FINSA

Ms. Elizabeth Leacy,
Environmental Protection Agency,
P.O. Box 3000,
Johnstown Castle Estate,
Co. Wexford.

Your Ref:

Our Ref: **M22**

Date: 25th June 2004.

Dear Sir or Madam:

In response to the Agency's request for additional information in relation to Finsa's IPC Licence review please see below. The information supplied below is only the first part of the information requested. The remainder of the information should be sent to the Agency within the next two weeks.

- **Describe the proposed waste wood shredder including emissions and any abatement installed:**
  The proposed waste wood shredder is a mobile drum shredder, which would be rented by Finsa from a waste recycling company to come onsite as required. The shredder is a horizontal infeed system so no wood particle emissions occur; also the machine has a water sprinkler system to settle any dusty material. We would not operate on windy days so wind blown material is not a problem. Shredding activities would only occur between Monday and Friday and between 9am and 5pm.

  Finsa would like to shred waste pallets produced onsite and also to purchase waste pallets from waste contractors. We currently buy the shredded pallets from waste contractors; it would be more cost effective for us to buy the pallets from them before they are shredded. We would have the waste recycling company come onsite when we would have accumulated ~1,000 tonnes of timber which would be every 4 months or so. The pallets will be stored in the timberyard near the recycled chip storage area. The shredded pallet material will be stored along with the purchased recycled chip in the timberyard.

  We carried out a trial run on May 21st 2003 to shred approximately 350 tonnes of water-damaged pallets and there was no dust problem. We also had a noise survey carried out that day to assess the impact of the shredder on noise levels at the closest noise sensitive locations. The survey shows that at the nearest noise sensitive location the shredder did not significantly increase noise levels and did not give rise to noise levels above daytime noise limits. Please see the noise survey attached.

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Directors: S. Garcia (Spanish), J.M. Ramos (Spanish), V. Romero (Spanish), E. Santos (Spanish), G. Frey (Spanish), J. Ischner (German)

- **Describe all ancillary processes including emissions.**

Laboratory activities:

1. Determination of the viscosity of glue – 250ml of glue is sent to the glue storage tank.
2. Determination of Glue Gel time: 100g of hardened glue is sent to an offsite landfill per test.
3. pH of glue – glue returned to the glue storage tank. (pH electrode storage solution and pH buffers (pH10-borate; pH7-phosphate; pH4-phthalate) are well diluted and disposed of down the drain to the town sewer every few months)
4. Density of glue – 500ml of glue sent to the glue storage tank
5. Density of chipboard – chipboard is used as a fuel in the HGG.
6. Determination of bending strength, modulus of elasticity, surface soundness and internal bond of particleboard - waste boards are used as a fuel in the HGG.
7. Determination of raw materials moisture content – raw materials are returned to the timberyard and used in the board making process.
8. Determination of grit content of particleboard - 100ml of HCl per sample, this is well diluted and poured down the drain to the town sewer.
9. Determination of water absorption of particleboard - waste board is used as fuel in the HGG.
10. Determination of moisture content of particleboard - waste board is used as a fuel in the HGG.
11. Determination of Swelling Thickness in water of particleboard - waste board is used as a fuel in the HGG.
12. Determination of moisture resistance of particleboard under cyclic test conditions - waste board is used as a fuel in the HGG.
13. Sieve analysis test of raw materials - Waste raw materials are returned to the main process for use.
14. Formaldehyde in particleboard test - 500ml of toluene is recovered; other reagents are titrated together and the resulting mixture is well diluted and disposed of down the drain to the town sewer (50mls I_2, 20mls NaOH, 10mls H_2SO_4, 5 drops of starch indicator and ~120ml $Na_2S_2O_3$).
15. BOD water test: test water and reagents are well diluted and disposed of down the drain to the town sewer. (50ml / test)
16. COD water test: Aqueous solution of inorganic compounds, $HgSO_4$, H_2SO_4 and $Kr_2Cr_2O_7$ will be sent to SES for disposal.
17. Ammonia water test: Aqueous solution of inorganic and organic compounds, $Na_2Fe(CN)5NO.2H_2O$, $NaCl_2(NCO)_3$ will be sent to SES for disposal.
18. Total P water test: waste $C_6H_8O_6$, H_2SO_4, aqueous solution of organic compounds, $K_2S_2O_8$ and $NaNO_3$ stored and sent to SES for disposal.
19. Formaldehyde water test: $C_{10}H_6Na_2O_8S_2*H_2O$, H_2SO_4 and aqueous buffer solution are well diluted and disposed of down the drain to the town sewer.
20. Suspended solids: Glass microfibre filter paper is sent to offsite landfill.
21. Oils, Fats & Greases: Solvents are reused. Filter paper is sent to offsite landfill.

Wash down of machines:

The veneer line before the press is washed down at the end of each day, this produces ~0.5m^3 of glue-contaminated water, this water is reused at the glue kitchen on the board line by mixing it into the glue along with the hardener. None of the other lines are washed down in this way as air hoses are used to clean dust from the other lines.

Pre-dryer fly ash cyclones:

Fly ash is separated from the gas stream by a series of six cyclones positioned after the HGG and before the dryer. The fly ash is separated from the gas stream in these cyclones and is then dropped down into the wet de-asher. In the wet de-asher the fly ash mixes with the ash that falls out from the grates of the HGG and together the two types of ash is passed along a conveyor to the collection trailer. When the trailer is full it is weighed and taken to the onsite landfill.

HGG and Heat Exchanger:

Please see information attached.

- **Give details for each category of fuel materials.**

Wood Boilerfuel:

Origin: Sawmills.

Quality:

- Wood
- 99% not greater than 500mm
- Maximum moisture content: 170%
- Foreign matter content: none

Quantity used per annum: ~5,000Tonnes/annum

Is wood boiler fuel hazardous? No

Heavy fuel Oil:

Origin/Source: Sourced from fuels distributors

Quality: Mixture of straight run and residual fractions. HFO is likely to contain <1% H_2S.

Quantity used per annum: ~ 6,000Tonnes/annum

Is HFO hazardous? This material is flammable and toxic.

Gas Stream from Press (this is not a fuel as such but a substitute for the air required for combustion):

Origin: Board Press

Quality: Formaldehyde, Steam, Paraffin Wax Vapours, Vapours from the press lubricating oil, VOC's resulting from the heating of wood in the press, Ammonia and wood particles. These are removed from the gas stream by combustion in the HGG as follows:

1. Formaldehyde is reduced to water and carbon dioxide.
2. Steam is unaffected.
3. Paraffin wax vapours are reduced primarily to carbon dioxide and water. (These are the same waxes used in the manufacture of candles).
4. Vapours from the lubricating oil are reduced primarily to carbon dioxide and water. Kluber in Germany manufactures these oils and some information on the breakdown of these products is attached.
5. VOC's from the press are reduced primarily to carbon dioxide and water.
6. Ammonia may be converted to NO_2, however the quantity of ammonia present is very small and this does not affect the levels detected in the dryer stack.
7. Wood particles are combusted primarily to carbon dioxide and water similar to the wood already combusted in the HGG.

Is Gas Stream from Press hazardous? Formaldehyde is a suspected carcinogen.

- **Give details of any proposed fuel materials and their likely effect on emissions and the environment.**

  Atlas Reclaimed Fuel Oil:
  Origin/Source: Atlas Oil.
  Quality: Used mineral oil. (An information sheet on this fuel was included with IPC Licence Review Application.)
  Quantity used per annum: Yet to be determined. We propose to use this fuel in conjunction with the HFO to begin with and if the Atlas Reclaimed Fuel Oil is satisfactory we may use it instead of the HFO.
  Is RFO hazardous? This material is flammable.

