence Application					
Document Title	Article 12 Compliance Requirements					
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F01	Final	S. Aherne	K. Garvey	W. Madden	Galway	20/09/05

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1 NON-TECHNICAL SUMMARY

The non-technical summary has been revised to reflect the information supplied in this Article 12 compliance.

A.1.1 Nature of the Facility

Killarney Waste Disposal (KWD) operate a Materials Recovery Facility at Aughacurreen, 4.5km northwest of Killarney Town, under a Waste Permit from Kerry County Council allowing an annual waste intake for recovery of 16,500 tonnes. The site is 2.2 hectares in size and is located in a rural context. There are approximately 20 no. residences within 500m of the facility boundary. Most of the residences are located on a ribbon development on the nearby road from Knockasarnet to Aghalee. The primary landuse in the vicinity of the facility is agriculture.

Killarney Waste Disposal propose to increase the waste intake at the facility to 40,000 tonnes per annum and to provide an extension to the facility to incorporate a new materials recovery building. Therefore an Environmental Impact Statement (EIS) is required together with the Waste Licence Application for the proposed increase in tonnage and facility extension. It is in this context that this EIS has been prepared by RPS Consulting Engineers for Killarney Waste Disposal.

The General Soils Map of Ireland indicates that the soil type in the area is podzolic. These are poor, acidic soils, typical of cool, damp climates. GSI Quaternary maps record Devonian Sandstone dominated Till (boulder clay) at the site location. The thickness of the subsoil deposits in the area can reach up to 30m in places while elsewhere the subsoil is absent (at outcrop) or less than a metre. The GSI has classified the shale and sandstone bedrock underlying the site as a locally important aquifer which is moderately productive only in local zones.

The Killarney Waste Disposal facility is located in the catchment of the Glanooragh River which flows to the Gweestin River c.10km downstream of the facility. The Gweestin flows for a further c.10km before joining the River Laune.

A.1.2 Classes of Activities as specified in the Third and Fourth Schedules of the Act

The proposed waste disposal activities carried out under the Third and Fourth Schedule are as follows:

Third Schedule:

Class 11: This activity provides for the processing and mixing of wastes prior to transfer to another facility for disposal.

Class 12: This activity is required for the processing and baling of waste on-site prior to disposal.

Class 13: This activity is required for the storage of waste arising at the facility prior to disposal.

Fourth Schedule:

Class 3: This activity is required for the sorting of metals which will be stored at the facility and then transferred to a metal recycling facility for recovery.

Class 4: This activity is required for the sorting, separation and processing of mixed municipal waste and separately collected dry recyclables and Construction & Demolition waste.

Class 11: This activity is limited to the packaging of waste by baling, wrapping, placing in containers or trailers prior to submission to a recycling facility.

Class 12: This activity is limited to the exchange of recycling at the facility.

Class 13: This activity is required for the short-term storage of waste at the facility.

The Principal Activity carried out at the site in accordance with the Fourth Schedule of the Waste Management Acts 1996 to 2003, is as follows:

Class 2: This activity refers to the processing of municipal waste. This material will be processed and the organic fines separated out and sent off site for further treatment/processing. Sorted organic waste will also be accepted at the facility.

A.1.3 Quantity and Nature of the Waste

A total of 16,500 tonnes per annum of non-hazardous waste is currently accepted by KWD. The facility currently accepts municipal waste arising in County Kerry from the domestic and commercial sectors. KWD also provides its own collection service for its customers. It is proposed to increase the annual waste intake to 40,000 tonnes, the breakdown of which is shown below in Table 1.1.

Table 1.1 Waste Types and Quantities Proposed

Waste Type	Maximum Tonnes per Annum
Household	11,000
Commercial	17,000
Construction & Demolition Waste	12,000
Total Waste	40,000

A.1.4 Operations

The proposed operating hours are from 07:00 to 20:00 Monday to Saturday inclusive. The proposed waste acceptance hours are from 07:30 to 19:30 Monday to Saturday inclusive.

The following waste types are accepted for recovery and disposal:

1. Mixed municipal Waste;
2. Source segregated waste, which includes organic waste and dry recyclables (plastic (bottles and film), paper, cardboard and packaging waste, glass, metals and textiles);
3. Timber;
4. Construction & Demolition Waste.

Incoming waste is weighed on the weighbridge near the site entrance and the waste record keeping system is updated with information on the incoming waste.

The waste is then tipped into the Material Recovery Facility (MRF) and inspected prior to processing. Any suspect load is removed to the quarantine area for further inspection and if found to be non-compliant is returned to the customer. Mixed municipal waste is processed (mainly by the trommel but it can also be processed by the ballistic separator) to separate the organic fines from the residual waste. C&D waste is sorted and processed into various fractions which are sent onto licensed/permitted facilities for materials recovery. Timber processing will continue to take place outdoors. Timber is shredded on site and sent on to a Material Recovery Facility. Source segregated waste is baled and sent on for recycling.

A.1.5 Emissions, Impacts and Mitigation Measures

Runoff from processing mixed municipal waste (indoors)

The processing of mixed municipal waste produces an effluent. The new processing building will have an effluent holding tank in the centre of the building. This precast concrete holding tank will be 6,920 litres in capacity and will be lined with a 2.5mm thick HDPE liner. A bund will be constructed around the tank which will have a volume of 110% of the tank capacity. The effluent will be sent to Killarney WwTP for treatment.

Runoff from timber shredding and outdoor storage areas for timber and metals

The shredding of timber outdoors has the potential to contaminate groundwater if the drainage water from this area is not adequately controlled and treated. Contaminants will depend on the chemicals

used to treat the timber and could, for example include creosols (coal tar derived), organochlorine pesticides, metals (copper-chromium-arsenate, boron) and light organic solvents. The storage of timber outdoors also has the potential to contaminate groundwater as runoff from waste materials stored may contain contaminants.

There will be no risk to groundwater or surface water as timber processing and storage and metal storage will take place on a concreted area and any effluent will drain to the oil and solids separator and then on to the lagoon/reed bed/percolation system. Therefore the effluent emissions from the timber processing and runoff from the outdoor storage area will be contained and treated. The outlet from the constructed wetland to the percolation area will be monitored to ensure that treatment from the storm water treatment system is effective. Metal will be contained in skips on the concreted area.

Noise

It is proposed to increase the waste intake at the facility from 16,500 tonnes to 40,000 tonnes per annum. A ballistic separator, trommel, baler and dryer will be used to process waste inside the MRF building thereby reducing noise emissions. It is proposed to continue the timber shredding operations outdoors. The results of noise monitoring have shown that noise levels currently on site are generally below the standard emission limits for daytime operations (55 dB (A)) with the exception of the shredding operation which results in a noise level of 56 dB (A). The background noise level (L90) is increased significantly when shredding takes place. Mitigation measures will be required in order to remain within standard limits. It is proposed to purchase a new quieter shredder and create an enclosed area for its operation. This will certainly result in a sufficient reduction to remain within standard noise limits. In the meantime shredding will be limited to 3 hours per day, carried out in mid morning when site traffic is light and a temporary noise barrier is created using bales of materials to reduce noise levels to the North of the site. The temporary compressors which form part of the dryer system are not a significant problem and it is proposed that an enclosure for the compressors will mitigate the situation.

