Toxic Substance Reduction Plan

Durez Canada

December 20, 2012

Amended November 25, 2013 for Phase II Substances

Contents

Facility Information

Location

Durez Canada 100 Dunlop Street Fort Erie, Ontario L2A 4H9	Longitude: -78.9303 Latitude: 42.9247 UTM: 668906.50 m E 4754524.66 m N

Full-Time Employee Equivalents

As of July 1, 2013, Durez Canada employed 67 full-time employees.

Facility NPRI Identification Number

Durez Canada's facility NPRI Identification Number is 656.

Canada Revenue Agency Business Number

Durez Canada's Account number is 13776 9220RC (0002).

North American Industrial Classification System (NAICS) Code

2-Digit	32	Manufacturing
4-Digit	3252	Resin, Synthetic Rubber, & Artificial & Synthetic Fibers & Filament
6-Digit	325210	Resins and Synthetic Rubber Manufacturing

Contact Information: Public Contact, Technical Contact, Person Responsible for Coordinating the Plan, and Highest Ranking Employee

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Planner Responsible for making Recommendations	Phase I Philip Girard TSRP #0019 Vice President Pinchin Environmental	Phase II Connie Lum TSRP #0089 Senior Project Manager Pinchin Environmental	Phone: (905) 363-1324
Planner Responsible for Certification	Phase I Philip Girard TSRP #0019	Phase II Connie Lum TSRP #0089	Phone: (905) 363-1324

Company Description

Durez Canada Company Ltd. is part of the SUMITOMO BAKELITE GROUP, the world's largest manufacturer of thermosetting phenolic resins and moulding compounds covering a wide range of applications. Durez phenolic resins can be found in everything from coatings for food can linings to insulating materials on the space shuttle. The moulding compound line offers an extensive range of high quality, cost effective products for many applications in the automotive, electrical and appliance industries. The products made at the Fort Erie facility are described in the following sections.

Product Description

Phenolic Resins

Phenolic resins are hard, crystalline products formed by a chemical reaction between phenol and formaldehyde. In general, phenolic resins are characterized by dimensional stability, heat and chemical resistance, thermal and electrical resistance, and surface hardness.

Resin at Fort Erie can come in two forms; flake or powder. Flake is produced in the kettle building. The powder is produced by pulverizing (grinding) the flake. Currently most of the phenolic resins produced at the facility are used in flake form as an intermediate for the molding compound process.

Phenolic Moulding Compounds

Phenolic moulding compounds are formed by using phenolic resin as a base material, combined with fillers, pigments, and mould release agents. In general, the moulding compounds are characterized by good chemical resistance, superior electrical and insulating properties, excellent thermal properties, and outstanding dimensional stability.

In addition to ease of processing, the special formulations have good arc resistance, very low heat conductivity, and combine hardness with shock resistance.

The phenolic compounds produced at the Fort Erie facility have a variety of applications in the automobile, appliance, and electrical industries.

Process Description

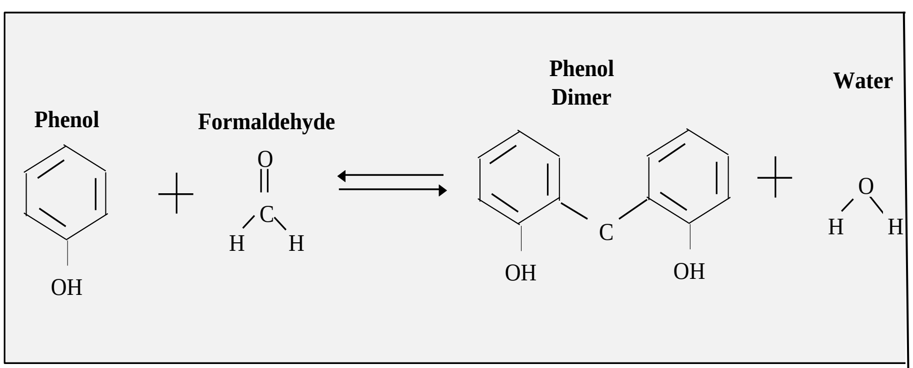
Phenolic Resins

Phenol, formaldehyde, and a small amount of acid or other material used as an initiator are placed in a pressure vessel (known as a kettle) where they chemically react with each other to form phenolic resin. The process building containing the process for producing the resin is known as Building #3. Please see Figure 1 for the chemical reaction.

The kettles are equipped with agitators and automated heating and cooling systems. Fumes are captured by condensers where the fumes are converted into liquid distillate. This distillate is either allowed to flow back into the kettle or collected and removed from the kettle process.

The resin leaves the kettle in a heated, liquid form. The phenolic resin is transferred to a hold tank, cooled to a solid, then crushed and packaged for use. The majority of the resin currently made at the facility is for internal use and handled in 45 gallon steel drums.

Figure 1, Phenol and Formaldehyde Chemical Reaction



Solid (Powder) Resin

The flake resin may be further processed into powder form. This process takes place in our Building #6. Phenolic resin is combined with other solid materials such as hexamethylenetetramine, clays, or lime and charged through a grinder into a mixer to form a homogeneous material. This material is then pulverized and blended in a batch blender. After blending, the product is packaged and shipped to customers, usually in 22.7 kg paper bags.

Airveyors are used at various locations in the production process to convey materials. Dust collectors are used in the conveying systems to filter the conveying air of as much solid material as possible before discharging the conveying air to the environment.

Dust collectors are used to separate the conveying air used to move material from process location to another. The air enters the dust collector and due to the large volume of the collector hopper, the air velocity drops and thus allows the material being conveyed to "drop out" of the air stream. A rotary valve, operating under the same principle as a rotating door, allows the material to leave the collector. The conveying air is forced through a set of filter bags. The filter bags are sized to allow air through the filter media but capture any dust material. The filters have a self-cleaning system of compressed air that shakes the dust off the filter at some timed interval. See Figure 2 for a basic schematic of a dust collector. These collectors capture > 99.9% of the material. It is the < 0.1% of the 'dust carried in the conveying air that makes up the majority of the particulate matter.

Moulding Compound

Powder resin is combined with various fillers such as clays, wood flour, and pigments to form a moulding compound. The materials are mixed, processed on heated rollers, then ground and screened through a sifter. Once sifted, the material is blended and bagged for shipment to customers. Airveyors as well as other material handling means are used to convey material.

We have two production buildings that produce molding compound. Building #4 produces molding compound that is used to produce pistons for caliper automotive brakes. Building #5 produces product that is used for general purpose applications (BBQ handles, power tool parts) and glass filled applications such as water pump housings and commutators.

Toxic Substance Accounting

Tracking and Quantifying Method

At Durez Canada Company, Ltd. the primary method of tracking and quantifying toxic substances is the use of mass balances. Mass balances are calculated in conjunction with site specific emission factors in many cases. Durez uses these methods because they currently provide a consistent and logical data collection method.

Material Flow Charts

A general overview of flow in the plant as well as those showing a more detailed individual building process flow of each toxic substance is shown at the end of this report. The NPRI calculation that was completed for each substance is also included in this report. Please note that for 2011 Substance (Formaldehyde, Methanol, Phenol, and Sulfuric Acid) data is given for 2011. For the substances (Ammonia, Ethyl Alcohol, PM10 and PM2.5 Particulate Matter) required in 2012, 2012 data is used.

Substance Reduction Plans

Formaldehyde   CAS Number: 50-00-0

Manufacturing Overview

Formaldehyde is one of the main raw materials used to produce phenolic resin. The raw material arrives at the plant in tanker trailers in the form of a formaldehyde/water solution known as formalin. We currently use a 52% concentration (by MSDS) of formaldehyde in water. The formalin is unloaded into and stored in a large atmospheric vessel. The formalin is constantly circulated as the formaldehyde will precipitate out in the form of paraformaldehyde (CAS #30525-89-4) if not agitated.

The formaldehyde is reacted with phenol to produce phenolic resin in our Building #3. When a batch of resin is produced, phenol is charged to the kettle, an initiator is added, and then the formaldehyde is metered at the required flow rate and total amount. It is during this feed that the phenol/formaldehyde reaction takes place.