  Columbian Bituminous Coal:
  Origin/Source: Sourced from fuel distributors
  Quality:
  - Size: 40 – 100mm
  - Moisture: 10.5%
  - Ash: 1.34%
  - Volatile Matter: 34.70%
  - Sulphur: 0.38%
  - Gross Calorific Value: 7182 Kcal/kg
  - Net Calorific Value: 6884 Kcal/kg

  Quantity used per annum: ~1000 tonnes/annum
  Is coal hazardous? No

  The products of combustion of Atlas reclaimed fuel oil are mainly oxides of carbon and water vapour with nitrogen, sulphur and phosphorous compounds and unidentified organic compounds. Coal combustion produces carbon dioxide and it is a source of sulphur oxides and nitrogen oxides. These by-products are produced in the combustion of Heavy Fuel Oil and wood so the composition of the flue gas is not expected to change significantly.

- **Identify any existing measures to limit the introduction to the HGG of metals in fuel materials.**
  1. A ferrous metal separator is in place at the inclined conveyor of the HGG.
  2. Daily checks are made on the boiler fuel to check for contamination such as plastic or metals. Records of these checks are kept.

- **Identify any proposed measures to limit the introduction to the HGG of metals in fuel materials.**

  A shed will be constructed for the boiler fuel in late 2004 and this will help to keep the moisture content of the wood down. Under this covered area a cleaning system for the boiler fuel will be installed as shown in the attached drawing. The system will work as follows:
  1. The boilerfuel is fed into machine No. 1 (a sliding floor conveyor) using a Volvo loading shovel. The material can be piled up here by the Volvo loader and the speed at which the floor of the conveyor moves at will control the flow of the materials through the system. Note the conveyor floor is moved using hydraulic rams.

2. The material moves from machine 1 the sliding floor conveyor on to a chain type conveyor where by two chains at each side of the conveyor have steel cross members bolted between them, which pulls the material along the base of the conveyor. This conveyor will be powered by an electric motor and gearbox.
3. The un-cleaned material now passes on a rubber belt conveyor machine 3 from machine 2. This conveyor transports the material to the first cleaning process. This conveyor will be powered by an electric motor and gearbox.
4. The material now passes from machine 3 on to a grading machine 4. This machine consists of rollers rotating with gaps in between them, as the material passes over the tops of the rollers the smaller wanted material i.e. logs will pass out over the top of the rotating rollers and out over the end. This over sized material logs etc will be taken out of the process using the Volvo loader to our log-chipping machine (hacker) that we use in our chipboard raw material process.
5. The material that passed down between the rollers of machine 4 will fall down onto a belt conveyor machine 5 located directly below machine 4 (screener). This belt conveyor will have a magnetic front drum or roller so as any large ferrous metal pieces will come back along the roller falling into a waste bin. The wanted material will have travelled forward at this point due to the momentum it will have picked up from the speed of the conveyor, separating the chips from the steel. This bin of steel will then be emptied into our steel-recycling skip using a forklift.
6. The final operation will be for the cleaned material to pass from machine 5 on to an inclined rubber belt conveyor machine 6, which will pile the material for the Volvo loading shovel to remove and store in the clean chip area of the bark and chip storage shed.

- **Give details of recycled wood including details of its origins and quality.**
The recycled wood chip comes from a number of wood waste contractors. There are two sources for recycled chip – packaging and non-packaging waste. The majority of recycled chip that Finsa buys in as a raw material is packaging waste i.e. shredded pallets. The remainder of the recycled chip comes from non-packaging sources mostly construction and demolition waste. Finsa uses ~ 30,000 tonnes/annum of recycled chip. The recycled chip is only used to make chipboard. No recycled chip is used as boiler fuel. Finsa imposes the following specifications on its recycled chip suppliers:
    1. Chip Size: 99% not greater than 200*600mm.
    2. Dust content: Not more than 3% of material less than 0.5mm.
    3. Bark content: None.
    4. Waste Content: No unchipped portions of pallets or large wood pieces.
    5. Foreign matter content: The boilerfuel must be cleaned by its supplier. Finsa will clean the boilerfuel for any residual foreign matter. Excessive contamination may result in the load being refused.
    6. Quality: No dozed or decayed material.
    7. Moisture Guide: 20% to 40%.

- **Describe the Formaldehyde gas collection (ILA) system and its adequacy to capture emissions within the design constraints of the press. Comment on the risk of an explosive atmosphere. Details whether any LEL detectors, alarms, ignition prevention devices or bypasses or other such safety devices are installed on the system.**

The press exhaust system was manufactured by ILA of Switzerland to exhaust the press gases to the hot gas generator where they are used as air in the combustion process. Please see drawing attached.

The function of the ILA system is to exhaust the press gases ensuring that particulates and condensable materials continue in these gases and do not stick to the walls of the ducting. We estimate that the efficiency of removal of the individual components by the ILA system to be 80 – 90%. The gases are fed into the HGG at points where the combustion air is taken in. Therefore we are replacing fresh air with these gases. They are injected directly into the flame where the temperature is between 1,000 – 1,500°C. These gases do not result in an increase in emissions from the dryer stack and there is no increase in the volume of air emitted. Should the ILA system stop functioning, vent gases from the press are exhausted through the building exhaust system EP6. The ILA system can stop functioning for the following reasons: 1) Not sufficient water pressure in the membrane system, 2) Mechanical/electrical problem with the transportation fan. To minimise this occurring we have a preventative maintenance programme in place. We also hold spare parts in stock. We have an alarm system on the press control panel, which indicates faults in the ILA system. Should faults occur which will result in an unscheduled release to the atmosphere through EP6, we will empty the press and stop the production line until the fault is rectified.

The ILA system consists of sorption tubes containing membranes of fixed permeability. This ensures that the inside of these membranes is coated with a film of water. Dust and other particles passing through these tubes will be coated with water, which insulates the particle surfaces and means that sticky particles become free flowing and do not stick to the walls of the transport pipes. The flash point for formaldehyde is 85°C and its auto ignition point is 430°C. Temperatures in the HGG are always in excess of these temperatures.

The ILA system installed at Finsa consists of the following:

1. A centrifugal fan located near the HGG, which sucks the gases from the press and blows them into the combustion chamber.
2. A duct running from the press to the HGG.
3. Five sorption columns on the press outlet. (Two on the left side, two on the right side and one on top of the press).
4. Two suction inlets at the left side of the press and two at the right side.
5. A pressure switch on the water inlet pipe.
6. Water pressure regulators at each of the sorption ducts.
7. A tank located under the press for wastewater from the system.
8. A pump and pipe to pump the water from this tank to the water tank in the glue kitchen.

The gas in the ILA system is a damp gas so there is no risk of explosion. A fire risk assessment of the factory is attached.

- **Give details of the drier capacity.**
  The dryer capacity is 14,000kg of water evaporated per hour.

- **Describe any proposed alterations to current processes and emissions (consider the HGG and drier in detail) as a result of the planned capacity expansion.**
  At the moment the planned capacity expansion is a medium term project and so we do not have any specific details at present on changes that will be made to current processes and emissions. Details will be forwarded to the Agency when we have them.

- **Provide a process flow chart that identifies the emissions from each stage of operation and all corresponding emissions point references.**
  Please see attached a process flow chart that identifies the emissions from each stage of operation and all corresponding emission point references.

- **Summarise in tabular form self-monitoring and EPA monitoring results obtained since commencement of Licence Reg. No. 22 for all emissions to atmosphere.**
  Please see attached a summary of self-monitoring and EPA monitoring results obtained since commencement of Licence Reg. No. 22 for all emissions to atmosphere.

- **With regard to EP1, describe the dryer operating conditions and dryer loads that give rise to variations in flowrates and particulate levels. Give the maximum flowrate and maximum concentration of particulates and comment on correlation between parameters. Give details of process control conditions with previous licence limits.**
  We do not know the dryer operating conditions and dryer loads that give rise to the variations in flowrates and particulate levels. We have carried out various studies over the last few years to determine the operating conditions that cause licence exceedances and none of the studies have been conclusive. The flow rate at EP1 should be constant as a fixed rate fan controls it.