Dust

The standard emission limit of 350 mg/m²/day is not exceeded at any of the four dust monitoring locations at the facility. Therefore the existing facility is not having a negative impact on the surrounding air quality.

Emissions of dust will be generated from the processing and storage of C&D waste within the MRF building and the processing and storage of timber outside. Dust will also be generated from traffic travelling to and from the facility. Dust emissions associated with timber shredding will be reduced as it is proposed to enclose the timber shredder.

Having regard for the draft BAT Guidance Note for the Waste sector: Transfer Activities (November 2004) the measures to control and reduce dust emissions at the facility include the following:

- Regular sweeping of the facility with the automatic sweeper will control the amount of dust generated.
- The surrounding trees will attenuate the dust generated from the proposed facility.
- A mobile water sprayer will be employed during dry weather conditions to reduce dust emissions.
- Plant equipment used on site will be regularly maintained to prevent excessive exhaust emissions of particulates and other pollutants
- The timber shredder will be housed on three sides to reduce dust being emitted into the atmosphere.
- Regular dust monitoring will indicate if the levels are exceeding the standard limits.

With the implementation of the dust measures outlined above, emissions of dust will be adequately controlled. Overall, dust emissions are predicted to be low.

Odour

The processing of mixed municipal waste and the acceptance of segregated organic waste has the potential emit odour. The potential for odour emissions is minimised by a series of design features, work practices and mitigation measures at the facility. These measures are outlined briefly below:

- All organic and mixed municipal waste is processed indoors and this significantly reduces any odour emissions from the waste.
- All work surfaces and floors are cleaned and regularly maintained to a suitable standard to prevent the build up of anaerobic bacteria. All areas where there is a potential for the generation of odour (i.e. temporary storage areas, skips, bins, etc) are covered to reduce the potential for escape of odours.
- Residence time for waste, even non-odorous waste, will be kept to a minimum before transfer.

As there is no odour problem at the facility it has been decided that an odour abatement system (biofilter) is not necessary and the control measures outlined above are sufficient.

Domestic Effluent

Currently the domestic effluent treatment system on site consists of a septic tank. A puraflo treatment unit and raised percolation area is required to be installed as per original planning permission Reg No. 337/03. It is proposed to install this puraflo system and percolation area immediately. The proposed puraflo unit and associated percolation area will be designed, located, constructed and maintained in accordance with the manufacturer's instructions. The design of the puraflo system and percolation has been approved by Kerry County Council. The design of the domestic effluent system is in line with the EPA Wastewater Treatment Manuals.

A.1.6 Determination of Compliance with Section 40 (4) of the Act and the Requirements of BAT

The applicant KWD are committed to applying the BAT principle as appropriate to reduce emissions from the facility as far as is practicable to comply with any conditions of the waste licence and ensure that any emissions are within the standard limits. The applicant KWD, are committed to use energy efficiently in the carrying out of activities and to implement necessary measures to maintain site safety prevent accidents. KWD are fully aware of their environmental responsibilities and realise that financial provisions may be required for decommissioning, aftercare and environmental pollution incidents.

2 FURTHER INFORMATION

In additional information received on 21/06/05, it is stated that the applicant proposes to install a dryer. Give details of the dryer, emissions from the dryer and measures to abate/treat these emissions.

The proposed layout of the MRF building has been updated and is shown in Drawing No. DG0004-01F03 Proposed Layout for MRF Building. The proposed vortex dryer has been re-located as shown. The capacity of the dryer is 4.5-5 tonnes/hour. A heat exchanger and two compressors are located outside the building and are connected to the dryer inside. A shredder shreds the organic waste before being sent for drying. The capacity of this shredder is 5-7 tonnes/hour. Subsequent to drying the organic waste is sent to a pelletiser.

The dryer system is a completely enclosed system and there are no emissions to the air. An air filter traps any dust emissions which are re-circulated back into the drying process. Appendix A provides more information on the proposed vortex dryer and air filter. The noise assessment in Appendix B assesses the noise impacts of the compressors.

In additional information received on 21/06/05, it is stated that the applicant proposes to install a biofilter. Give details of the areas of the facility where localised extraction (negative pressure) to the biofilter is proposed. Give details of the biofilter including location, operation and control. Complete Table F1 of the application in relation to the biofilter.

The processing of mixed municipal waste and the acceptance of segregated organic waste has the potential to emit odour. The potential for odour emissions is minimised by a series of design features, work practices and mitigation measures at the facility. These measures are outlined briefly below:

- All organic and mixed municipal waste is processed indoors and this significantly reduces any odour emissions from the waste.
- All work surfaces and floors are cleaned and regularly maintained to a suitable standard to prevent the build up of anaerobic bacteria. All areas where there is a potential for the generation of odour (i.e. temporary storage areas, skips, bins, etc) are covered to reduce the potential for escape of odours.
- Residence time for waste, even non-odorous waste, will be kept to a minimum before transfer.

As there is no odour problem at the facility it has been decided that an odour abatement system (biofilter) is not necessary and the control measures outlined above are sufficient.

Having regard for the draft BAT Guidance Note for the Waste sector: Transfer Activities (November 2004) give details of measures to control dust arising from working areas within the material recovery building and from storage areas.

Table 1.2 below presents dust monitoring results for KWD facility. The standard emission limit of 350 mg/m²/day is not exceeded at any of the four locations. Therefore the existing facility is not having a negative impact on the surrounding air quality.

Table 1.2: Dust Deposition Results at Killarney Waste Disposal

Dust Monitoring Point	August 2004 mg/m ² /day
D1	172.7
D2	173.8
D3	116.6
D4	90
D5	227.7*
Emission Limit Value	350

* Sample D5 contained excessive foliage and plant debris from overhanging trees.

Emissions of dust will be generated from the processing and storage of C&D waste within the MRF building and the processing and storage of timber outside. Dust will also be generated from traffic travelling to and from the facility. Dust emissions associated with timber shredding will be minimised as it is proposed to enclose the timber shredder.

Having regard for the draft BAT Guidance Note for the Waste sector: Transfer Activities (November 2004) the measures to control and reduce dust emissions at the facility include the following:

- Regular sweeping of the facility with the automatic sweeper will control the amount of dust generated.
- The surrounding trees will attenuate the dust generated from the proposed facility.
- A mobile water sprayer will be employed during dry weather conditions to reduce dust emissions.
- Plant equipment used on site will be regularly maintained to prevent excessive exhaust emissions of particulates and other pollutants
- The timber shredder will be housed on three sides to reduce dust being emitted into the atmosphere.
- Regular dust monitoring will indicate if the levels are exceeding the standard limits.

With the implementation of the dust measures outlined above, emissions of dust will be adequately controlled. Overall, dust emissions are predicted to be low.