Since water is produced during the reaction, a major step of the manufacturing process after reaction is collecting the water through a process known as dehydration. This collected “water” is known as distillate. The dehydration can be done by applying heat to the kettle either at atmospheric pressure or under vacuum. A percentage of “free” formaldehyde stays within the resin that is used throughout the plant. A small amount of formaldehyde is part of the distillate. The distillate is sent off site for disposal.

Once the water is removed, the resin is moved to a holding tank from the kettle. From the holding tank, the resin is pumped through a filter and then cooled on a water cooled belt. The cooled resin is coarse ground by a grinder into flake form and packaged for use. The type of package will depend on the intended use of the resin. If being sold to a customer, the package may be drum or bulk bag. If intended for internal use, the flake resin is packaged in a drum.

Emissions in this area are vapours collected as air volume is displaced as liquid moves from location to location, vapours given off during reaction, or as the resin is flaked.

The vapours are collected in a common header that is directed to a caustic scrubber where salts are formed, thereby reducing our emissions. Wastes may also be produced and sent to an appropriate disposal location.

The resin for internal use will go to one of three buildings. The use of formaldehyde in each of these buildings is simply as being part of the phenolic resin. The resin is used as a binder in the moulding compounds and as a main raw material in the pulverizing building.

Building #4 is a moulding compound building. Here the resin is charged to a mixer along with other filler materials. The mix is then pulverized (a grinder ensures the mix is ground to a powder). This resin mix is then charged to another mixer where even more fillers are added. The final charge mix is then conveyed to a set of two rolls where the mix is kneaded and heated to melt the resin and form a solid material that is put through another grinder. The discharge from this grinder is sifted in order to obtain the proper granulation size requested by our customer. When enough material from the mixers is rolled and ground the material is all blended together and then packaged for sale to the customer.

Emissions during the moulding compound process are from dust collectors that discharge a small amount of dust and vapours (from the heated material on the rolls). Formaldehyde is released only at the rolls in this process due to the heating of the mix. Dust collectors are used throughout the process when the material is moved from location to location. We also have waste discharge from dust collected through housekeeping. This material cannot be reused due to contamination concerns.

Building #5 is also a moulding compound building. The process is very similar to Building #4 except the kneading process is completed through a combination of an extruder and a roll. Emission sources are the same in each building with calculations being based on the different formulation mass balances.

Building #6 is where the flake resin is mixed with a small amount of fillers and the mix is then pulverized to a powder. Once pulverized the powder is packaged and sent to our customers. Unlike Buildings #4 and #5, the process here does not use heat and therefore no formaldehyde is released while processing the material.

Formaldehyde amounts were determined through the use of actual emissions data, MSDS noted concentrations and engineering calculations. Emissions from diesel and natural gas consumption were obtained through emission formulas. The following seven sections discuss possible improvements in the seven areas of interest. As shown by the formaldehyde mass flow balances the total was only 0.3 tonnes related to waste in 2011. Given this amount the area of concentration for reduction of use is with the phenol material. Given the close relationship between the two materials, any improvement identified for the phenol will result in a corresponding impact with formaldehyde.

Materials or Feedstock Substitution

Since formaldehyde is one of the main components of Durez Canada's resin product it is not possible to make a substitution.

Product Design or Reformulation

The amount of formaldehyde used in the process has been optimized to yield the most desirable product, thus product design or reformulation is not an option. Durez Canada uses a high formaldehyde percentage formalin that generates less distillate than if a lower percentage formalin were to be used.

Equipment or Process Modification

Formalin requires constant movement or else it will solidify into a solid known as paraformaldehyde. Paraformaldehyde, if in small quantities, can be consumed in the making of phenolic resin. (Paraformaldehyde is a raw material for us). In large amounts, it can only be landfilled as the timeline to consume the amount of paraformaldehyde that could be generated is simply too long based on annual usage. An area that we constantly look to improve is the efficiency of the circulation/agitation of the formaldehyde in order to prevent the formation of paraformaldehyde. The formation of paraformaldehyde decreases the concentration of formalin and therefore has the potential of increasing total formaldehyde usage.

The final resin has a percentage of “free” formaldehyde. Ultimately driven by reaction chemistry, the percentage can be reduced based on the length of time and/or efficiency of the reflux at the end of the reaction. Consequently process modifications that would improve the efficiency of the reflux are an option.

Spill and Leak Prevention

As with the whole kettle area, we constantly monitor for evidence of spills and leaks. We do use high quality gaskets for all piping. At this time we have been unable to identify any new specific spill or leak prevention options.

On-Site Reuse or Recycling

Essentially all of the formaldehyde used ends up bounded to phenol in our product. It is not possible to separate any “free” formaldehyde in order to reuse or recycle formaldehyde. Consequently, there are no re-use or re-cycling options that would reduce our use of formaldehyde.

Improved Inventory Management or Purchasing Techniques

Formaldehyde is purchased based on the production schedule. The material is stored in a 65,000 litre tank. Temperature is maintained at optimal to reduce the risk of paraform as well as limit the evaporation rate. Improved inventory management or purchasing techniques will have no impact on our use of formaldehyde; therefore, no options were identified under this category.

Training or Improved Operating Practices

Formaldehyde is not directly handled; it is automatically added into the kettles via the computer system in the amount on the formulation work ticket. The operators receive training in proper Personal Protective Equipment, spill prevention and remediation, and operational procedures that include environmental points. Additional staff training and improved operating practices will not reduce the amount of formaldehyde used, consequently no options were identified.

Estimates of Reduction

In 2011, there was 50 kg of paraformaldehyde disposed by us. This value was known as we track our landfill and source. The nature of formalin is that the formation of paraform is a natural occurring phenomenon; we cannot consider a total reduction. To be conservative, we assumed at best a 20% reduction in the 2011 amount if we improved the agitation.

For NPRI and mass flow calculations we based the free formaldehyde on a conservative 1.2% free formaldehyde value. We therefore had a total of 57 tonnes of formaldehyde still in the flake resin from resin building. We currently perform one hour reflux for each batch. Experimenting with longer times has shown only a 0.1% drop to 1.1% even after two hours of reflux. This percentage drop would result in a total reduction in the product of 4.6 tonnes. Please note that that 4.6 tonnes would now be contained in the distillate stream.

The following table gives a summary for the amount of formaldehyde reduced in use, creation, discharges, and contained in product.

Plan Option	Reduction in Use	Reduction in Creation	Reduction in Discharges	Reduction in Amount in Product
Improving circulation in B3	0 tonnes	0 tonnes	0.01 tonne	0 tonnes
Reflux to lower free percent	0 tonnes	0 tonnes	0 tonne	4.6 tonnes

Technically Feasible Options

All two options are technically feasible. For increased circulation we would look at installing an agitator in the storage tank and/or adding a second dedicated circulation line. Currently circulation is accomplished through the same line that feeds our kettles.

For reflux, as noted before, this would require no equipment investment just increasing the time needed for the reflux step in the reaction.

List of Options with Financially Feasible Options and Timeline

List of Technically Feasible Reduction Options	Area	Comments
Improving Agitation	Economics	Given the 2011 paraform amount (10 kg) it would be difficult to get any pay back for any change. However in 2012 we experienced a paraform waste total of 25 tonnes at a cost of $100 K in disposal and cleaning charges. We are currently obtaining estimates for improved agitation and believe a total capital project would be no more than $100 K. Options include agitation through pump circulation, a side mounted agitator, or a top-mounted agitator. This provides a one year payback even just based on the disposal costs.
	Timeline	This project is part of our 2013 capital budget and we plan on implementing the not yet decided best method to improve before August 2013.
Reflux to lower free percent	Economics	We have experimented with longer reflux times and have found that the decrease in free formaldehyde is on an exponential slope. Formalin is currently priced at ~ $0.40/kg. The total yearly savings is at best $1850. Our machine time in B3 is $1000/hour. We made 281 batches in 2011. To save $1850 would cost us $281 K in additional cycle time. This option is not economically feasible.
	Timeline	Not applicable as this option is not economically feasible.

Statement of Intent and Objectives of Plan:

In 2013 Durez Canada will implement the identified toxic substance reduction measurement that will, if successful, reduce the use of formaldehyde per unit of production output as noted. The objective of this reduction plan will be to reduce the risk of paraform through improved agitation. This project will include the selection of a best agitation method, creation and approval of a request for capital funds, and then installation of the agitation method.