  The monitoring results from EP1 carried out by consultancies show that since 1997 the level of particulates has been below 140mg/Nm^3 except on two occasions (once in July 2001 and once in July 2002). There is no reason to believe that there will be exceedances of 140mg/Nm^3 particulates in the future. If there is an exceedance the cause will be investigated.

  The maximum flow rate recorded by a consultancy since 1997 from EP1 is 180,237Nm^3/hr recorded in July 2001 with a particulate level that day of 92.7mg/Nm^3.

  The maximum concentration of particulates recorded by a consultancy from EP1 is 360.5mg/Nm^3 recorded in July 2002 with a flow rate of 94,961Nm^3/hr.

  There does not seem to be any correlation between the flow rate and the particulate levels.

- **Give details of the height of EP1 and EP6 above roof ridge height of any building within a distance of five times the stack height.**
  Please see the attached drawings showing the height of EP1 and EP6 above roof ridge height of any building within a distance of 5 times the stack height. (Note: EP1 is 38 metres high.)

- **Submit a copy of the original ambient dust deposition monitoring reports and ambient formaldehyde reports.**
  Please see attached copies of the original ambient dust deposition monitoring reports and ambient formaldehyde reports carried out since 1997.

  The ambient dust monitoring is carried out on Finsa's own initiative and is not an IPC Licence requirement. The dust collecting devices are located on private property close to the factory and remain there by the good will of the property owners. Finsa have no way of guaranteeing the continuing good will and cooperation of these property owners in the future and so cannot guarantee the continuation of ambient dust deposition monitoring at these locations. Finsa will continue to monitor the ambient dust deposition levels where possible.

- **Provide a new site layout plan indicating the proposed new plant including all connections to the existing facility.**
  Please see attached a layout showing the second possibility for the proposed new plant. The first option has already been submitted to the Agency. As the plan is still a mid-term project we do not have further information available at present.

- **Submit the report on the assimilative capacity assessment of a section of the River Graney.**
  Please see attached a copy of the assimilative capacity assessment report on a section of the River Graney that was completed in 2000.

- Please see attached **Table 17A** for fly ash.

- We are no longer planning on installing a **CHP** at present.

Should you require further information please do not hesitate to contact me.

Yours Sincerely,

Louise Ryan.
Environmental Officer.

ADDITIONAL INFORMATION – IPC LICENCE REVIEW FINSA FOREST PRODUCTS - PART A

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NOISE ASSESSMENT OF PALLET SHREDDER AT FINSA FOREST PRODUCTS MAY 2003

Prepared for:

FINSA FORSET PRODUCTS,
SCARIFF,
CO.CLARE

Report Ref:	**NA0858 NR01**
Date:	**04th June 2003**
Report prepared by:	**Jennifer Harmon, BSc, Dip. Acoustics**
	Environmental Consultant
Reviewed by:	**Paul Chadwick BSc, MSc,**
	Senior Environmental Consultant

RPS McHugh
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CONTENTS

RPS McHugh
PLANNING & ENVIRONMENT

1.0 Brief for Consultancy

To assess noise levels from the operation of a pallet shredder machine at the nearest noise sensitive locations to its position in Finsa Forest Products.

2.0 Summary

A noise survey has been conducted outside the nearest noise sensitive locations to the assessed machinery to evaluate the noise impact of its operation at these locations.

The operation of the equipment was audible at the nearest noise sensitive location (NSL 1) but its operation did not significantly increase noise levels at this location. The operation of the equipment did not give rise to noise levels above daytime noise limits of 55dB L_{Aeq} as specified in condition 8.1 of Finsa Forest Products IPC licence (Licence No. 22)

JENNIFER HARMON
Environmental Consultant

PAUL CHADWICK
Senior Environmental Consultant

RPS McHugh
PLANNING & ENVIRONMENT

3.0 Introduction

RPS Mc Hugh Planning and Environment were commissioned by Finsa Forest Products to measure noise levels from the operation of a pallet shredder machine located towards the western boundary of the site. The proposed operating frequency of the equipment is at maximum once a month, operated by an external contractor.

Measurements were made at the two nearest residential properties to the location of the equipment to assess its noise impact. The findings of the survey are summarised in this report (a summary of the terminology used in this report is given in Appendix B).

4.0 Noise Survey Assessment Method

A noise survey was conducted on 21st May 2003 between 13:00 to 15:00 hours. The equipment under assessment was a Peterson Pacific HC 7400 shredder with Caterpillar 800 HP Diesel engine and outfeed conveyor belt. The equipment was positioned along the western site boundary between a number of timber mounds made up of wooden logs, timber pallets and shredded material. The nearest noise sensitive location to the equipment is approximately 230m west of the site boundary. This location has a clear line of sight to Finsa site boundary where the machine was located. The assessed equipment however was not visible at this location due to screening from timber mounds. Measurement periods were 15 minutes at the two nearest noise sensitive locations. Measurements were also made at the noise source for periods of 5 minutes.

The instrumentation used was a Brüel and Kjaer Type 1 2260 Integrated Averaging Sound Level Meter. The machine was calibrated before and after the survey to ensure no drift in the instruments sensitivity had occurred.

Measurements were made at a height of 1.5m above ground level, and measurements were free-field, taken approximately 1-2m from reflecting surfaces. Measurements were made as best as practicable in accordance with the requirements of ISO 1996: *Acoustics – Description and Measurement of Environment Noise.* Some strong wind gusts and light rain fall were experienced during the survey. Wind generated noise was a contributor to most measurements made.

5.0 Survey Results and Discussion

Noise levels were measured at the nearest residence with and without the shredder in operation to compare noise levels. Measurements were also measured at the nearest noise sensitive location to the south of the site (Thomond B&B) and adjacent to the pallet shredder. For reference purposes, the property west of the assessed equipment is referred to as NSL 1 and Thomond B&B as NSL2. The results of the noise survey are presented in Table 2 below.

Location	Time	L_{Aeq}	L_{Amax}	L_{Amin}	L_{A10}	L_{A90}	Notes
NSL 1	13:00	53	72	42	56	45	Shredder not in operation. Wind generated noise in background. Bird song dominant sound. Finsa site operations not audible.
NSL1	14:26	54	74	43	59	46	Shredder in operation with loading crane and lifting truck. Audible at location. Wind generated noise and birdsong additional sources.
Approx 7m from conveyor belt	14:08	84	90	79	86	81	Machine running at full load, oading crane also in operation.
Approx. 10m from conveyor behind timber mound. Machine not fully screened	14:14	79	95	69	82	73	Machine main noise source. Strong wind gusts made accurate measurements difficult.
NSL2	14:53	57	75	53	59	54	Road traffic, site vehicles and general plant noise main sources. Noise from Shredder not noticeable at this location.

Table 2: *Summary of noise measurements*

Noise levels measured at NSL1 did not increase significantly above baseline levels with the operation of the pallet shredder. L_{Aeq} levels were subject to wind generated noise and rustling foliage during both measurement periods. During calmer weather conditions the ambient level would be expected to be lower. The L_{A90} parameter, which is a better descriptor of steady background noise, measured 45dB without the shredder in operation. This was increased by 1dB to 46dB when the shredder was in operation. The operation of the machinery was audible at this measured location in the background. Appendix A includes the graphed 1/3rd octave band analysis measured at this location illustrating no tonal components were present in the measured noise while the shredder was operational.

Noise from the pallet shredder was not discernible at NSL2 above surrounding noise sources including road traffic noise, site vehicles and general plant noise. The location of site buildings act as a buffer against noise from the western area of the site at this noise sensitive property. Although noise levels were higher than those measured during previous surveys, this was considered to be as a result of weather conditions and traffic noise.

6.0 Conclusions

A noise survey has been conducted to assess the noise impact of a pallet shredder machine on the surrounding noise sensitive properties to the Finsa Forest Products site.