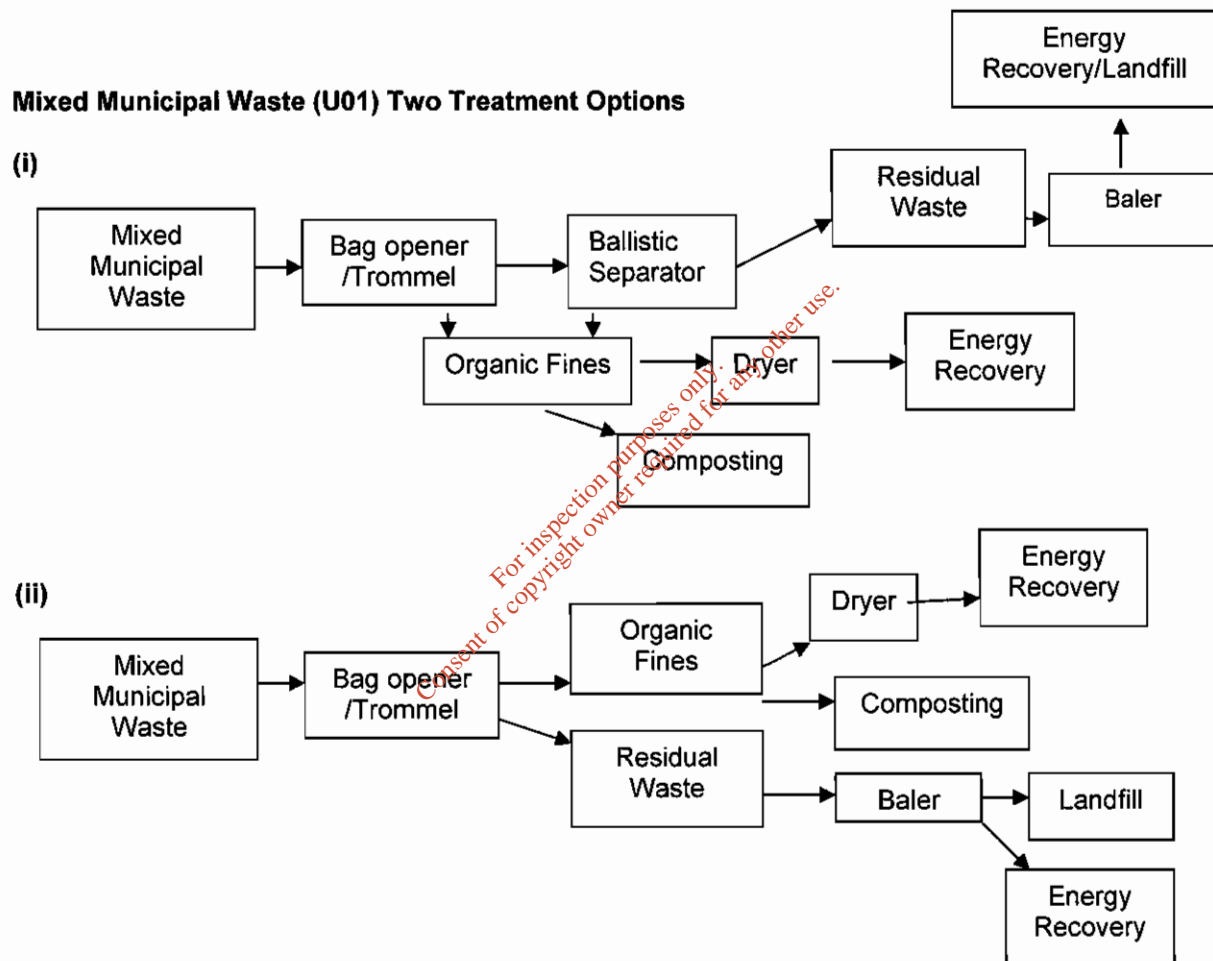
Give details of the predicted noise levels from the proposed activity. Give details and an assessment of the impacts of predicted noise emissions on the environment using BS 5228, or ISO 9613-2. Complete Table I.6 (i) in relation to the predicted impact. Predicted models, maps, diagrams and supporting documents, including details of noise attenuation and noise proposed control measures to be employed, should form part of the response.

Appendix B provides a further noise assessment prepared by Biospheric Engineering Ltd.

FURTHER INFORMATION PROVIDED BY RPS CONSULTING ENGINEERS

(1) Trommel

The proposed layout of the MRF building has been updated and is shown in Drawing No. DG0002-01F03 Proposed Layout for MRF Building. The quarantine area and the dryer have been re-located. The screener will be replaced with a trommel. All waste is inspected on arrival in the inspection and sorting area. If any consignment is non-compliant the customer will be notified and it will be returned to the customer. In cases where the waste can not be returned to the customer it will be temporarily stored in the quarantine area. The following unit operations have been updated to include the trommel instead of the screener.



Waste is tipped onto the inspection and sorting area. Then the material is inspected and any hazardous waste is removed and placed in the quarantine area. There are two processing routes for mixed municipal waste as shown above. The finer organic particles are separated from the rest of the residual mixed waste. The residual waste is baled and wrapped in a plastic film to ensure that the bales remain intact. These bales are stored in the facility and then transferred to landfill or exported to an energy recovery facility. The separated organic fraction of the waste is sent either to a composting facility for further processing or sent to the dryer to decrease the moisture content and then to an energy recovery facility.

Appendix C contains the specification of the trommel. The following impacts of noise, runoff and odour in relation to the operation of the proposed trommel have been assessed below:

Noise

The proposed trommel as well as the ballistic separator, baler and dryer will be used to process waste inside the MRF building, therefore reducing noise emissions.

Runoff from processing mixed municipal waste

Any effluent produced from processing the mixed municipal waste on the trommel will be collected in the effluent holding tank in the centre of the MRF building. The effluent will be sent to Killarney WwTP for treatment.

Odour

Refer to previous section on odour assessment on Page 6.

(ii) Impact of Effluent on WwTP

Appendix D provides details on the analysis of the effluent from the MRF building which is being sent to Killarney WwTP for treatment. However we recommend that the effluent is re-analysed as the results for BOD and COD are significantly higher than expected (compared to maximum BOD and COD concentrations for leachate referenced in the EPA Landfill Site Design Manual). In the meantime we have referenced the EPA Landfill Site Design Manual for BOD concentrations for leachate to assess the impact of this effluent on the WwTP and subsequently the environment.

Killarney Wastewater Treatment Plant has been designed for a capacity of 42,000 Population Equivalent¹, i.e. 9,450 cu.m/day and 2,520 kg BOD/ day.

Current plant loading averages 8,666 cu.m per day with an average BOD of 182 mg/l¹ (i.e. 1,577 kg BOD/ day). This includes leachate loading from the current waste facility.

Performance compliance testing of the plant indicates that the plant is producing treated effluent well within the required standard. Annual averages of 5.7 mg/l BOD and 0.3 mg/l Total Phosphate have been recorded.

The additional leachate loading from the increased waste facility has been calculated as 11.23 cu.m/ day. Using a maximum concentration of 68,000 mg/l BOD² a total maximum load of 763 Kg/ day would be anticipated (with an average daily load of 380 Kg/day).

Based on the above figures the plant has capacity to accept the additional flow and BOD loading. The current performance of the plant would further indicate that it has sufficient capacity to cope with any increased nutrient loading from the waste facility.

¹ Kerry County Council – Killarney WwTP records

² EPA Landfill Manuals

(iii) Timber Processing

Drawing No. 02-034-J4-MCOS2F03 Site Layout Plan has been updated to show the location of the timber processing area and the storage areas for timber and metal, generator, heat exchanger, compressors and the proposed new location for weighbridge.

Runoff from timber shredding and outdoor storage areas for timber and metals

The shredding of timber outdoors has the potential to contaminate groundwater if the drainage water from this area is not adequately controlled and treated. Contaminants will depend on the chemicals used to treat the timber and could, for example, include creosols (coal tar derived), organochlorine pesticides, metals (copper-chromium-arsenate, boron) and light organic solvents.