Methanol CAS Number: 67-56-1

Manufacturing Overview

Methanol is used as a stabilizer in the formalin solution. Methanol is not an identified, nor a necessary chemical in the phenolic resin reaction. We have not made, installed, or used any equipment specifically to handle or process methanol. The methanol follows the process flow path of formaldehyde. The methanol arrives at the plant by tanker with the formalin. The methanol is stored with the formalin in an atmospheric storage tank. The methanol is charged as part of the formalin being feed to the phenol during the making of a resin batch. Methanol is consumed during the reaction but also is emitted in air through the caustic column. Methanol is also in the distillate at an average percentage of 0.5% (as tested by outside lab).

Specific methanol emission rates were obtained from actual testing of emissions. The following seven sections discuss possible improvements in the seven areas of interest.

Materials or Feedstock Substitution

On an on-going basis Durez will continue to make inquiries to determine if there are non-methanol options for stabilizing formaldehyde. Currently there are no material or feedstock substitution options available.

Product Design or Reformulation

The amount of stabilizing methanol added to each batch is carefully controlled. If the amount of methanol is reduced, more paraform will be generated which will increase the off-site land disposal and increase the amount of formaldehyde used. Increasing the amount of methanol will reduce the amount of paraform, consequently, the methanol ratio is carefully balanced and reformulation options are not an option at this time

Equipment or Process Modification

Since the methanol is extraneous to the phenolic reaction and process, there is very little that can be done in this area to reduce methanol usage. Consequently, no equipment or process modifications were identified that could reduce the use of methanol.

Spill and Leak Prevention

Given that methanol is closely tied to formaldehyde; any and all measures in this area for formaldehyde are applicable here. (See Spill and Leak Prevention for Formaldehyde).

On-Site Reuse or Recycling

Methanol is a stabilizer for formaldehyde, and is delivered with the formaldehyde and not a component of Durez Canada's product. Consequently, no on-site reuse or recycling options were identified that could reduce the use of methanol.

Improved Inventory Management or Purchasing Techniques

Our use of methanol is not affected by our inventory management or purchasing techniques, consequently no options could be identified.

Training or Improved Operating Practices

Our use of methanol is not affected by our training or operating practices, consequently no options could be identified.

Technically Feasible Options

At this point in time, until a methanol substitute is identified, no options were identified that would reduce our use of methanol. Methanol is a necessary component of the process.

Statement of Intent and Objectives of Plan:

At the current time no technically feasible options were identified that if implemented could reduce the use of methanol. Durez will continue to work with suppliers and customers and implement methanol reduction initiatives as deemed appropriate.

Phenol CAS Number: 108-95-2

Manufacturing Overview

Phenol is one of the main raw materials used to produce phenolic resin. The raw material arrives at the plant in tanker trailers. The phenol is unloaded into and stored in a two large atmospheric vessel. Phenol must be kept above 40^{o}C in order to keep the phenol from freezing.

The phenol is reacted with formaldehyde to produce phenolic resin in our Building #3. When a batch of resin is produced, phenol is charged to the kettle, an initiator is added, and then the formaldehyde is metered at the required flow rate and total amount. It is during this feed that the phenol/formaldehyde reaction takes place.

Since water is produced during the reaction, a major step of the manufacturing process after reaction is collecting the water through a process known as dehydration. This collected “water” is known as distillate. The dehydration can be done either at atmospheric pressure or under vacuum and by applying heat to the kettle. A percentage of phenol is contained within the resin that is used throughout the plant. A certain percent of the phenol is part of the distillate. The distillate is sent off site for disposal.

Once the water is removed, the resin is moved to a holding tank from the kettle. From the holding tank, the resin is pumped through a filter and then cooled on a water cooled belt. The cooled resin is coarse ground by a grinder into flake form and packaged for use. The type of package will depend on the intended use of the resin. If being sold to a customer, the package may be drum or bulk bag. If intended for internal use, the flake resin is package in a drum.

Emissions in this area are vapours collected as air volume is displaced as liquid moves from location to location, vapours given off during reaction, or as the resin is flaked. The vapours are collected in a common header that is directed to a caustic scrubber where salts are formed, thereby reducing our emissions. Wastes may also be produced and sent to an appropriate disposal location.

The resin for internal use will go to one of three buildings. The use of phenol in each of these buildings is simply as being part of the phenolic resin. The resin is used as a binder in the moulding compounds and as a main raw material in the pulverizing building.

Building #4 is a moulding compound building. Here the resin is charged to a mixer along with other filler materials. The mix is then pulverized (a grinder ensures the mix is ground to a powder). This resin mix is then charged to another mixer where even more fillers are added. The final charge mix is then conveyed to a set of two rolls where the mix is kneaded and heated to melt the resin and form a solid material that is put through another grinder. The discharge from this grinder is sifted in order to obtain the proper granulation size requested by our customer. When enough material from the mixers is rolled and ground the material is all blended together and then packaged for sale to the customer.

Emissions during the moulding compound process are from dust collectors that discharge a small amount of dust and vapours (from the heated material on the rolls). Phenol is released only at the rolls in this process due to the heating of the mix. Dust collectors are used throughout the process when the material is moved from location to location. We also will have waste discharge from dust collected through housekeeping. This material cannot be reused due to contamination concerns.

Building #5 is also a moulding compound building. The process is very similar to Building #4 except the kneading process is completed through a combination of an extruder and a roll. Emission sources are the same in each building with calculation being based on the different formulation mass balances.

Building #6 is where the flake resin is mixed with a small amount of fillers and the mix is then pulverized to a powder. Once pulverized the powder is packaged and sent to our customers. Unlike Buildings #4 and #5, the process here does not use heat and therefore no formaldehyde is released while processing the material.

Phenol amounts were determined through the use of actual emissions data, MSDS noted concentrations and engineering calculations. The following seven sections discuss possible improvements in the seven areas of interest.

Materials or Feedstock Substitution

Since phenol is one of the main components of Durez Canada's resin product it is not possible to make a substitution.

Product Design or Reformulation

The amount of phenol used in the process has been optimized to yield the most desirable product, thus product design or reformulation is not an option.

Equipment or Process Modification

Phenol is driven out of the resin through the dehydration process. A longer dehydration would help drive the phenol percent in the product down. We also currently collect the phenol rich distillate and reuse it in the resin manufacturing process in formulations that allow the use of this "recovered" phenol. Phenol separates from the distillate through an organic (phenol)/aqueous (water) separation. This separation can be optimized by lowering the temperature of the distillate. A second option to capture more phenol is through a solvent extraction of the phenol.

Phenol reduction in the other areas of the plant are more difficult as the phenol is emitted as we heat the raw material mix as we process the material into a saleable finished good. Phenol will be released as long as it is contained in the resin.

In 2011, we experienced a serious contamination issue with the product from B4. After investigation we found the problem was with a contaminated raw material. We have since improved our inspection procedures. More importantly we have identified a method to sift our raw material to capture the contamination before it is processed into our finished product.

Spill and Leak Prevention

As with the whole kettle area, we constantly monitor for evidence of spills and leaks. We do use high quality gaskets for all piping and have a mechanical integrity inspection program in place to monitor condition of the pipes and tanks in our resin production building. We do have a housekeeping program. We know from our waste monitoring program we averaged 1 % landfill from the process to total finished goods produced. This material contains resin and other raw materials. We have and are implementing more efficient housekeeping standards as well as looking to invest in a twinned vacuum system in one of our Molding compound process buildings to allow the better capture of "good" material. Currently this material is considered to be landfill as the single vacuum system introduces contamination into any vacuumed material.

On-Site Reuse or Recycling

As noted in the equipment section, we currently do recycle phenol in our process. The installation of a chiller to lower distillate storage temperature to promote the organic/aqueous separation would provide more recovered phenol. Consequently, we believe we can obtain reduction through improved recovery of phenol from distillate.