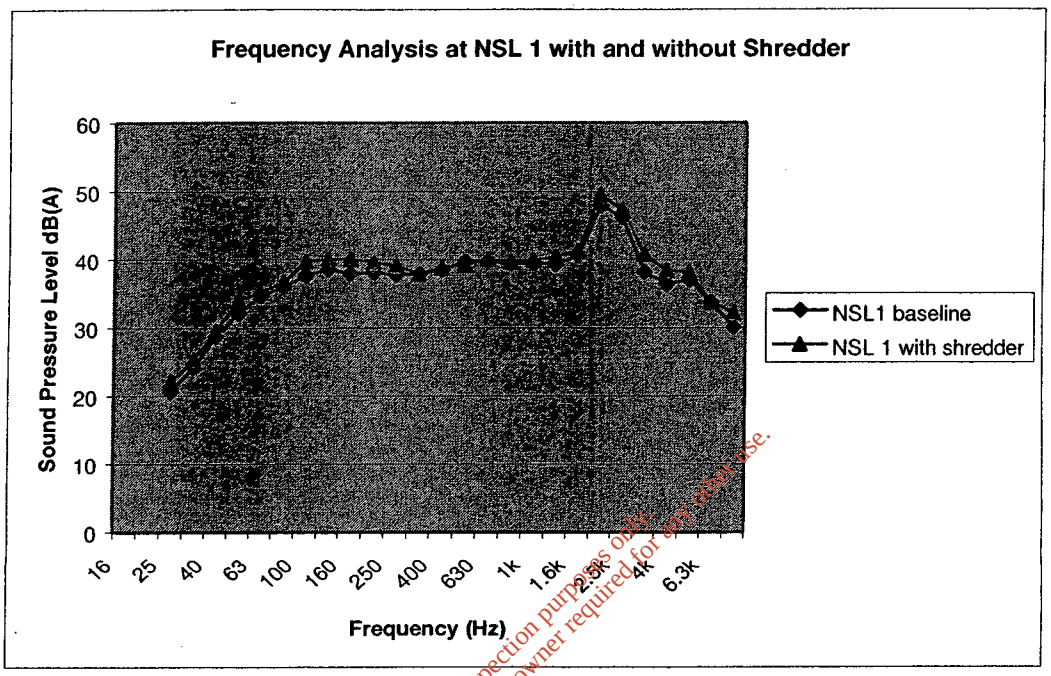
Noise levels measured at the nearest noise sensitive property located directly west of the operating equipment resulted in no significant increase above baseline levels. The total encompassing noise level measured with the shredder in operation resulted in noise levels within daytime guidance limits of 55dB L_{Aeq} at the nearest residence. As wind generated noise contributed to the overall noise level during measurements it is anticipated that noise levels during calmer conditions would result in lower noise levels.

It can therefore be concluded that the operational noise impact of the pallet shredder will not give rise to elevated day time noise levels at the nearest noise sensitive location.

RPS McHugh
PLANNING & ENVIRONMENT

APPENDIX A

Frequency Analysis of NSL 1



Note: Elevated levels between 1.6kH to 3kH are a result of bird song.

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APPENDIX B

Summary of Terms

L_{Aeq}	The continuous equivalent A-weighted sound pressure level. This is an "average" of the sound pressure level.
L_{A90}	The noise level exceeded for 90% of the measurement period. This is normally used to measure background noise.
L_{A10}	The noise level exceeded for 10% of the measurement period. This is normally used to measure road traffic noise.
A-weightings	The human ear is sensitive to different frequencies of sound. The A-weighting represents the response of human ear to sound.

Octave band analysis

This is measured to determine whether there are any dominant tonal fluctuations over the monitoring period, as required by the EPA Guidelines.

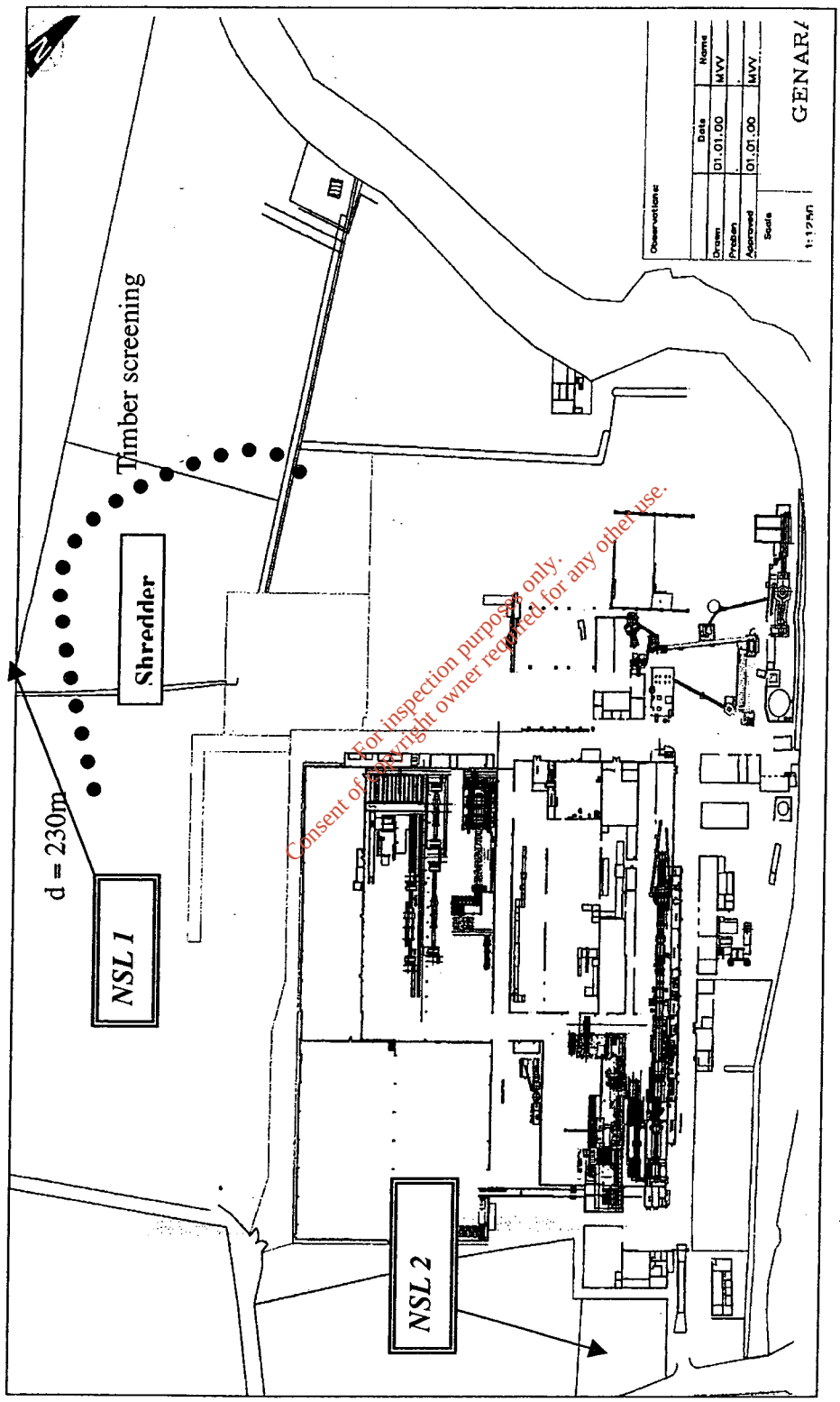

Figure 1: *Site layout and noise monitoring locations*

HOT GAS GENERATOR AND DRIER

OPERATIONAL PROCEDURE & DRAWING

OF THE HEAT EXCHANGE (WASTE HEAT)

SECTION OF THE HOT GAS GENERATOR.

Tramitado **Procedimientos**

Datos Generales	Fecha : 04/06/2002
Fábrica : Finsa Forest ✓	Tipo Doc. : Operational Procedures ✓

Asunto : FFP-QM-001/03 HOT GAS GENERATOR AND DRYER OPERATION
Descripción Larga :

FFP-QM-001/03	HOT GAS GENERATOR AND DRYER OPERATION	REV 1

1.0 Introduction

The Hot Gas Generator and drying plant is used to produce the dried chip required by the production line and to generate the heat required by the production presses and the glue plant.