The storage of timber and metal outdoors also has the potential to contaminate groundwater as runoff from waste materials stored may contain contaminants.

There will be no risk to groundwater or surface water as outdoor processing and storage of timber will take place on a concreted area and any effluent will drain to the oil and solids separator and then on to the lagoon/reed bed/percolation system. Therefore the effluent emissions from the timber processing and runoff from the outdoor storage area will be contained and treated. The outlet from the constructed wetland to the percolation area will be monitored to ensure that treatment from the storm water treatment system is effective. This monitoring point SW1 is shown on Drawing No. 02-034-J4-MCOS2F03 Site Layout Plan. Metal will be contained in skips on the concreted area.

The treated discharge from the constructed wetland drains to a percolation ditch as shown in Drawing No. 02-034-J4-MCOS2F03. The final disposal route is therefore to surface water and therefore Table E.4 (i) Emissions to Groundwater is no longer applicable. Table E.2 (i) Emissions to Surface Waters has been completed which is included in Appendix E.

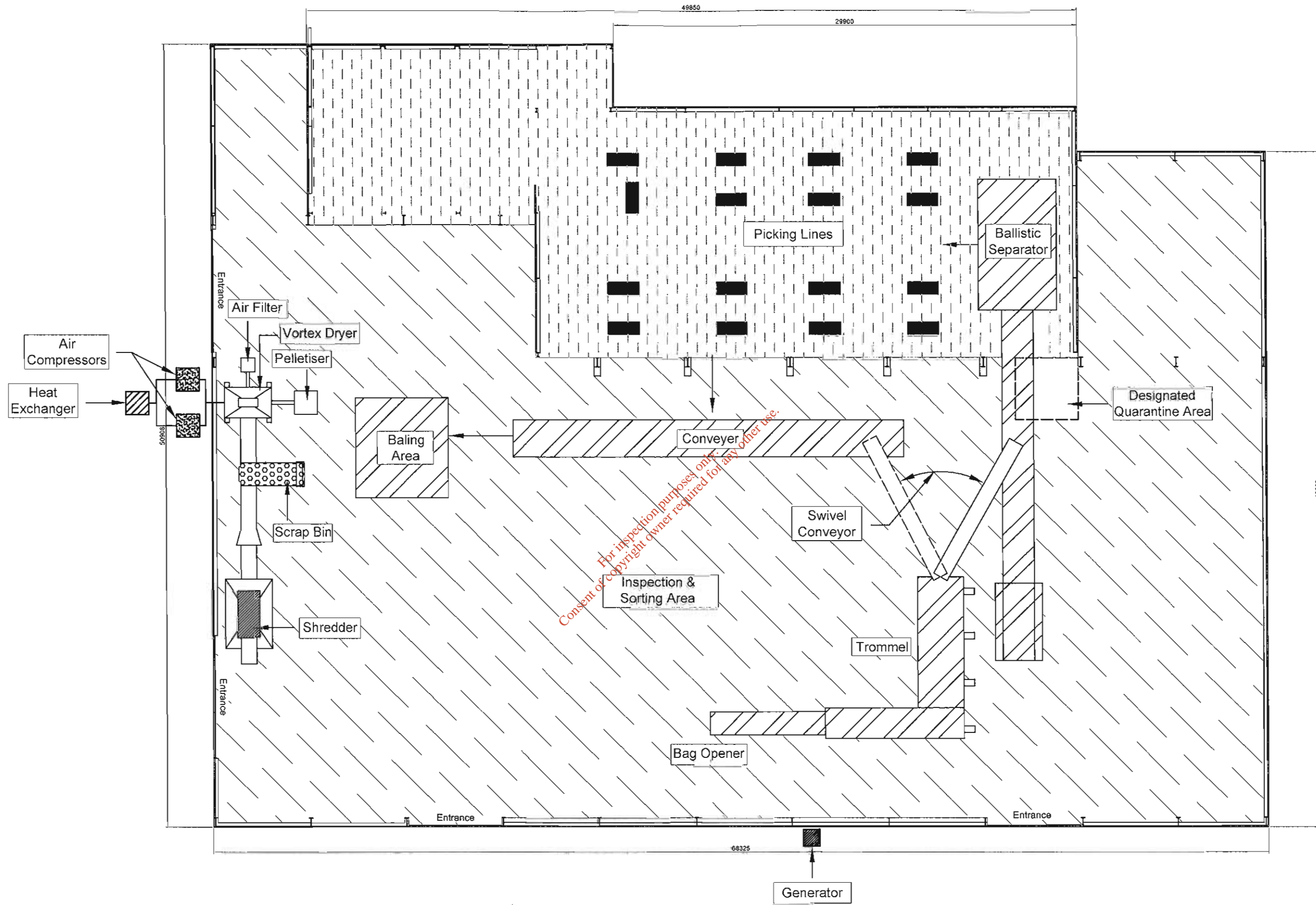
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(iv) Proposed Waste Types with EWC Codes for Acceptance

The different proposed waste types and their associated EWC Codes is shown in Table 1.3 below which was contained in Attachment H of the original Waste Licence Application, has been updated to include the following waste categories: clothes 20 01 10 and textiles 20 01 11.

Table 1.3: Proposed Waste Types with EWC Codes for Acceptance

Waste Type	EWC Code
Paper and cardboard	20 01 01
Glass	20 01 02
Biodegradable kitchen and canteen waste	20 01 08
Wood other than that mentioned in 20 01 37	20 01 38
Clothes	20 01 10
Textiles	20 01 11
Plastics	20 01 39
Metals	20 01 40
Other fractions not otherwise specified	20 01 99
Biodegradable waste	20 02 01
Soil and stones	20 02 02
Other biodegradable wastes	20 02 03
Mixed municipal waste	20 03 01
Paper and cardboard packaging	15 01 01
Plastic packaging	15 01 02
Wooden packaging	15 01 03
Metallic packaging	15 01 04
Mixed packaging	15 01 06
Glass packaging	15 01 07
Concrete	17 01 01
Bricks	17 01 02
Tiles and ceramics	17 01 03
Mixture of concrete, bricks tiles and ceramics other than those mentioned in 17 01 06	17 01 07
Wood	17 02 01
Glass	17 02 02
Plastic	17 02 03
Mixed metals	17 04 07
Soil and stones other than those mentioned in 17 05 03	17 05 04
Mixed construction and demolition wastes other than those mentioned in 17 09 01, 17 09 02, 17 09 03.	17 09 04



KWD RECYCLING

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NOTES

- This drawing is the property of RPS-MCOS Ltd., it is a confidential document and must not be copied, used, or its content divulged without prior written consent.
- All Levels refer to Ordnance Survey Datum, Malin Head.
- DO NOT SCALE, use figured dimensions only, if in doubt ask.

No.	Date	Amendment / Issue	App.
F02	19/09/05	Final Issue	W.M.
F03	17/08/05	Final Issue	S.A.
F01	09/02/05	Final Issue	W.M.

Killarney Waste Disposal LTD.
Waste Licence Application

Title:

Proposed Layout for MRF Building

Drawn by:	C.N.	Job No:	MGE0031
Checked by:	S.A.	File No:	MGE0031DG0004
Approved by:	W.M.	Drg. No:	Rev:
Scale:	Not to Scale	DG0004-01	F03
Date:	Sept '04		

APPENDIX A

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What does it do and how does it work?