Improved Inventory Management or Purchasing Techniques

Phenol is purchased based on the production schedule. The material is stored in one of two tanks. Temperature is maintained at optimal to limit the evaporation and thus emissions rate. We have taken steps over the last several years to reduce our inventory turnover ratio. We target a one month's or less sales turnover ratio for finished goods. Given the number of different resins used and the volume used, it would be difficult to further reduce this number. However, we will continue to explore opportunities that may reduce our use of chemicals that do not end up as finished goods. At the present time however, no reduction options could be identified for this category.

There was obsolete material that was landfilled as we no longer had a customer for the product. We have already reduced our turnover ratio that the possibility of this reoccurring is very low.

Training or Improved Operating Practices

Phenol is not directly handled; it is automatically added into the kettles via the computer system in the amount on the operators work ticket. The operators receive training in proper Personal Protective Equipment, spill prevention and remediation, and operational procedures that include environmental points. Consequently, because the use of phenol is not staff training or improved operating practices no reduction options could identified that would reduce our use of phenol.

Estimates of Reduction

In 2011 we produced 3812 MT of phenolic resin from a total of 3577 MT of phenol. (The reaction does not result in a pound to pound conversion). There is approximately 5 % free phenol in the flake resin. The distillate contains on average 8.5% of phenol.

We identified a total of 191 tonnes of phenol in the finished product out of B3. Tests and actual production of some current low free phenol resins that we produce are obtained by extending the dehydration process from the normal 12 to 16 hours to 18 to 24 hours (six hours longer on average). This would reduce the average of free phenol to approximately 4%. This reduction would have gained us 153 MT of phenol. We will assume a best case where all of this phenol would be recovered and used back in the kettle.

The reduced free phenol would reduce the amount of discharges in landfill from the molding compound buildings. The lower phenol percent in the phenolic resin would reduce the percentages (based on the formulation mass balances) from 1% to 0.85% in B4, and 2% to 1.6% in B5. Given the total landfill from each building the total reduction is 0.6 MT (B3), 1.3 MT (B4), and 2.1 MT (B5) for a total of a 4 MT reduction in waste discharges.

We know from winter shipments of distillate that a lower distillate temperature can reduce the phenol percent in distillate from 8.5% to 6.5%. Therefore we would reduce the amount of phenol in the 1935 MT of distillate shipped in 2011 to 126 MT from 165 MT.

Solvent extraction would reduce the phenol percentage in distillate to almost zero. This would allow the reclamation of almost the entire 165 MT of phenol in the distillate in 2011.

To address the contamination issue we experienced we did investigate and found a sifter that was able to handle the unique blend of raw material mix for our product. We landfilled 100 MT of contaminated product in 2011. This all would have been avoided with the sifter and therefore would have reduced phenol discharges by 1 MT.

Improved housekeeping through more diligent monitoring in our moulding compound buildings would reduce the total amount of material sent to landfill. This includes little items such as checking equipment on a more frequent basis. Our target is to get to 0.7% of total production to landfill. From 2011 this 0.7% target from the 1% achieved in 2011 would have saved a total of 14.1 MT of total raw material or 0.141 tonnes of phenol. B5 would reduce a total of 23.1 MT or 0.46 MT reduction in phenol.

A twinning of the B5 vacuum system would allow the capture of good material. In 2011 there was a total of 6 MT that was sent to landfill due to the use of the single vacuum system. Through knowledge of the process, it is estimated that at least 5% of the housekeeping 77 MT would have a possibility of being reused if the vacuum was available. This provides a total of 10 MT of good raw material of which 0.2 MT would be phenol.

The following table gives as summary for the amount of phenol reduced in use, creation, discharges, and contained in product.

Plan Option	Reduction in Use	Reduction in Creation	Reduction in Discharges	Reduction in Amount in Product
Lower Free Phenol through Longer Dehydration	153 tonnes	0 tonnes	4 tonnes	153 tonnes
Chiller system to Reclaim more phenol from distillate	40 tonnes	0 tonnes	40 tonnes	0 tonnes
Extraction process to claim more recovered	165 tonnes	0 tonnes	165 tonnes	0 tonnes

Plan Option	Reduction in Use	Reduction in Creation	Reduction in Discharges	Reduction in Amount in Product
Lower Free Phenol through Longer Dehydration	153 tonnes	0 tonnes	4 tonnes	153 tonnes
phenol distillate				
Installation of Raw Material Sifter in B4	1 tonne	0 tonnes	1 tonne	0 tonne
Improve Housekeeping to reduce landfill	0.6 tonnes	0 tonnes	0.6 tonnes	0 tonnes
Twin B5 Vacuum System to keep “good” material segregated from possible contamination	0.2 tonnes	0 tonnes	0.2 tonnes	0 tonnes

Technically Feasible Options

All identified options are technically feasible.

List of Options with Financially Feasible Options and Timeline

List of Technically Feasible Reduction Options	Area	Comments
Lower Free Phenol through Longer Dehydration	Economics	The extraction of 4 MT of phenol (at the $1.54/kg average price in 2011), would save $6.1 K. The 153 MT of phenol savings would save $236 K. Given the longer cycle time required (6 hours/batch at $1000/hour cost to run the building and total of $1600 K dollars of cost to our resin. The yearly cost of $1440 K would make us uncompetitive. There is no cost savings in disposing of the distillate as the same amount will be collected. We do look to charge more for this type of resin although market conditions will dictate final selling price structure.
	Timeline	This is on-going on a product by product basis and will be driven through customer demand.

Chiller system to Reclaim more phenol from distillate	Economics	A reduction in cost in waste disposal would not be obtained as the same amount of distillate would need to be handled. (We are charged by the amount of distillate and not the phenol concentration). The savings of not having to purchase 40 tonnes of phenol is $62 K. We have estimated this project to cost $125 K. The payback would be 2 years.
	Timeline	This project has been approved. The chiller has been selected, the required change in piping has been designed and we are looking to have this equipment in operation by June 2013.
Extraction process to claim more recovered phenol distillate	Economics	The extraction process has high capital cost ($3,800 K) and even with a full resin production at Fort Erie this project would not be economical for just our plant. The 165 tonnes of phenol would save $195 K. For FE we would still have to pay for disposal of the left over distillate. (The local sewer by-law holds phenol to 1 ppm – the water would still have greater than this concentration). The corporation has looked at the economic feasibility of this project if all three resin plants were to ship to a common location. This location has been chosen to be Kenton, OH. With all three plants supplying distillate it has been determined that the project payback would be 3.1 years. It should be noted that Fort Erie would not reduce our phenol discharge amounts – it would be shipped off-site to Kenton.
	Timeline	This project is written but not approved. The payback was calculated using some resin sales volume that has not been obtained. Once the volume is obtained (the actual date when this sales would be obtained is undetermined at this point), the project will go ahead. It will take a year to install and commission the process from the time of approval.
Installation of Raw Material Sifter in B4	Economics	The phenol savings possible with this project ($1.5 K) do not support any type of project. However, the cost of disposal is about $0.2/kg. There was 100 MT in 2011 due to contamination. The total variable cost ~$1.20/kg (average for all three moulding compound products). We would have had to also reproduce the piston material that was lost due to contamination. Fixed cost conversion is ~ $1.00/kg between the two buildings. There was also a $120 K claim paid to our customers due to the contamination. The sifter project was developed and total capital cost is $125 K. Adding up the 2011 cost of over $260 K this project is very self-supporting.

	Timeline	This project has been approved and we have planned to install the raw material sifter in B4 before the end of 2012.
Improve Housekeeping to reduce landfill	Economics	We tackle this all the time and have a number of checklists and the like available. We have identified some major problem areas such as design of conveyors and the need for better dust collection at certain points. The phenol savings is $1 K. The wasted material, including disposal cost and remaking the total materials (40 MT) would be a potential cost savings of ~ $90 K.
	Timeline	We have begun the investigation into equipment design and dust collection. We are hoping to make improvements in 2013 and continue into 2014 if needed. This will be based on the capital required. We are driving this project through improved EHS standards. We are targeting to reach the 0.7% landfill number by the end of 2014 even if specific ideas are not yet identified.
Twin B5 Vacuum System to keep “good” material segregated from possible contamination	Economics	As with improved housekeeping, the cost savings here would be in the saving of total raw material and not just “phenol”. The 10 MT would result in ~ $25 K in savings. We believe this project will cost $75 K (it is still in the design phase). This project has a 3 year payback. The company prefers a less than 2 year pay back although in the case of projects in the environmental/safety area exceptions are made.
	Timeline	We are looking to proceed with this project in 2013. As noted above we are investigating design and costs of this project in the last quarter of 2012. We do anticipate that the project will improved for late 2013/early 2014 installation.