The Hot Gas Generator contains:

1.) a moving grate on which waste materials are burned,
2.) a dust combustion system which burns dust from the sanding line, forming line, from the added value filters and from the dry chip shakers,
3.) three 300l/hour and one 500l/hour Weishaupt oil burners.

The plant has a thermal capacity of 21.5 Gcal/hour, of which 17.5 is available for the dryer and the remainder for the hot oil system.

2.0 Thermic oil system

Thermic oil is the heat exchange medium used in the factory. Oil is returned from the factory through two pipes which feed the main collector. From here the oil is pumped using either pump number one or two, to the return collector and from here to the HGG for reheating. The oil enters the heat exchange coil of the waste heat boiler where initial heating takes place. From here it passes to the heat exchange coil in the combustion chamber where the final heating takes place. The hot oil then passes to the main collector from where it is pumped using pumps number seven or eight to the forward collector and to the plant. The oil level in the circuit is maintained constant by the expansion tank. Oil is passed to and from this tank as required. The plant is fitted with an automatic degasification (Venting) circuit.

The temperature of the thermic oil leaving the HGG is controlled by:

1. The speed of the flue gas fan.
2. The temperature in the combustion chamber.
3. The positions of flaps K7 and K8.

The flue gas fan takes its air from the hot gas pipe and draws it through the waste heat boiler where initial heating takes place. The amount of heating which takes place primarily depends on the quantity of air taken through the waste heat boiler and this is controlled by the speed of the flue gas fan and the position of flap K8.

The temperature of the thermic oil as it leaves the combustion chamber (TIRCA 201) determines the speed of the flue gas fan, the position of K7 and the position of K8. When the temperature increases to near its set point, Flap K7 closes. If the temperature continues increasing or does not decrease, the speed of the flue gas fan is reduced and K8 starts to close. If the temperature increases to three degrees or more above its set point the flue gas fan stops. When the temperature drops to 20C above its set point, the flue gas fan starts again and K8 starts opening. When the temperature drops to 30C below its set point K7 opens again. Should the temperature continue dropping, the flue gas fan will speed up more.

The set point for the thermic oil is set on CONTROLLER NO. 1. The controller temperatures can be seen in the thermic oil process specifications FFP-QM-006/03/03.

As the quantity of air drawn to the waste heat boiler increases so does the temperature at the flue gas fan and the exhaust pipe after it. To protect this fan and pipe from over temperature there is a thermocouple marked "Exhaust Tail Pipe 207" and this has an alarm point A1 which if exceeded will stop the flue gas fan. This alarm point can be seen on FFP-QM-006/03/03.

EMERGENCY COOLING PUMP

To protect the thermic oil system from overheating the plant contains an emergency cooling circuit. This circuit is activated for the following reasons:

1. The temperature of the thermic oil at TIRCA 201 increases to over its A! alarm point (290C).
2. Circulation is lost in the oil circuit. This is monitored by differential pressure switches on the circuit.
3. The temperature of the gases exiting the combustion chamber (Hot Gas Exit 212) increases to over its A1 alarm point (960C) .
4. Power failure

The above activate the "Safety Shutdown" system. Once the alarm condition no longer exists, this can be reset.

3.0 Grates

The Hot Gas Generator has three moving grates, the first of which is used to pre-dry the material.

On the second and third grates the material is burned.

Waste material is fed into the feed bunker by the Volvo driver.

From here it is hydraulically fed to the inclined feeding conveyor as required.

The quantity of material on the conveyor is kept constant by L.S 105 which activates and deactivates the bunker hydraulic system.

The material is transferred from the conveyor to the inlet chute.

The quantity of material in the inlet chute is maintained by L.S 106 which switches on and off the conveyor. Material is transferred as required from the inlet chute to grate no. 1 by the thrust feed.

The quantity of material on grate no. 1 is maintained constant by controlling the time interval between the thrust feed strokes.

The quantity of material on grate 1 depends on its moisture. If the material is very wet a higher level of material on grate 1 must be used. This will allow a maximum amount of predrying.

The amount of predrying which occurs depends on the following:

i. The quantity of material on the grate.
ii. The initial moisture content of the material.
iii. The speed of the grate.

The material is transferred to grates no. 2 and no.3 where combustion takes place. The quantity of material fed to grate no 2 and no.3 is adjusted by adjusting the time intervals between grate movements. The material is combusted by blowing air through it. This air is supplied by combustion Air Fan 1.

The quantity of material combusted depends on:

a. The calorific value of the material.
b. The moisture content of the material.
c. The quantity of material on the grate.
d. The quantity of air supplied by combustion air fan 1.
e. The speed of grates.

During the combustion process the ash which is generated falls through the grate bars into the de-asher conveyor. Non combusted material is transferred to the end of the grate and into the waste hopper form where it is manually removed.

During operation the thrust feed, grate no. 1, grate no. 2 and grate no.3 are switched to the automatic position.

It is necessary to observe the position on the grate where combustion is taking place.
Combustion should take place across the centre of the grate (sections 8 & 9).
If combustion is occurring after this area, the timers are set too fast, the material will move forward on the grate and will eventually leave the grate uncombusted.
If the timers are set too slow, the material will move back on the grate and eventually combustion will take place on grate 1 unless corrective action is taken.

It is very important that the dryer operator maintains a good fire on the grates to reduce as much as possible the fuel oil consumption and to get a more even hot gases supply to the Dryer.

4.0 PLC Control system

The HGG and Dryer are controlled through a Mitsubishi PLC.
The operator controls and monitors the functions of the HGG and Dryer by means of adjusting diagrammatic controls on a computer screen.

The images on the computer screen are generated using "Factory Link" Software.

Any changes to on screen controls generated by this Software, are relayed back to the PLC which in turn controls the required adjustments

5.0 Controllers

No. 1 - OIL HEATER FEED 201

This Controller regulates the temperature of the thermo oil by varying the speed of the flue gas fan and the position of flap and thus the quantity of air drawn through the waste heat boiler.
Controller temperatures can be seen in the Thermo Oil Process Specifications FFP-QM-006/03/03

- If the temperature increases to over its set point, the speed of the flue gas fan will be reduced.
- Should the temperature increase to over A1, the flue gas fan will stop and the emergency cooling pump will start.
- Should the temperature decrease to below the A2 alarm point (124°C) the plant will shut down on the safety system and this will not reset until the temperature increases to over this alarm point again.

No. 2 - COMBUSTION CHAMBER

This is the Master Controller for the Plant.
This controls:

- flap SA6
- the speed of combustion air fan 1
- the speed of the twin dust worms.
- It can also be used to control the quantity of oil used by the burners.

The set point will be set by the Dryer Operator to operational requirements at that moment. If the pressure becomes higher than 0.5mbar the dust combustion system and the oil burners are switched off.

No. 3 - COMBUSTION AIR FOR DUST SA6

This controller regulates the quantity of air supplied to the dust combustion system by adjusting flap SA6.

This controller is itself controlled by controller No. 2

" COMBUSTION CHAMBER "SET POINT <21%

No. 4 - DRYER OUTLET

This controls the dryer outlet temperature by automatically regulating the plant to achieve the outlet setpoint temperature.

6.0 Automatic control of the plant

The plant controls to regulate the dryer outlet temperature and the thermic oil feed temperature.

If the dryer outlet temperature is below its set point, K17 will be closed and the plant will be calling for maximum heat output. Should the dryer outlet temperature exceed its set point, K17 will start to open and will allow cold air to enter the mixing chamber. When K17 opens it means that the Hot Gas Generator is generating too much heat and thus when it opens it means that the heat output from the Hot Gas Generator must be reduced (when this happens, the quantity of material fed to the dryer can be increased).

When K17 opens the pressure in the combustion chamber will increase from its set point and the plant will automatically adjust to return it to its set point.