The Polifka Windhexe is best described as a "Super-charged, Tornado-In-A-Can." The device is capable of accomplishing four tasks simultaneously. Like no other machine available today, the Polifka Windhexe is capable of grinding, drying, separating and sterilizing. Here we will take a look at each capability in detail.

Vortex Physics

Before any insight can be gained examining each phase of processing, one must understand the physics involved in this "Tornado-In-A-Can."

As the vortex is generated inside of the housing, wind speeds on the outer edges reach almost twice the speed of sound or Mach 2! As the tornado rotates, high pressure air around the outside rapidly converges with a vacuum in the center of the vortex. Particles introduced into the vortex are not able to withstand this sudden acceleration and change in pressure.

Power

How does this vortex reach speeds of Mach 2? Air compressors give this machine the high volume of air that is required to generate this type of vortex. The Polifka Windhexe is able to maximize the efficiency of an otherwise inefficient machine. Air compressors generally expend 4% of their input power compressing air. The remaining 96% of the energy is "rejected heat" (in most cases this is considered to be lost or wasted energy). The Polifka Windhexe however, provides "Maximum System Efficiency" by utilizing not only the compressed air but the heat as well! The substantial levels of heat assist in evaporation and sterilization.

Grinding

The Windhexe has the ability to completely pulverize almost any product. During this grinding or pulverization process the matter is reduced to mere microns in size. For most applications, this is accomplished with relatively low air pressure (around 30 psi).

Drying

The Windhexe is able to provide either partial or "complete" drying results with process rates unmatched by any technology known today. The following outlines the details pertaining to the drying process and the efficiency when compared to conventional drying systems.

The efficiency of the drying with this machine far exceeds that of any conventional dryer. Conventional dryers require roughly 1300 BTU's to remove one pound of water. The Polifka Windhexe routinely performs complete drying operations with as little as 780 to 980 BTU's (precise value within this margin is subject to the characteristics of the raw material). In summary, the Polifka Windhexe requires 50% to 75% of the power required by conventional systems.

This drastic difference occurs for these reasons. First, to change a substance (water) from a liquid to a gas we must add energy, (primarily in the form of heat). This heat energy (otherwise known as, "change in enthalpy", required to convert one pound of water from a liquid to a gas is 970 BTU's (at sea level). Thus, in a perfect world, the conventional dryers would use 970 BTU's to remove one pound of water. Because there is no such thing as "Perfect Efficiency", conventional dryers tend to use roughly 1300 BTU's to remove (evaporate) one pound of water.

What does it do and how does it work? (continued)

A question is generally raised about this point, "How is it possible that this machine can achieve near-perfect scenario results?" The answer is that the machine is NOT evaporating off all of the water. Some is being evaporated as expected but the balance of the moisture is actually being "spun" off.

How does this machine differ from that of a centrifuge if it is "spinning-off" water? The simple answer is the result itself-dryness. The product which exits the Polifka Windhexe is equally as dry as any conventional "heated" dryer (moisture tolerances are readily accepted as high as 1%). A centrifuge is nothing more than a filter. Complete dryness can not occur in a centrifuge (typical moisture levels are 50% to 75% water).

Separation

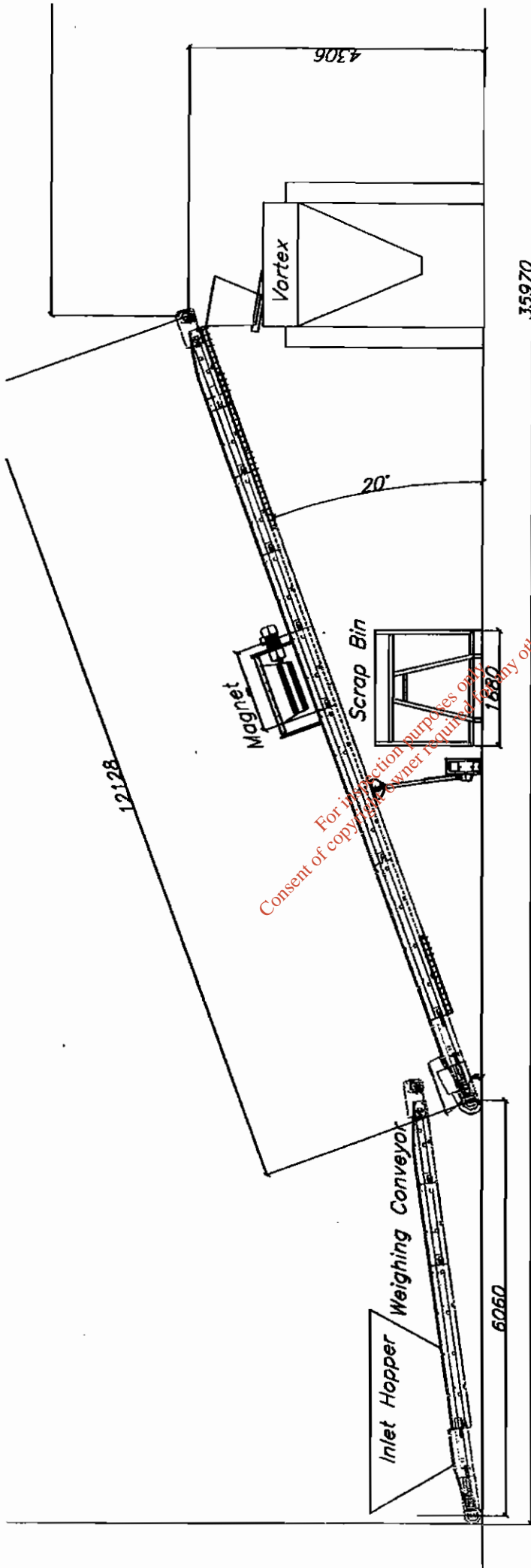
The Polifka Windhexe is a natural separator. Initially one usually identifies this with the recognizable shape or outline. The Windhexe closely resembles what is usually referred to as a "Cyclone Separator." However in this case, two things are strikingly dissimilar. In a typical cyclone separator the in-flow is a single stream. The Windhexe has multiple streams, compressed air and raw material. The second difference is the speed and G-forces that are generated within the Windhexe. Cyclone separators only require enough air to keep the particles in suspension prior to entering the separator.