Statement of Intent and Objectives of Plan:

In 2013 and beyond, Durez Canada will implement the identified toxic substance reduction measurement that will, if successful, reduce the use of not only phenol per unit of production output but total raw material usage per production output as noted above. The objective of this reduction plan will be to reduce the phenol usage through a chiller system in our distillate area, installation of a raw material sifter in our B4 process, improved housekeeping, and the twinning of the vacuum system in B5. Each project will include the selection of a design and equipment, creation and approval of a request for capital funds, and then installation chosen equipment.

Sulphuric Acid CAS Number: 7664-93-9

Manufacturing Overview

Sulphuric acid is an initiator used in the reaction of phenol and formaldehyde. The acid is added to the phenol in the pressure vessel (kettle) before the formaldehyde is fed. The acid is consumed in the reaction; i.e., it no longer exists. The amount of sulphuric used is based on the demand for resins produced using sulphuric acid. The acid in liquid form is shipped in 1000 litre totes. At any point in-time the maximum volume of sulphuric acid in the plant would be two full totes.

There is a dedicated pumping system that will pump acid out of the tote to the kettle when needed in the resin making process. Although the sulphuric acid is totally consumed in the reaction, we also believe that a small amount is emitted through our vapour collection system. Emissions are based on a mass balance calculation and estimated to be a ratio to the formaldehyde and based on the percent of sulfuric used versus the total resin pounds produced.

The following seven sections discuss possible improvements in the seven areas of interest.

Materials or Feedstock Substitution

The use of sulfuric acid initiated reactions has been developed to promote certain resin properties. While it is true that other acids can and have been used to promote the reaction, we have found no material that provides the same properties as sulphuric acid initiated resins. As sulphuric acid imparts desirable properties to the resin, no other material or feedstock substitution options could be identified that are technically feasible.

Product Design or Reformulation

The use of sulphuric acid is required in order to obtain the desired resin properties. There would be a required full research and development effort to not only develop a new resin but also develop new compound products that would make use of nonsulphuric initiated resins. No product design or reformulation options could be identified because sulphuric acid is required to manufacture the resin and the concentration is carefully controlled based on reaction kinetics.

Equipment or Process Modification

A modification in the equipment or process would not affect the amount of sulphuric acid used since all of it is consumed in the reaction; therefore, there are currently no apparent options in this area.

Spill and Leak Prevention

Sulphuric acid is added into the kettles via vacuum, and the storage containers are regularly inspected in order to minimize spills and leaks. At this time there are no other apparent measures to take.

On-Site Reuse or Recycling

Since all of the sulphuric acid is consumed during the reaction it is not possible to reuse or recycle the substance.

Improved Inventory Management or Purchasing Techniques

Sulphuric acid is purchased based on the production schedule; all of what is purchased is used.

Training or Improved Operating Practices

There are identified procedures regarding the use of sulfuric acid. No possible modifications are apparent at this time.

Technically Feasible Options

At this point in time no options were identified that would reduce our use of sulphuric acid. Sulphuric acid is necessary component of the process.

Statement of Intent and Objectives of Plan:

At the current time no technically feasible options were identified that if implemented could reduce the use of sulphuric acid since it is completely consumed in the process.

Ammonia CAS Number: 107-02-8

Manufacturing Overview

Ammonia is created as a by-product due to the use of hexamethylenetetramine (hexa) in the moulding compound process. Hexa continues the cross-linking of the phenolic resin and thus allows the resin to "finish" cross-linking and thus provide the thermo-set properties for materials made with phenolic resins and compounds. This cross linking takes place during the kneading portion of our moulding compound operation; i.e., whenever the material is heated. There are no ammonia emissions if the material is handled at ambient temperatures. The following seven sections discuss possible improvements in the given areas, or explain why an improvement is not possible at this time.

Materials or Feedstock Substitution

Hexa is a crucial component in the moulding compounds made at Durez Canada due to its cross-linking properties. There is no reasonable substitute for it, and thus there are no plan options in this area at this time.

Product Design or Reformulation

The amount of hexa used in the process has been determined in order to yield the most desirable product; redesign or reformulation would decrease the physical integrity of the product.

Equipment or Process Modification

The conversion of hexa is critical to the nature of the finished product and therefore the process cannot be modified.

Spill and Leak Prevention

Since ammonia is a by-product, it is not handled directly in the plant, and thus spills and leaks of ammonia do not occur.

On-Site Reuse or Recycling

As noted above, ammonia is a by-product, so Durez Canada has no plans to reuse or recycle it.

Improved Inventory Management or Purchasing Techniques

Ammonia is not purchased or stored on-site.

Training or Improved Operating Practices

There are no identified procedures regarding the use of ammonia since it is a by-production of normal production. No modifications are apparent at this time.

Technically Feasible Options

At this point in time no options were identified that would reduce our use of hexa and therefore creation of ammonia.

Objective of Plan:

The purpose of the plan is to determine the technical and economic feasibility of any identified option to reduce ammonia creation, and therefore ammonia emissions at the Durez Canada plant.

Statement of Intent:

At the current time no technically or economically feasible options were identified that if implemented could reduce the amount of ammonia emitted/created by Durez Canada.

Ethyl Alcohol   CAS Number: 64-17-5

Manufacturing Overview

Ethyl alcohol is created as a by-product, due to the use of silane in the production of specific resins made at Durez Canada and premix containing silane used in the moulding compound process. Silane is used to bind the organic and inorganic materials used in our process. The following seven sections discuss possible improvements in the given areas or explain why an improvement is not possible at this time.

Materials or Feedstock Substitution

As silane is identified as a crucial binding component in the products made at Durez Canada there is no reasonable substitute for it, and thus there are no plan options in this area at this time.

Product Design or Reformulation

The amount of silane used in the process has been determined in order to yield the most desirable product; redesign or reformulation would decrease the physical integrity of the product. There are no plans to make any changes in this area at this time.

Equipment or Process Modification

The conversion of silane is critical to the nature of the finished product and therefore the process cannot be modified.

Spill and Leak Prevention

Since ethyl alcohol is a by-product, it is not handled directly in the plant, and thus spills and leaks of ethyl alcohol do not occur.

On-Site Reuse or Recycling

As noted above, ethyl alcohol is a by-product, so Durez Canada has no plans to reuse or recycle it.

Improved Inventory Management or Purchasing Techniques

Ethyl alcohol is not purchased or stored on-site.

Training or Improved Operating Practices

There are no identified procedures regarding the use of ethyl alcohol since it is a by-production of normal production. No modifications are apparent at this time.

Technically Feasible Options

At this point in time no options were identified that would reduce our emissions of ethyl alcohol.

Objective of Plan:

The purpose of the plan is to determine the technical and economic feasibility of any identified option to reduce ethyl alcohol creation, and therefore ethyl alcohol emissions at the Durez Canada plant.

Statement of Intent:

At the current time no technically or economically feasible options were identified that if implemented could reduce the amount of ethyl alcohol emitted/created by Durez Canada.

PM10, PM2.5 -- Particulate Matter   CAS Number: N/A

Manufacturing Overview

PM10 is particulate matter 10 micrometers or less in diameter. PM2.5 is particulate matter 2.5 micrometers or less in diameter and is generally described as fine particles. By way of comparison, a human hair is about 100 micrometers, so roughly 40 fine particles could be placed on its width. The chemical properties of particulate matter vary depending on sources of particles. It is important to note that particulates are not one particular chemical substance but a classification of particles by size rather than chemical properties.

The majority of particulate matter at Durez Canada originates from our many airveying systems. Airveyors are used in the production process to convey materials from one location to another. For example, material may be charged at ground level and then conveyed to a mixing tank at a different elevation in the building. Airveyors at the Durez Canada plant consist of an air fan, dust collector, and pipes and air lock feeders.