This is achieved as follows:

When K17 opens, the drier fan takes some air from here and thus takes less from the hot gas pipe. Consequently the pressure inside the combustion chamber increases.
The pressure controller then closes flap SA6 and the burner flaps (if they are in operation) and reduces the speed of combustion air fan 1 until the pressure is again back to its setpoint.
As the speed of combustion air fan 1 reduces, less air is transported through the grate and consequently the heat output from the grate is reduced.

The combustion air for the dust is supplied through SA6. As more dust is combusted more air must be supplied through SA6 and visa versa. The speed of the dust worm is directly related to fluctuations in the chamber pressure. When the pressure increases above its setpoint the speed of the dust worm is reduced. The position of SA6 is controlled by the speed of the dust worm. As this speed is reduced SA6 closes and thus the heat output from this section of the plant is reduced.

Similarly with the oil burners. As the quantity of oil being burned is increased more combustion air must be supplied. Each burner has its own combustion air fan and its own flap for regulating the quantity of air. Consequently as these flaps close, the quantity of oil supplied is reduced and hence the heat output from the burners is reduced.

If the rotary drier outlet temperature decreases below its setpoint, K17 closes and the above process is reversed.

For regulation of Thermic oil temperature refer to Section 2.0 Thermic oil system.

7.0 Start up of HGG

1. Remove all isolations.
2. Reset all emergency stops.
3. Switch on Rotary valves 1-4.
4. Reset the "Safety Shutdown".
5. Switch on the thermic oil circulating pumps.
6. Start the flue gas fan.
7. If the Dryer is running (for start up of the dryer, refer to Section 9.0 Start up of Dryer) :

    a) Switch on combustion air fans 1 and 2.
    b) Switch on the oil pumps to the burners.
    c) Reset the burners and switch them on.
    d) When the chamber temperature is more than 450°C, switch on the dust system (dust fan, dosing screws and extraction screw from silo).

8. Switch on the hydraulics pump for the grates and the infeed pushers.

NOTE: If the Dryer is not running, the switching on of combustion air fans 1 and 2 or the burners will depend on the pressure in the combustion chamber.

8.0 Shutdown of HGG

1. Switch off the burners, dust system and combustion air fan 1.
2. When the temperature in the combustion chamber drops to approximately 600°C, switch off the dryer fan.
3. When the temperature leaving the combustion chamber drops to approximately 400°C, switch off combustion air fan 2 and the flue gas fan.

9.0 Start-up of Dryer

1. Reset all isolations and emergency stop buttons.
2. Switch on the control voltage.
3. Press alarm reset.
4. Get shift electrician to start the Dryer Drum.
5. Press "Permission to start".
6. Once we have permission to start, press "Start Dryer Fan, Redler and Screws". This starts the first vertical screw and injection screw, the Rotary valve, and the Redler conveyor under the dryer cyclones.
7. When the conveyors and the dryer fan have started, flap 232M41 and rotary valves 231M32 and 231M33 have started, start "Feed to Dryer" (214M2).
8. Start the weighing scales (Group 211 & Group 212).
9. Start the discharges from the wet silos, Pallmann, sawdust and Bezner (If neccessary).
10. Control the material feed to the dryer and the temperature from the HGG.
11. Alert the Volvo driver to remove the chips from the fire flap. Once the moisture of the material begins to improve, Start the " Transport to Screens" and divert the chips to the sawdust shed.

10.0 Operation of Dryer

The dryer must be operated in such a manner as to achieve an output moisture content as specified in *Process Specification*, FFP-QM-006/03/01.

The Moisture content of chips can be measured by using the IMAL moisture testing machine by :

1. Take a sample of chips from the appropriate location (e.g. after the dryer, at inner layer sampling point and outer layer sampling point).
2. Open the Imal moisture meter/balance and, after ensuring that the tray is clean. place between 5-10g on the tray and close the door.
3. Press the bottom green button on the right hand side of the keypad. The weight will appear on the digital screen as will "db" indicating that the test has begun.
4. When the test is finished the moisture content will be displayed on the digital readout.
5. Record the result on the Dryer Control sheet FFP-04-005.

NOTE: Ensure the moisture reading is in ATRO.

11.0 Shut-down of Dryer

1. Reduce the gas temperature from the HGG to approximately 600-700°C.
2. Switch off the material feed to the Dryer and the weighing scales
3. Switch off the "Dryer Fan, Redler and Screws".
4. After approximately one hour, switch off the drum.

12.0 Screening section

This section of the plant is used to generate the surface and core layer material required on the forming-Pressing Line and to remove from the process particles which are too small (These are sent to the Dust Silo for combustion in the HGG).

This section of the plant consists of the following items:

1. Two vibrating screeners, each generating four particle fractions.
2. Various transport conveyors.
3. Two PZ mills (For refining oversized particles for use in the core layer)
4. Two PSKM mills (For refining oversized particles for use in the surface layer).
5. A Pal Sifter for removing impurities and heavy particles.
6. Two Bag Filters for removing dust particles from air emitted to the atmosphere.

SCREENERS
These separate the incoming material stream into four fractions namely:

1. Oversized material.
2. Core layer.
3. Surface layer.
4. Dust.

The Screen sizes currently used for each layer can be seen in FFP-QM-006/03/02 (Mills/Screen sizes).

When taking samples for moisture content, if a high proportion of small particles are observed in the sample, inform the shift manager as this can be due to a blocked or partially blocked screen and can lead to problems in the Forming/Pressing Line.

13.0 Start up of screening section

Note: Before starting anything in this section, the "Start Permission" has to be pressed and the " Start Permission" light has to be on.

1. Start "Dust Line". This starts the dust blower and the rotary valves under the screeners.
2. Start "Surface". This starts the following equipment

    a. The Rotary valves on top of the Surface Layer Silo
    b. The PSKM filter.
    c. The Rotary valve and screw conveyor under the PSKM filter feeding the Blower pipe.

3. Start "Core". This starts the following equipment

    a. The Rotary valve on top of the core layer Silo.
    b. The transport conveyor from the Pal Sifter.
    c. The Pal Sifter.
    d. The chain conveyor feeding the Sifter.
    e. The screw conveyors from the Screeners.

4. Start "PSKM mill" (If neccessary). This button will start the mill and the dosing screw for the mill.
5. Start "Screeners".
6. Start "PZ mill" (If neccessary). This button will start the following:

    a. The Rotary valve over Screener 2.
    b. The suction system for the mill.
    c. The mill.
    d. The Screw conveyor feeding the mill.

7. Start "Transport to screens". This starts the following :

    a. Chain conveyor to Sawdust shed.
    b. Vertical screw and injection screw at screeners.
    c. Chain conveyor from Dryer.
    d. The second Vertical screw and Injection screw at the dryer outlet
    e. Once the moisture content of the material is in accordance with FFP-QM-006/03/01, start sending material through the screening section.

This section has 3 diverter flaps which are used to divert material from the process should the following occur:

1. Either one of the dry chip silos is full.
2. The moisture content is outside specification FFP-QM-006/03/01.
3. There is an electrical problem in the screening section or transport conveyors to the screening section.
4. There is a blockage in the screening section or transport conveyors to the screening section.

These flaps are marked as follows:

1. Tail Flap 261F2. This Flap removes from the process the oversized chips from the Pal Sifter which are fed through the PSKM or PZ mills.
2. Flap Over Screeners. This is used to divert the material rom the screening section to the sawdust shed.
3. Fire Flap After Dryer. This is used to divert the material from the dryer outlet onto the ground.

14.0 Shutdown of Screening Section

1. Divert material to the sawdust shed.
2. Stop the screeners.
3. Stop the dust system.
4. Stop PZ10 mills.
5. Stop the core layer.
6. Stop PSKM mills.
7. Stop surface layer.