Sterilization

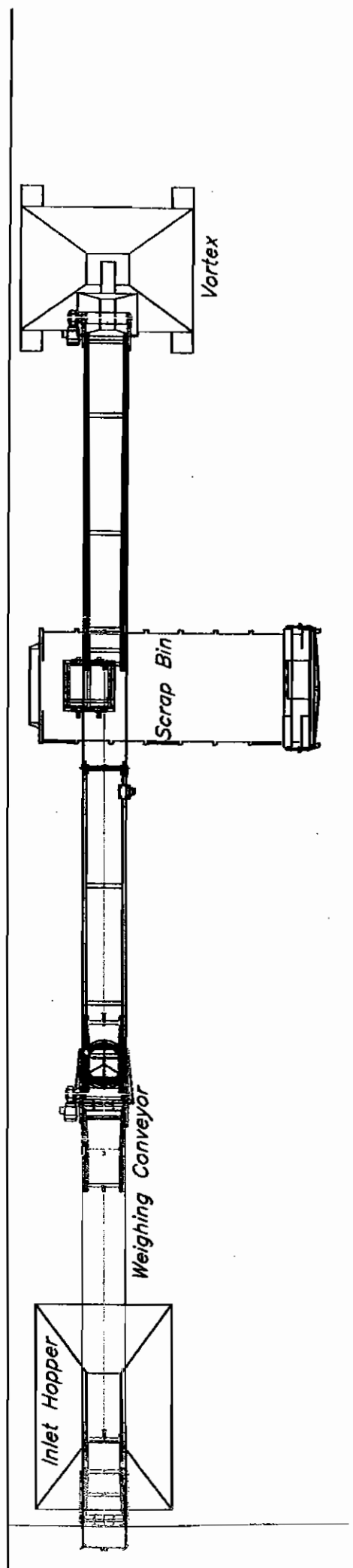
Sterilization is accomplished by two methods. The first method is through heat. This is accomplished by regulating the in-flow of heat or by adjusting the through-put volume. These factors must be in balance to produce a product which has been successfully sterilized.

The second method of sterilizations is accomplished through the cyclone G-forces. Substantial G-forces within the Windhexe have been known to break down the cell wall. Studies are being conducted to determine reduction levels.

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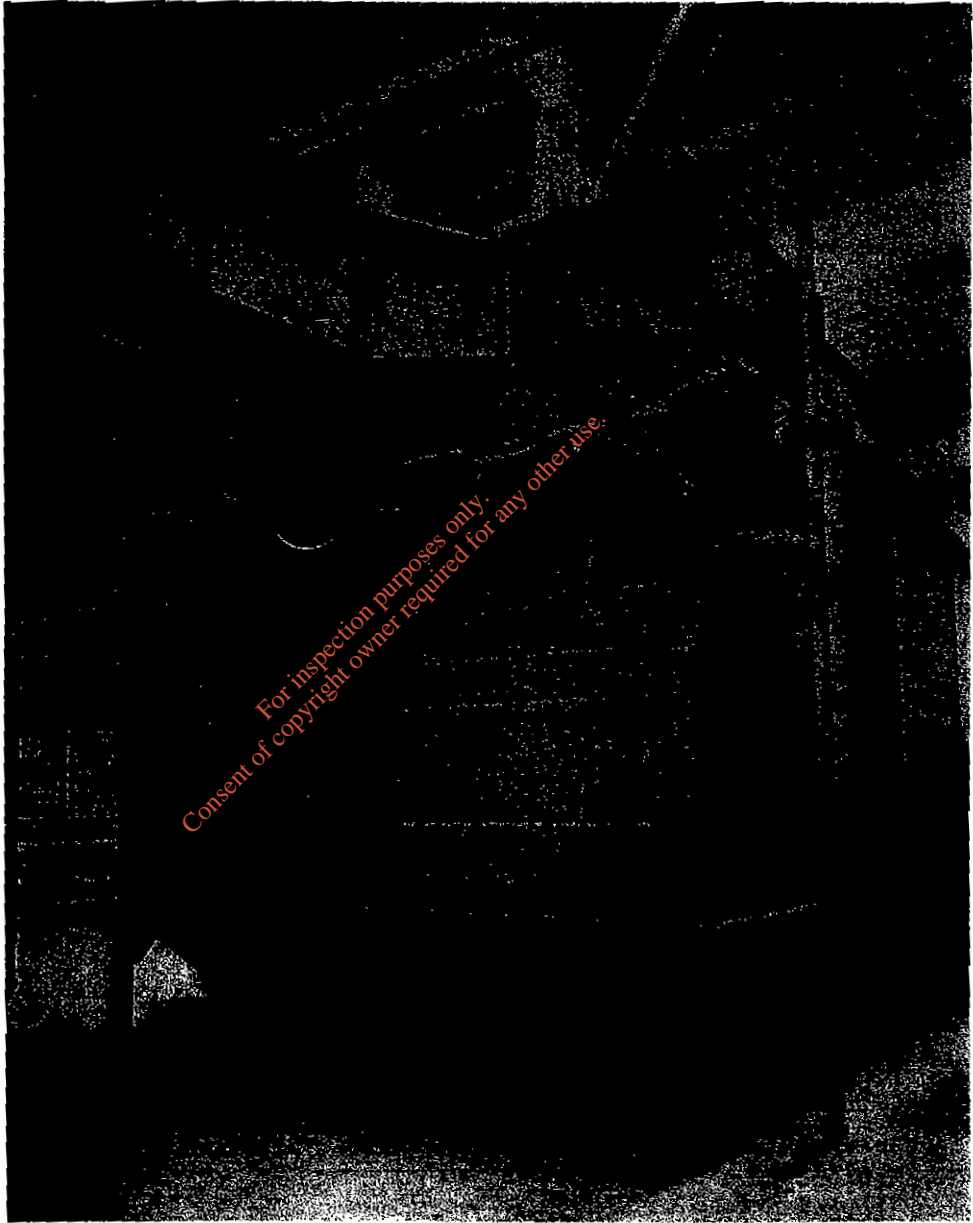
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SFV & SFW RANGE OF DUST COLLECTORS

CONTINUOUSLY OR INTERMITTENTLY RATED CARTRIDGE FILTER DUST COLLECTORS

MAE
Mac Allister Engineering Ltd.
Ballycurreen
Airport Road, Cork 021-4968122



Filtration to
to 5 micro

SFV (REVERSE JET) RANGE

Using compressed air at 6 bar pressure the SFV range of reverse jet cartridge filter dust collectors are suitable for continuous or intermittent operation.

This range of dust collectors are applied to general dust collection applications.