Dust collectors are used to separate the material being conveyed from the air used to move material from process location to another. The air enters the dust collector and due to the large volume of the collector hopper, the air velocity drops and thus allows the material being conveyed to "drop out" of the air stream. A rotary air lock valve, operating under the same principle as a rotating door, allows the material to leave the collector. The air is forced through a set of filter bags. The filter bags are sized to allow air through the filter media but capture any dust material. The filters have a self-cleaning system of compressed air that shakes the dust off the filter at some timed interval. These collectors capture > 99.9% of the material. It is the < 0.1% of the dust carried in the conveying air that makes up the majority of the particulate matter.

The other sources of particulate matter at the plant are cooling towers and combustion of propane, diesel, and natural gas. Each of these sources is critical for the operation of the plant. The emission rate from these secondary sources is derived from calculated formulations. For this reason no plans for reduction are given for these sources.

The following seven sections discuss possible improvements in the seven areas of interest for the process discharge of particulate matter only.

Materials or Feedstock Substitution

Regardless of the material being transported there is always particulate matter. Therefore no options in the area have been identified at this time.

Product Design or Reformulation

The movement of material is in consequential to the discharge of particulate matter and therefore no options have been identified at this time.

Equipment or Process Modification

Dust collectors are designed to operate at a given volume of air with a given filter area. All of our collectors operate at these optimal parameters in order to reduce the amount of particulate matter. There are currently no apparent options in this area.

Spill and Leak Prevention

During operation we constantly monitor the discharge of the fan for excessive dust. This practice limits excessive discharge of particulate matter. At this time there are no apparent options in this area.

On-Site Reuse or Recycling

The particulate matter is discharged to atmosphere and therefore it is not possible to reuse or recycle the material.

Improved Inventory Management or Purchasing Techniques

Particulate matter is neither purchased nor stored and therefore there are no measures to take in this area.

Training or Improved Operating Practices

There are identified procedures regarding the operation and monitoring of dust collectors and their discharge of particulate matter. No possible modifications are apparent at this time.

Technically Feasible Options

At this point in time no options were identified that would reduce our discharge of particulate matter.

Objective of Plan:

The purpose of the plan is to determine the technical and economic feasibility of any identified option to reduce particulate matter emissions at the Durez Canada plant.

Statement of Intent:

At the current time no technically or economically feasible options were identified that if implemented could reduce the amount of particulate matter emitted by Durez Canada.

Estimates of Current Direct and In-Direct Annual Costs

The following table summarizes the estimated costs in 2011 of use, release, disposal, transfer, and being contained in product, for formaldehyde, methanol, phenol, sulphuric acid. The new substances of ammonia, ethyl alcohol, and PM10 and PM2.5 Particulate matter are based on 2012 data. Total cost for each product includes the price of the material and an allocation of waste costs that were common for substances. For example, formaldehyde and phenol are both contained in the distillate. Total landfill disposal costs were used for this calculation. These costs were allocated on a 50/50 basis as they are the two main raw materials needed for phenolic resins.

It should be noted that in case of ammonia and ethyl alcohol both are by-products and therefore no value can be given.

Particulate Matter costing is based on average cost of the product being made in each building since the particulate matter is composed of the formulation mix. Also included in this costing is the amount spent on changing and replacing filter bags used in the dust collectors (noted in waste) and an estimate of internal maintenance costs for maintaining the dust collectors.

The estimates are given in 1000 Canadian dollars.

Substance	Use	Release (Emissions)	Disposal (Waste)	Transfer	In Product
Formaldehyde	725	3	180	0	25
Methanol	0	0	0	0	0
Phenol	5600	10	437	0	300
Sulphuric Acid	8	0	0	0	0
Ammonia	0	0	0	0	0
Ethyl Alcohol	0	0	0	0	0
PM10 and PM2.5 Particulate Matter	10	2	20	0	0

Certification of Highest Ranking Employee

As of December 20, I, Robert Hunt, certify that I have read the toxic substance reduction plans for the toxic substances referred to below and am familiar with their contents, and to my knowledge the plans are factually accurate and comply with the Toxics Reduction Act, 2009 and Ontario Regulation 455/09 (General) made under that Act.

Formaldehyde	Plan Prepared December 20, 2012
Methanol	Plan Prepared December 20, 2012
Phenol	Plan Prepared December 20, 2012
Sulphuric Acid	Plan Prepared December 20, 2012

Robert Hunt
Plant Manager
Durez Canada

CERTIFICATION BY HIGHEST RANKING EMPLOYEE

As of November 25, 2013, I, Robert Hunt certify that I have read the toxic substance reduction plan for the toxic substances referred to below, and am familiar with its contents, and to my knowledge the plan is factually accurate and complies with the *Toxics Reduction Act, 2009* and the Ontario Regulation 455/09 (General) made under that Act.

Ammonia, Plan prepared November 25, 2013

Ethyl alcohol, Plan prepared November 25, 2013

Particulate Matter 2.5, Plan prepared November 25, 2013

Particulate Matter 10, Plan prepared November 25, 2013

Robert Hunt
Plant Manager
Durez Canada

Certification of Toxic Substance Reduction Planner

As of December 20, I, Phil Girard, TSRP #0019, certify that I am familiar with the processes at Durez Canada that use the toxic substances referred to below, that I agree with the estimates referred to in subparagraphs 7 iii, iv, and v of subsection 4 (1) of the Toxic Reduction Act, 2009 that are set out in the toxic substance reduction plans referred to below for the toxic substances and that the plans comply with the Act and the Ontario Regulation 455/09 (General) made under that Act.

Formaldehyde	Plan Prepared December 20, 2012
Methanol	Plan Prepared December 20, 2012
Phenol	Plan Prepared December 20, 2012
Sulphuric Acid	Plan Prepared December 20, 2012

Phil Girard, TSRP #0019
Pinchin Environmental Ltd.

CERTIFICATION BY LICENSED PLANNER

As of November 25, 2013, I, Connie Lum certify that I am familiar with the processes at Durez Canada that use the toxic substances referred to below, that I agree with the estimates referred to in subparagraphs 7 iii, iv and v of subsection 4 (1) of the Toxics Reduction Act, 2009 that are set out in the toxic substance reduction plans referred to below for the toxic substances and that the plans comply with the Act and the Ontario Regulation 455/09 (General) made under that Act.