15.0 Plant Set up

The operator sets the following parameters:

1. The set point on the dryer outlet: To ensure that the moisture content of the dried material is acceptable and the temperature doesn't go too close to its alarm point.
2. The set point of the thermic oil leaving the combustion chamber :To ensure that there is sufficient heat available for the presses and that the oil temperature doesn't go to close to its alarm point.
3. The temperature of the gases entering the grit separation cyclones.
4. The pressure in the combustion chamber.
5. The control sequence for the burners i.e. the sequence in which the burners open up and close down.
6. The maximum speed of the dust worms. This depends on the quantity of dust available for combustion.
7. The maximum settings for the oil burners. On automatic the burners will only open up to this setting.
8. The speeds of grates 1, 2 and 3 and the number of grate movements required for one grate infeed push. This is to control the position on the grates where combustion takes place.
9. Plant configuration:

There are four configurations available for operating the plant:

A DUST
This is used when the burners are switched off, and all the controlling is done by the dust.

B BURNER
This is used when the dust is switched off and all the controlling is done by the burners.

C DUST- BURNER
This control configuration is used to control both the burners and the dust.
With this configuration, when the plant requires less heat output, the dust will slow down and when this is at its minimum setting the burners will start to slow down, as per their start up selection sequence.
When the plant requires more heat output, the burners will open up first and then dust system will speed up.

D BURNER - DUST
This control configuration is used to control both the burners and the dust.
With this configuration when the plant requires less heat output, the burners will slow down as per their start up selection sequence.
When the burners are at their minimum settings, the dust system will start to slow down.
When the plant requires more heat output, the dust system will speed up to its maximum setting and then the burners will start to open as per their start up selection sequence.

10.START UP SELECTION

This allows the operator to decide the sequence in which the burners open and close down when they are running on automatic.

The first burner selected will be the last burner to close down, when the plant requires to reduce its heat output, and the first burner to open when more heat is required.

The last burner selected will be the first burner to close down, when the plant requires to reduce its heat output and the last burner to open when more heat is required.

1) Switch off the dust combustion system and reduce the chamber temperature to approximately 500°C.
2) Switch off the dryer infeed conveyors.
3) Switch off the dryer fan.
4) Switch off transport to screens.
5) Switch off the screens.
6) Switch off the dustline.
7) Switch off the condux mill.
8) Switch off the PSKM mills.
9) Switch off core and surface layers.
10) When the dryer outlet temperature drops below 50°C, switch off the dryer drum.

NOTE:
Plant safety comes before oil temperature control. If you cannot maintain a negative pressure in the combustion chamber, switch off the oil burners.
There is an automatic water injection valve located before the material entry point on the flash dryer. Should the dryer outlet temperature increase to more than 5°C over its setpoint water is injected through this valve to cool the dryer down. Water is injected for the duration of the time that the temperature remains more than 5°C over the setpoint.

11.1 - Sudden drop in heat output from Hot Gas Generator

a. Check the dust filling bunker. If this bunker is not filling then there is no dust in the silo or the agitator is not working. Switch on all three oil burners and switch off the dust transport fan. Check the agitator.

b. If there is a supply of dust, check that the thrust pushers are not jammed. The pushers should normally be in their resting position. If they are not in this position, observe them for approximately 30 seconds, if in this time they haven't returned to their resting position, switch off the inclined feeding conveyor and get the limit switches checked.
Activate the front limit switch. If the pusher does not move back to its original position or if it again fails to move forward fully, then there is an obstruction blocking its travel and this must be cleared.

c. If the thrust pushers are operating normally check if the full switch on the inlet chute is staying activated. If it is staying activated then there is either an obstruction in the chute or material has accumulated on the faces of the detector. Switch off the thrust pusher and the inclined feeding conveyor. Look down the chute and if there is an obstruction clear it using the steel bar provided. If there is no obstruction then you must clear the sensors on the full switch.

d. If everything is functioning correctly on the infeed section of the plant check that flaps SA5 and K17 are controlling normally. Put both of these flaps on hand and close them. If one or other of them fails to close contact an electrician.

e. If both of these flaps are functioning normally, check that all the doors near the outlet side of the drier are closed.

f. If the problem cannot be found, contact your Supervisor.

11.2 - Power failure; P.L.C. Cut out, control voltage cut out

A) If the P.L.C. cuts out or if the control voltage trips, contact an electrician immediately. In all cases, proceed as follows:

i. Switch off combustion air fan 1.
ii. Switch off dust fan.
iii. Check that emergency cooling pump is operating.

When the power has been restored.

1. If the plant shutdown is due to a power failure, reset the burners and switch them on.
2 Check under Z6 rotary valve and remove any material which as accumulated. Refer to section of manual dealing with start-up of drier.

B) POWER CUT (ESB) If an ESB power cut occurs then the standby diesel generator (located in the compressor room) turns on, supplying emergency power to the following machines.

1. Dryer drum drive (to keep it turning)
2. Thermic oil cooling pump
3. Glue plant agitator
4. Burner fans
5. Water pumps

It is necessary to look and see if each of these items of plant are actually in operation during a power cut.
If not then an electrician must be called and the supervisor alerted.

17.0 Plant Safety

The plant is protected from over temperature/pressure as follows:

1 Dryer Outlet Temperature

Should the dryer outlet temperature increase to 148°C, the water valve on the flash dryer pulses on and off. (On for 5 seconds, off for 10 seconds).

Should the outlet temperature to its A2 alarm point (150 °C), after a fifteen second time delay the burners will stop.

Should the outlet temperature increase to 151 °C, the water valve on the flash dryer will stay on continuously and K17 will open to 75%, (It will show 25% on the monitor)

Should the outlet temperature increase to 159 °C, we use it as an indication that we have a fire or there is a risk of a fire in the dryer.
The following happens :

A	The fire flap will open
B	The water valve on the drum will open
C	The water valve on the cyclones will open
D	K17 will open to 100% (it will show 0% on the monitor)

2 Dryer Inlet Temperature

If the dryer inlet temperature (drum inlet) increases to over its A1 alarm point 370°C, the dust system and the burners will stop.

Should the inlet temperature increase to 372 °C, the water valve on the flash dryer will pulse on and off, (On for 5 seconds, off for 10 seconds)

Should the inlet temperature increase to 376 °C, the water valve on the flash dryer will stay on continuously, and K17 will open to 75%, (It will show 25% on the monitor)

Should the inlet temperature increase to 390 °C, the water valve on the drum opens and K17 opens to 100%, (it will show 0% on the monitor)

3 Dryer Infeed Temperature

There are two alarm points for the Dryer infeed temperature, (Flash dryer inlet temperature). These are currently not used.

4 Hot Gas Entrance to Grit Cyclones (T213)

Should the temperature at this point increase to 863°C (A1) the burners will stop.

5 Combustion Chamber Exit Temperature (T212)

If the A1 alarm point is exceeded, the burners, dust system and combustion air fan 1 are switched off. The A1 alarm point is currently set at 9600C. To avoid this occurring, should the temperature increase to 9430C, Flap SA5 opens slowly and the speed of the dust worms reduce. SA5 opens to a maximum of 68%. Once the temperature drops below 9430C, SA5 closes fast and the dust worms speed up again.
Should the combustion chamber exit temperature drop below its A2 alarm point (450C), the dust feeding system is switched off. This is to ensure that there is sufficient temperature in the combustion chamber to ignite and fully combust the dust which is blown into the combustion chamber.

6 Interruption of Material Feed To Dryer

Should the Dryer Inlet conveyor stop or either one of the belt scales stop or run empty, to protect the Dryer from over temperature and the risk of a fire, the following occurs:
A. Flap K17 opens to 75% (It shows 25% on the monitor).
B. The water valve on the flash Dryer pulses on and off (On for 5 seconds, Off for 10 seconds).

7 Positive Pressure in the Combustion Chamber

The combustion chamber is fitted with a differential pressure gauge which continuously monitors the atmospheric pressure and the pressure inside the combustion chamber. It then calculates the pressure difference between the two pressures and displays this value. If the value displayed is negative, it means that the pressure inside the combustion chamber is lower than the atmospheric pressure.

The plant must always be operated with a negative pressure to ensure that :

1. Heat does not build up in the combustion chamber.
2. Hot air is not blown out the infeed chute which can lead to a fire
3. Hot air is not blown into the oil burners.