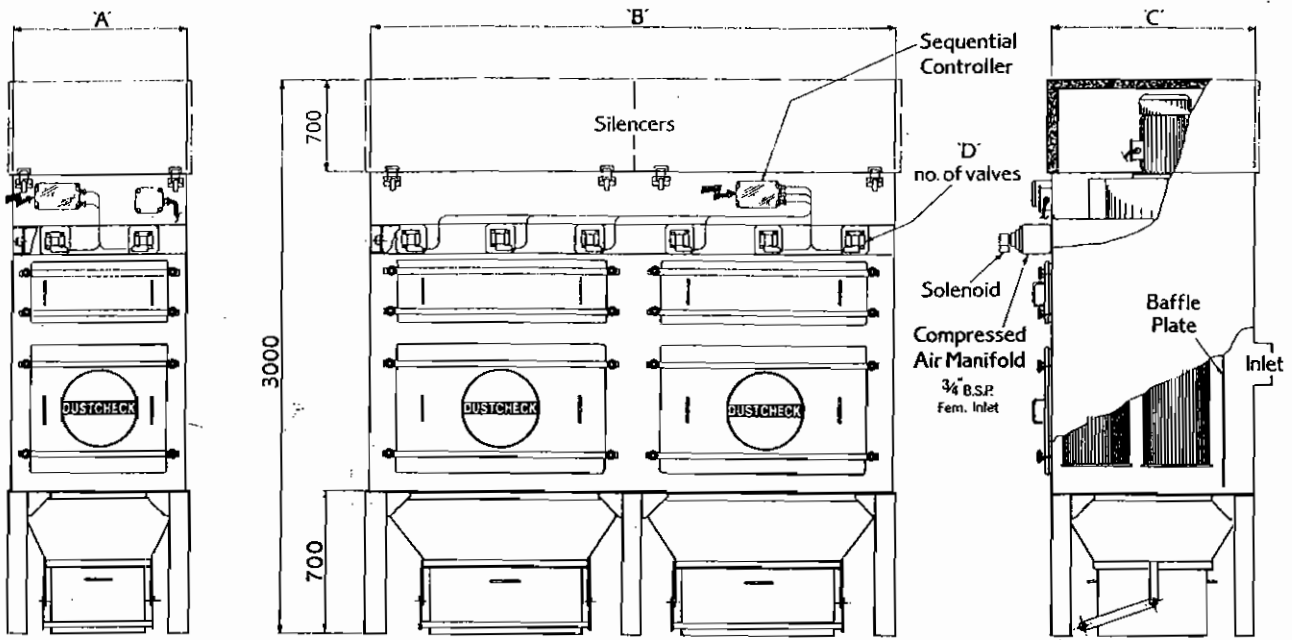
SFW (CLEANING WING) RANGE

Using compressed air at only 3 bar, the SFW range of dust collectors employ a rotating cleaning wing which provides a highly effective reverse air flushing action at low noise levels.

Apart from general dust collecting applications, the SFW range is particularly recommended when the control of finer particulates is required.

& SFW COLLECTORS: BASIC DIMENSIONS:—

Ref: D26a



SFV/W 20-60

SFV/W 70-120

NOTE: The above diagram shows a 'Bin' base. Hopper and valve take-off, bases can also be provided. Unless otherwise specified Controller will be positioned on left side of unit.

SFV/W MODEL	FILTER AREA : M ²	NOMINAL DUTY : M ³ /hr	DIM'N A	DIM'N B	DIM'N C	NO D
20	20	1440	900	—	850	2
30	30	2160	900	—	1000	2
40	40	2880	900	—	1000	2
50	50	3600	1350	—	1000	3
60	60	4320	1350	—	1000	3
70	70	5040	—	1800	1000	4
80	80	5760	—	1800	1000	4
90	90	6480	—	2700	1000	6
100	100	7200	—	2700	1000	6
110	110	7920	—	2700	1000	6
120	120	8640	—	2700	1000	6

CONTROLS: The continuous reverse jet control system is operated by a purpose built sequential controller, mounted in an 'IP65' enclosure. The controller initiates the release of compressed air, via a solenoid/diaphragm valve, down the cartridge element to cleanse the media, the duration and interval of pulsing being variable to suit the application.

CONSTRUCTION: Standard filter bodies are manufactured from heavy gauge mild steel panels of fully welded construction, the paint finish being a primed grey gloss.

Other finishes are available to customer requirements.

OPTIONS:

- a) Flameproofing
- b) Stainless Steel Construction
- c) Special Controlling
- d) Circular Construction
- e) Explosion Relief

SERVICES REQUIRED:

Compressed Air: Pressure SFV – 6 bar. SFW – 3 bar.
 Consumption SFV – approx. 5m³/hr. at 10sec. pulse interval.
 SFW – approx. 8m³/hr. at 15 sec. pulse interval.

ELECTRICAL: 110/220/240v – 1PH – 50Hz
 415v – 3PH – 50Hz



Mac Allister Engineering Ltd.

Ballycurreen

Airport Road Co. L 971 4068177

APPENDIX B

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Biospheric engineering

PARTNERS IN SUSTAINABLE DEVELOPMENT

Barna, Co. Galway.

Tel: +353-91-591336. Fax: +353-91-591364 E-mail: info@biospheric.ie

Ms. Siobhan Aherne,
RPS Consulting Engineers,
Lirr Building,
Mervue Industrial Estate,
Galway

September 19th 2005.

Re: Noise levels at KWD Recycling.

Siobhan,

As per your correspondence we have examined the revised equipment schedule and carried out monitoring on site before shift startup, during normal operations (increased capacity and traffic), with timber shredding in progress in the open yard and with the temporary dryer compressors operating in the yard. Noise measurements were taken at two noise sensitive locations and on site. The results are included in the attached forms.

Measurements were taken of the additional equipment on site including the dryer and ballistic separator, both of which are located inside the building. Measurements were also taken of the noise levels in the yard and at the nearest noise sensitive locations under 4 sets of circumstances:

1. Prior to the start of shift (No activity)
2. During normal shift operation, i.e. trucks arriving on site, loading & unloading activity, equipment in shed operation as normal.
3. As 2 above with the temporary air compressors operating in the yard for the dryer.
4. As 2 above, compressors stopped, shredding timber in the open yard area.

The results of these measurements are outlined on the attached Table A – External Noise Levels. From the table it can be seen that all activities can be carried out without exceeding 55 dBA at the site boundary (same as noise sensitive location) with the exception of the shredding operation which results in a noise level of 56 dBA. The background noise level (L90) is increased significantly when shredding takes place i.e. an increase of over 20 dB with some tonal component. Mitigation measures will be required in order to remain within standard limits.

I spoke briefly with Sean Murphy regarding possible enclosure of the shredder and he informed me that he intends to purchase a new (quieter) shredder and create an enclosed area in the yard for its operation. This will certainly result in a sufficient reduction to remain within standard noise limits. I suggest that in the interim shredding is limited to 3 hours per day, carried out in mid morning when site traffic is light and a temporary noise barrier is created using bales of materials to reduce noise levels to the North of the site.

The temporary compressors are not a significant problem and the proposed enclosure for the production compressor will be adequate to mitigate the situation.

Based on the above the site should not have any difficulty in remaining within standard noise limits.

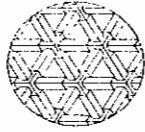
Yours sincerely,

Eugene McKeown

TABLE A – External Noise Levels

	Sound Pressure Levels		
	L(A) _{eq}	L(A) ₁₀	L(A) ₉₀
NOISE SENSITIVE LOCATIONS			
Location 1: Murphys House to NE of site			
No Activity	42	47	33
Normal Activity	46	47	37
Temporary Compressors	46	46	39
Shredding	46	58	53
Location 2: House to SW of site			
No Activity	43	48	35
Normal Activity	45	49	43
Temporary Compressors	49	50	47
Shredding	51	54	46

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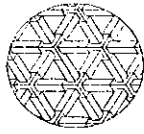
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frequency analysis				
Client:	KWD Recycling			
Site:	Aughnacurreen, Killarney, Co. Kerry			
Description:	Ballistic Separator @ 3m			
Survey Date:	19th September 2005			
Frequency Hz	$\frac{1}{3}$ Octave		$\frac{1}{1}$ Octave	
	dBA	dB lin	dBA	dB lin
25	29	74		
31.50	36	75	44	81
40	44	78		
50	44	74		
63	57	84	59	85
80	54	76		
100	57	76		
125	62	78	66	82
160	64	77		
200	67	78		
250	67	75	72	81
315	67	74		
400	71	75		
500	73	76	78	81
630	75	77		
800	76	76		
1000	76	76	81	81
1250	77	76		
1600	77	76		
2000	76	75	81	80
2500	75	74		
3150	74	73		
4000	73	72	77	76
5000	70	70		
6300	67	67		
8000	64	65	70	70
10000	64	62		
Overall Sound Level	86	90		

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Ballistic Separator @ 3m



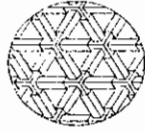
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frequency analysis