Ammonia, Plan prepared November 25, 2013

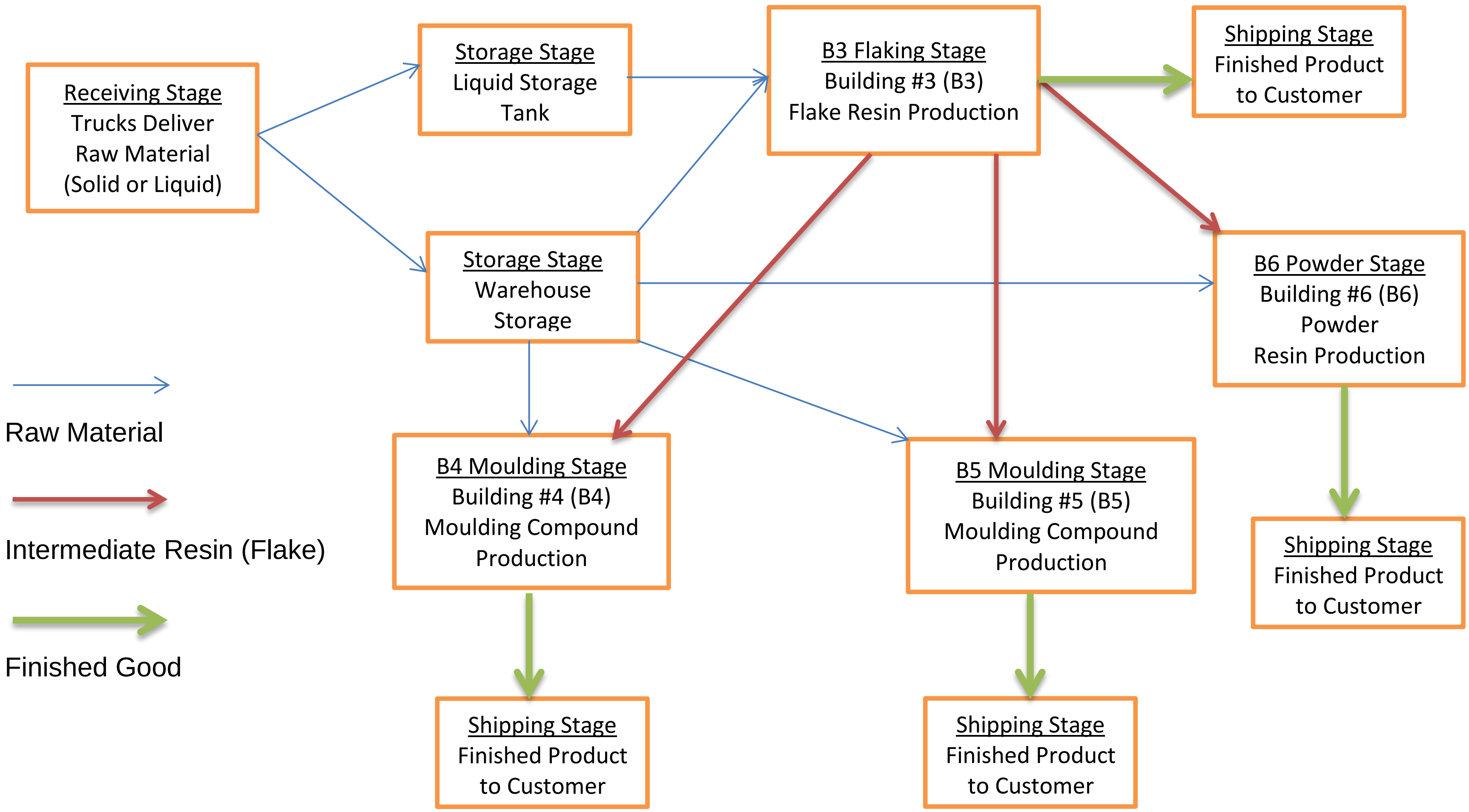
Ethyl alcohol, Plan prepared November 25, 2013

Particulate Matter 2.5, Plan prepared November 25, 2013

Particulate Matter 10, Plan prepared November 25, 2013

Connie Lum, B.Sc., EP, TSRP#0089
Senior Project Manager
Pinchin Environmental Ltd.
clum@pinchin.com

Overview of Processes at Durez Canada: Manufacturing Stages

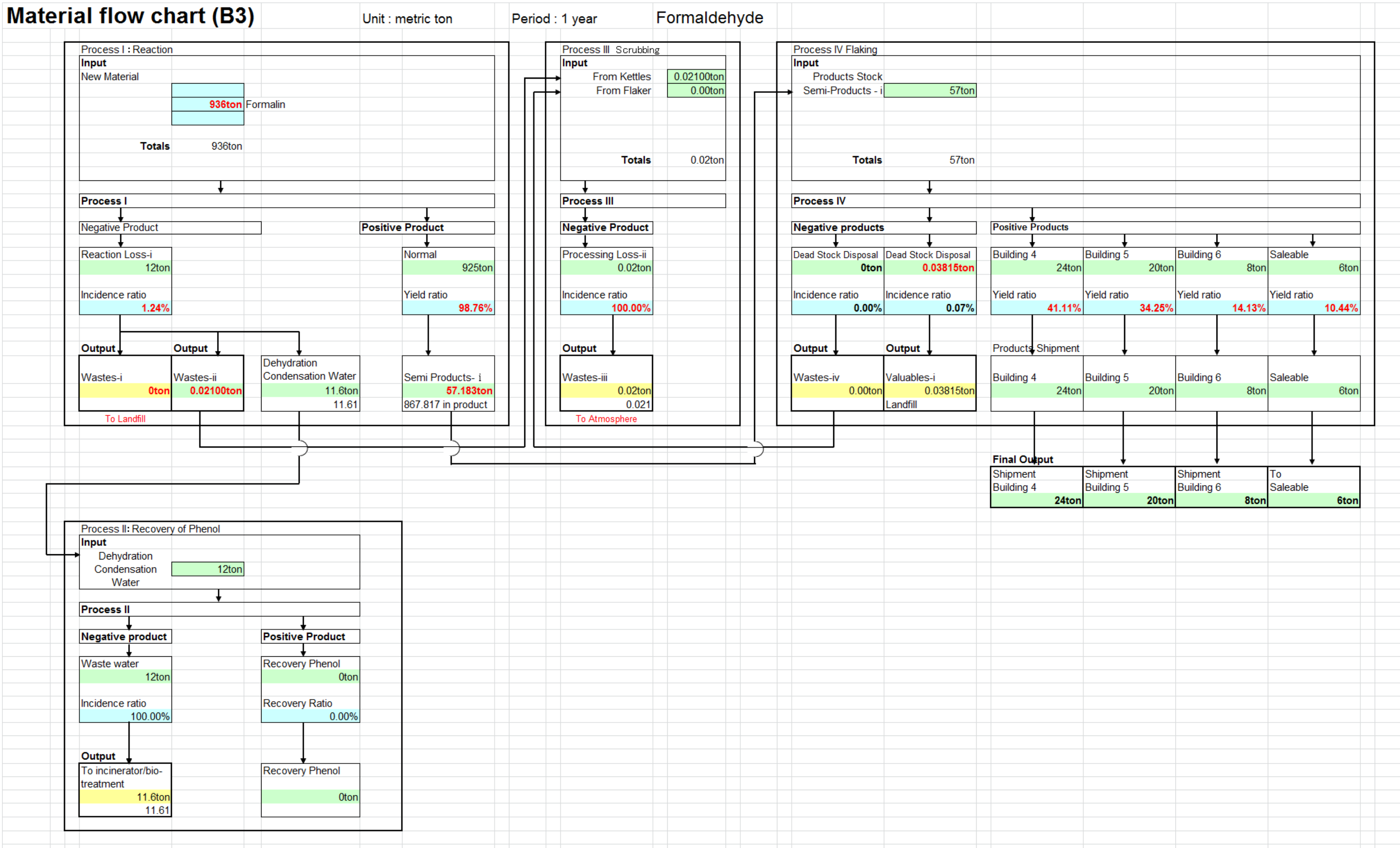


Formaldehyde NPRI Calculations (Uses 2011 Data)

Formaldehyde	CAS: 50-00-0				
Amount MPO:					
Building 3	Pounds Used (lbs)				
Formaldehyde 50% - 10928 (25-52%)	3969181	936254.988	kg	936.255	tonnes
(use 52% for calculation)	**Total MPO**	**936254.988**	**kg**	**936.255**	**tonnes**
Air Emissions:	Rate from CofA (g/s)	Emissions			
Building 3	0.001	21.114	kg	0.021	tonnes
Building 4	0.0007	10.899	kg	0.011	tonnes
Building 5	0.0016	26.657	kg	0.027	tonnes
Building 6	0	0.000	kg	0.000	tonnes
From diesel engine:		0.157	kg	0.000	tonnes
From natural gas combustion:		1.685	kg	0.002	tonnes
From propane heaters:		0.000	kg	0.000	tonnes
	Total Air Emissions:	**60.512**	**kg**	**0.061**	**tonnes**
Other Releases:					
Distillate (0.60% Formaldehyde)	Destination	Amount of Total Distillate		**Formaldehyde Contained in D**	
Recycle	Tembec	0.00	kg	0.000	tonnes
Bio	Lanxess	650,000.00	kg	3.900	tonnes
Incinerator	Clean Harbours	145,000.00	kg	0.870	tonnes
	Niagara Falls	1,140,000.00	kg	6.840	tonnes
	Total	**1,935,000.00**	**kg**	**11.610**	**tonnes**
Landfill (based on formulation weight percentages)	Destination			**Formaldehyde Contained in La**	
0.250% is Formaldehyde	Secure	15,260.00	kg	0.03815	tonnes
0.100% is Formaldehyde	Non-Secure B4	147,066.00	kg	0.147066	tonnes
0.055% is Formaldehyde	Non-Secure B5	132,882.00	kg	0.0730851	tonnes
	Total	**295,208.00**	**kg**	**0.2583011**	**tonnes**