If the pressure in the combustion chamber increases to it's A1 alarm point, the oil burners, dust system and combustion air fan 1 are switched off. If the pressure stays in excess of its alarm point, after a time delay combustion air fan 2 is switched off.

8 Thermic Oil

To prevent degradation of the thermic oil or the ignition of its vapours (gases) when exposed to the atmosphere, should its temperature increase to over its A1 alarm point (290°C), the safety shutdown system is activated.

Should the temperature of the thermic oil be below its A2 alarm point (124°C), the safety shutdown system is activated.

This is to ensure that the combustion chamber temperature is not increased too rapidly following start ups from cold.

9 Exhaust Tail Pipe 207

This is the gas temperature after the flue gas fan. If it increases to above its A2 alarm point , the flue gas fan stops.

10 Safety Shutdown

The Plant contains a safety shutdown system, which is wired outside of the PLC's.

This system is activated for the following reasons:

1 A1 alarm temperature after the flue gas fan is exceeded.
2 The thermic oil temperature exceeds the A1 alarm temperature.
3 The differential pressure switches on the thermic oil system.
4 The thermic oil temperature drops below its A2 alarm point.
5 The minimum level switch on the thermic oil expansion tank is activated.
6 The emergency cooling pump is running.
7 The thermic oil circulating pumps are off.

When the safety system is activated the following occurs:

1 The burners stop.
2 The oil pumps supplying the burner stop.
3 The dust system stops.
4 The flue gas fan stops.
5 Combustion air fan 1 stops.
6 The emergency pump starts.

18.0 Safety procedure to be followed in case of fire in The Dryer.

1. DO NOT switch off the dryer fan.
2. Switch off the transport conveyor to the screeners.
3. Switch off the material feed to the dryer.
4. The water valves on the flash dryer and the dryer drum should open automatically. Check that these valves are open at the manifold at the dryer control room.
5. Manually open the water valve for the cyclones and conveyors if necessary (normally this should not be necessary as the steam generated by the water entering the flash dryer and the drum should be sufficient to extinguish the fire).

The shift manager should organise the following:

1. Call the manager on call out duty.
2. Decide whether or not it is necessary to call the fire brigade
3. Place the covers over the water gullies near the dryer
4. Close the shut off valves at discharge points 1 and 3
5. Decide when it is safe to restart the dryer

19.0 Responsibilities

Dryer Operator

1. To operate the HGG and the dryer in a safe manner.
2. To maintain chip levels in the dry silos as far as possible.
3. To balance the levels in the dry silos.
4. To check the dryer outlet moisture as instructed and to ensure that chips which are not properly dried do not go to the forming line.
5. To check the screeners regularly for blockages.
6. To regularly patrol the area around the hot gas generator for faults / leaks etc. paying particular attention to the burners and the area around them.
7. To operate the HGG in such a manner that the quantity of fuel oil is used is minimised.
8. To keep the dryer control room clean and tidy.
9. To correctly fill in the Dryer Control Sheet FFP-04-005, for each shift.
10. To inform the shift manager immediately if the fire alarm sounds.
11. To inform the Volvo driver if material from the dryer is being directed to the fire flap.
12. To advise the press control room immediately if the dryer or screener section stops or any other problems occur which may affect the press.
13. To complete the Burner Changeout Report FFP-04-001.
14. To follow the process specifications Feedstock and Dried Chips Moisture Content FFP-QM-006/03/01, and Mills/Screens sizes FFP-QM-006/03/02.
15. The pressure in the combustion chamber must always be maintained negative.
16. The inlet chute must always be kept full of material.
17. There must always be material on grate no. 1.
18. Material must be combusted along the middle of grates no. 2 and 3.
19. During all power failures in the plant, check that the emergency oil cooling pump is operating.
20. Maintain the level in both dry silos as even as possible.

Cleaning Personnel

1.) To clean areas as directed by management
2.) To report any dust leaks or problems to management
3.) To safely operate all machines associated with this function

a. Responsible for removing material accumulated at side of inclined feeding conveyor.
b. Removal of material accumulated from de-asher conveyor, hopper at end of grate and from pre-drying hopper.

4.) To bring Ash from HGG to the landfill.

20.0 Documentation

Dried Chips Moisture Content	FFP-QM-006-03-01
Mills/Screens sizes,	FFP-QM-006-03-02
Thermo Oil Temp	FFP-QM-006-03-03
Dryer Control Sheet	FFP-04-005,

SAFETY DOCUMENTATION

FFP - GH - 012	Softwood dust
FFP - 001/05	Risk Assessment
FFP - SP - 005	Solution Procedure
FFP - SS - 001	Safety Manuel (PPE)
FFP - GH - 013	Noise
FFP - GH - 004	Fire /Explosion
FFP - GH - 005	HSK
FFP - GH - 016	Thermo Oil
FFP - GH - 007	Manual Handling

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Utility Men

a. The plant must be checked as per HGG and Dryer checklist (Utility). FFP-04-003
b. All abnormalities must be recorded on the check sheet and the drier operator must be informed
c. Clear out the waste ash from the HGG.

Main Line Press Operator

1. The press operator must inform the drier operator at all times when the press is stopped and if possible, state length of time the stoppage is likely to last

Combustion products of HOTEMP SUPER

1. Composition of HOTEMP SUPER

HOTEMP SUPER consists of a temperature-resistant ester oil and a polymer thickener based on synthetic hydrocarbons. It also contains oxidation inhibitors and antiwear additives.

HOTEMP SUPER does not contain any cancerogenic substances, and we do not have any knowledge of cancerogenic decomposition products.

The basic substances of HOTEMP SUPER are not expressly listed in Supplement E - Organic Substances - of the German Clean Air Directive. However, based on the information provided by our suppliers and according to our own evaluation we would classify the product in category III, the least problematic category.

We herewith confirm that HOTEMP SUPER is free from the following substances:

- polychlorinated bi- and ter-phenyls (PCBs and PCTs)
- polychlorinated dibenzo dioxins and dibenzo furans (PCDDs and PCDFs)
- polycyclic aromatic hydrocarbons (PCA)
- lead and lead compounds
- cadmium and cadmium compounds
- nickel and nickel compounds
- chromium and chromium compounds
- antimony and antimony compounds
- barium and barium compounds
- fluorine-containing compounds (CFCs, PTFE, ...)
- solvents of any kind based on CFCs, CHCs and aromatic hydrocarbons
- asbestos
- formaldehyde and compounds releasing formaldehyde
- nitrites

We can thus assume that such products are not generated when the oil evaporates and re-condensates and when it is decomposed, and that such products are not contained in the extracted air in the form of constituents or decomposition products of our oil.

2. Evaporation and condensation

Under the operating conditions existing in a ??? PRESS our product HOTEMP SUPER evaporates in a predominantly undecomposed form. i.e. the evaporated part, just as the fresh oil, mainly consists of ester oil and hydrocarbons of a high molecular weight.

Based on our evaluation, the belt and chain oil condensates are very low in quantity as compared to binder condensates since only a small amount of the applied oil actually evaporates.

Various filter condensate analyses we carried out did not show any presence of oil condensation products. The main constituents were resin-like condensates from the binder.

li. Weite im Blech
clearance in the sh

ø 1400
15°
1750
76 124 90
3
8
250
250
SUPERFELT 10 mm
LEGRIT 100/0,5
LEGRIT 135/1,3 S
F
80
448
250
SUPER ISOL
R 100
ø 900
8
30
30
SUPERFELT

lenanker ø6x275 mm
nchor

ø 2000
ø 2420
ø 2660
8
8

ABHITZEKESSEL
waste heat boiler

a. 1000/1000 mm

□ 500
H
H

150 150
300
150 150
300
1900

LEGRIT 135/1,3S
LEGRIT 100/05
50 150
+ 4400

120 255 120
280
ø 600

7220

SU
SUPE
LEG
18 K