Client:	KWD Recycling			
Site:	Aughnacurreen, Killarney, Co. Kerry			
Description	Shredder in Yard @ 3m			
Survey Date:	19th September 2005			
Frequency Hz	$\frac{1}{3}$ Octave		$\frac{1}{1}$ Octave	
	dBA	dB lin	dBA	dB lin
25	30	75		
31.50	39	78	61	96
40	61	96		
50	55	85		
63	56	82	63	89
80	62	84		
100	66	85		
125	67	83	75	90
160	73	86		
200	77	88		
250	86	95	90	98
315	88	94		
400	85	89		
500	89	92	92	95
630	88	90		
800	88	89		
1000	88	88	93	93
1250	88	87		
1600	87	86		
2000	88	86	91	90
2500	85	83		
3150	83	82		
4000	82	81	86	85
5000	78	78		
6300	76	76		
8000	72	74	79	79
10000	73	70		
Overall Sound Level	98	103		

Shredder in yard

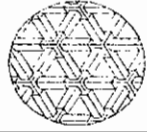


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frequency analysis				
Client:	KWD Recycling			
Site:	Aughnacurreen, Killarney, Co. Kerry			
Description	Temporary Dryer Compressors @ 3m			
Survey Date:	19th September 2005			
Frequency Hz	¹ / ₃ Octave		¹ / ₁ Octave	
	dBA	dB lin	dBA	dB lin
25	24	68		
31.50	38	78	45	81
40	44	79		
50	55	85		
63	52	79	60	87
80	57	79		
100	66	86		
125	65	82	72	89
160	70	83		
200	69	80		
250	70	79	75	84
315	71	78		
400	72	77		
500	75	79	80	83
630	76	78		
800	79	80		
1000	79	79	84	84
1250	80	79		
1600	77	76		
2000	79	77	83	82
2500	79	78		
3150	77	76		
4000	76	75	81	80
5000	76	75		
6300	74	75		
8000	73	74	80	79
10000	76	74		
Overall Sound Level	89	94		

Compressors on load



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frequency analysis				
Client:	KWD Recycling			
Site:	Aughnacurreen, Killarney, Co. Kerry			
Description	Dryer @ 3m			
Survey Date:	19th September 2005			
Frequency Hz	¹ / ₃ Octave		¹ / ₁ Octave	
	dBA	dB lin	dBA	dB lin
25	20	65		
31.50	30	70	36	73
40	35	69		
50	45	75		
63	47	73	51	78
80	46	68		
100	55	74		
125	60	76	63	79
160	60	73		
200	61	72		
250	62	71	67	76
315	64	71		
400	65	69		
500	66	69	71	74
630	67	69		
800	66	67		
1000	66	66	71	71
1250	67	66		
1600	67	66		
2000	69	68	73	72
2500	68	67		
3150	71	69		
4000	69	68	74	73
5000	66	66		
6300	65	65		
8000	63	64	69	69
10000	66	63		
Overall Sound Level	79	84		

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Dryer

APPENDIX C

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Trommel specifications

Trommel Drum:

Motor:	75kw Motor
Gearbox:	Brevini 2 stage Planetry Gearbox
Chain:	4" Leave Chain
Size:	18.6m x 2.2 m
Screens:	75 x 10mm Punch Plate, Aperture on customer requirements
Wheels:	4 X Steel support wheels 2 x Whiffle tree pivots 2 x polyurethane retainer wheels

Lubrication System:

- 1" Lincoln Auto Grease Pump, 2kg Reservoir to all grease nipples
- 1" Lincoln Auto Oil Pump, 2kg Reservoir to all wheels and chains

Feeder Conveyor:

Belt Width:	1200mm
Belt Type:	EP 500 3 ply 5 + 1.5 covers
Drive:	5.5kw Variable Speed, Chain Driven (Dependant on Length)
Scraper:	Rockline Flexco Con Shear
Rollers:	4" Variable Angle
Bearings:	RHP MP 65

Collection Conveyor:

Belt Width:	1500mm
Belt Type:	EP 500 3 ply 5 + 1.5 covers
Drive:	7.5kw Fixed Speed, Variable Optional, Right Angle Geared motor
Scraper:	Rockline Flexco Con Shear
Rollers:	4" Variable Angle
Bearings:	RHP MP 65

Fines Conveyor:

Belt Width:	1050mm
Belt Type:	EP 500 3 ply 5 + 1.5 covers
Drive:	5.5kw Variable Speed, Right Angle Geared motor
Scraper:	Rockline Flexco Con Shear
Rollers:	4" Variable Angle
Bearings:	RHP MP 65

All Conveyors complete with Skirting & 300mm diamond lagged drums
Rotation sensors are also fitted to all conveyors and other plant and interlocked for safety reasons

Capacity:

The capacity of machine will be around 50 ton per hour of MSW

APPENDIX D

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ANALYSIS REPORT

CUSTOMER:	KILLARNEY WASTE DISPOSAL	SAMPLE TYPE:	EFFLUENT
ADDRESS:	Aughacureen, Killarney, County Kerry	DATE SAMPLED:	-
REPORT TO:	Geraldine	DATE RECEIVED:	20 July 2005
ORDER NO:	N/A	DATE ANALYSED:	20 July - 10 August 2005
SAMPLING POINT:	-	DATE REPORTED:	11 August 2005
		WORK NO.:	14020 C

TABLE OF RESULTS

PARAMETER	LAB REF: YOUR REF:	C05-Jul 188 Killarney Waste Disposal
pH		6.0
BOD, mg/L		>246,743.0
COD, mg/L		360,000.0
Ammonia, mg/L NH ₄ ⁺		35.2
Total Suspended Solids, mg/L		32,350
Total Phosphorus, mg/L P		36
Total Nitrogen, mg/L		135
Arsenic, mg/L		0.17
Cyanide, mg/L		<0.1
Fluoride, mg/L		<1.0
Chromium, mg/kg fresh weight		0.11
Copper, mg/kg fresh weight		0.50
Lead, mg/kg fresh weight		<1.0
Nickel, mg/kg fresh weight		0.48
Zinc, mg/kg fresh weight		3.23

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Tuulia Inkinen
Tuulia Inkinen
Chemistry Laboratory

- * The results relate only to the items tested.
- * The analysis report shall not be reproduced except in full without written approval of the laboratory.

APPENDIX E

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TABLE E.2(i): EMISSIONS TO SURFACE WATERS
 (One page for each emission)

Emission Point:

Emission Point Ref. N ^o :	SWI
Source of Emission:	Treated discharge from constructed wetland/reed bed
Location :	Discharge outlet from constructed wetland/reed bed
Grid Ref. (10 digit, 5E,5N):	936046E 939706N
Name of receiving waters:	Aughnacurreen land drain
Flow rate in receiving waters:	_____ m ³ .sec ⁻¹ Dry Weather Flow _____ m ³ .sec ⁻¹ 95%ile flow
Available waste assimilative capacity:	_____ kg/day

Emission Details:

(i) Volume to be emitted			
Normal/day	12.8 m ³	Maximum/day	
Maximum rate/hour			

(ii) Period or periods during which emissions are made, or are to be made, including daily or seasonal variations (*start-up /shutdown to be included*):

Periods of Emission (avg)	_____ min/hr _____ hr/day _____ day/yr
---------------------------	--