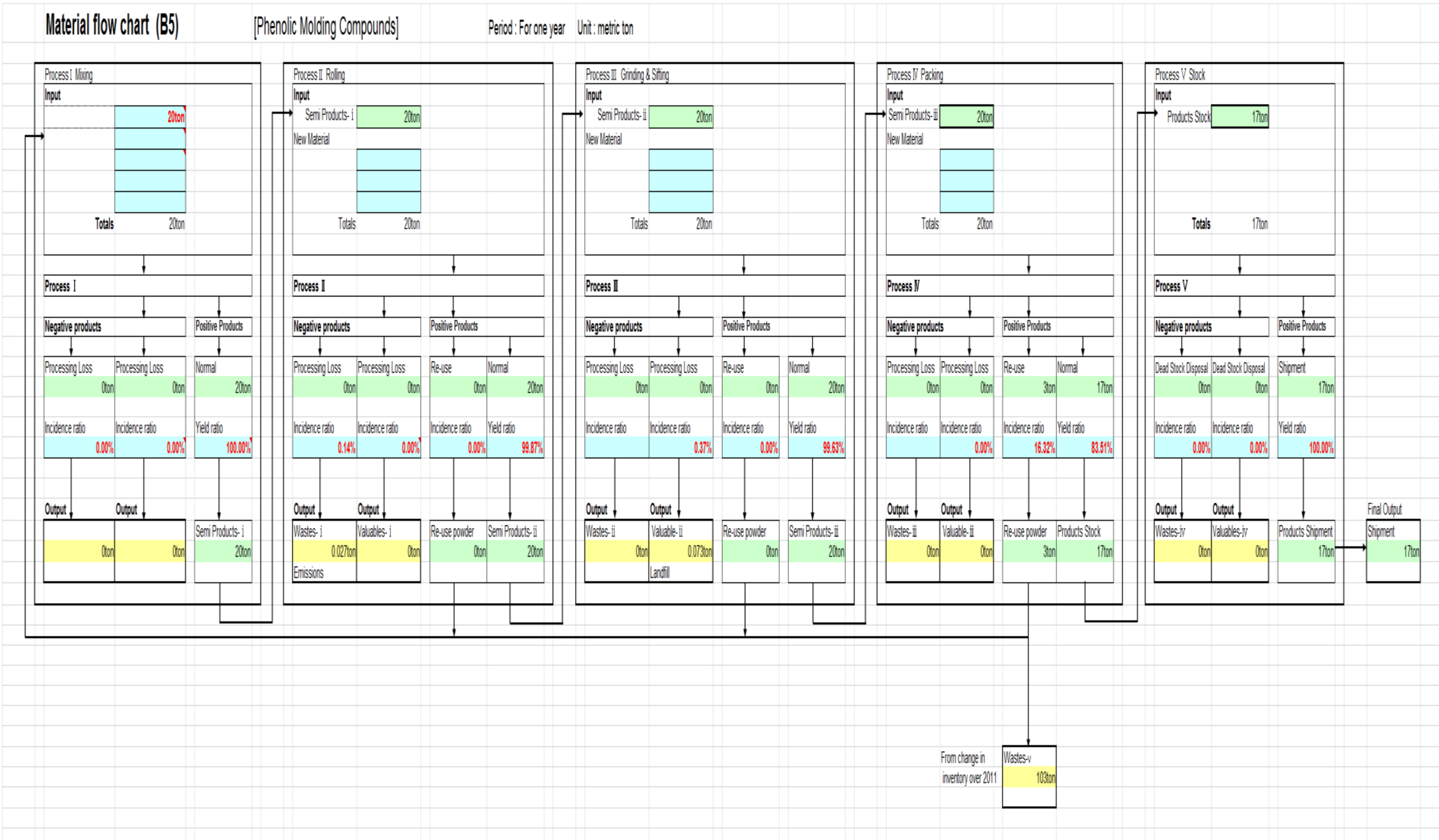
Process Mass Balance (Building #3, Resin Manufacturing) (Uses 2011 Data)

The mass balances shown in all the mass balance figures for formaldehyde are approximately equal.

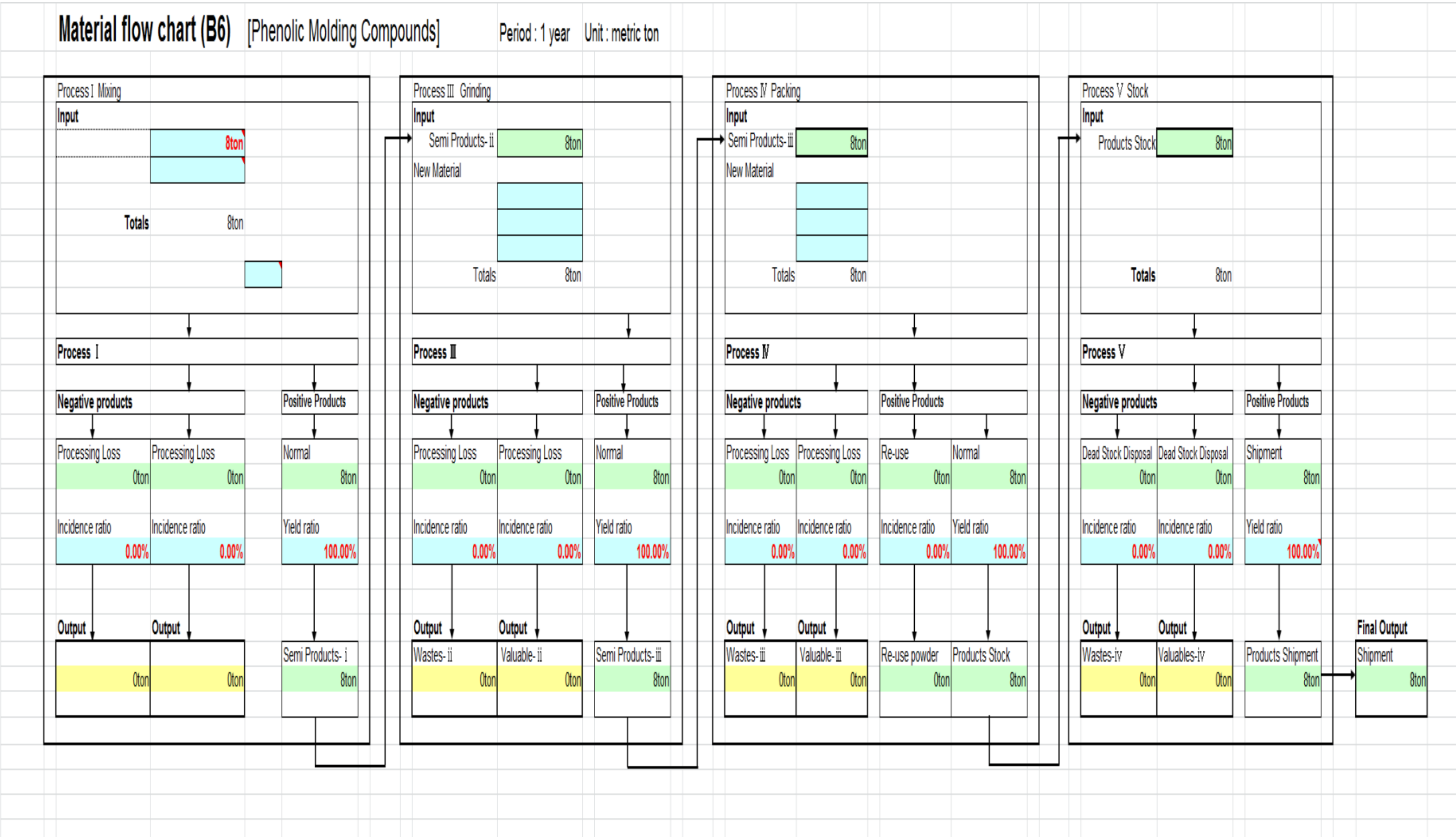


Formaldehyde Process Mass Balance (Building #4, Piston Manufacturing) (Uses 2011 Data)

Formaldehyde Process Mass Balance (Building #5, Glass Filled and General Purpose Manufacturing) (Uses 2011 Data)



Formaldehyde Process Mass Balance (Building #6, Powder Resin Manufacturing) (Uses 2011 Data)

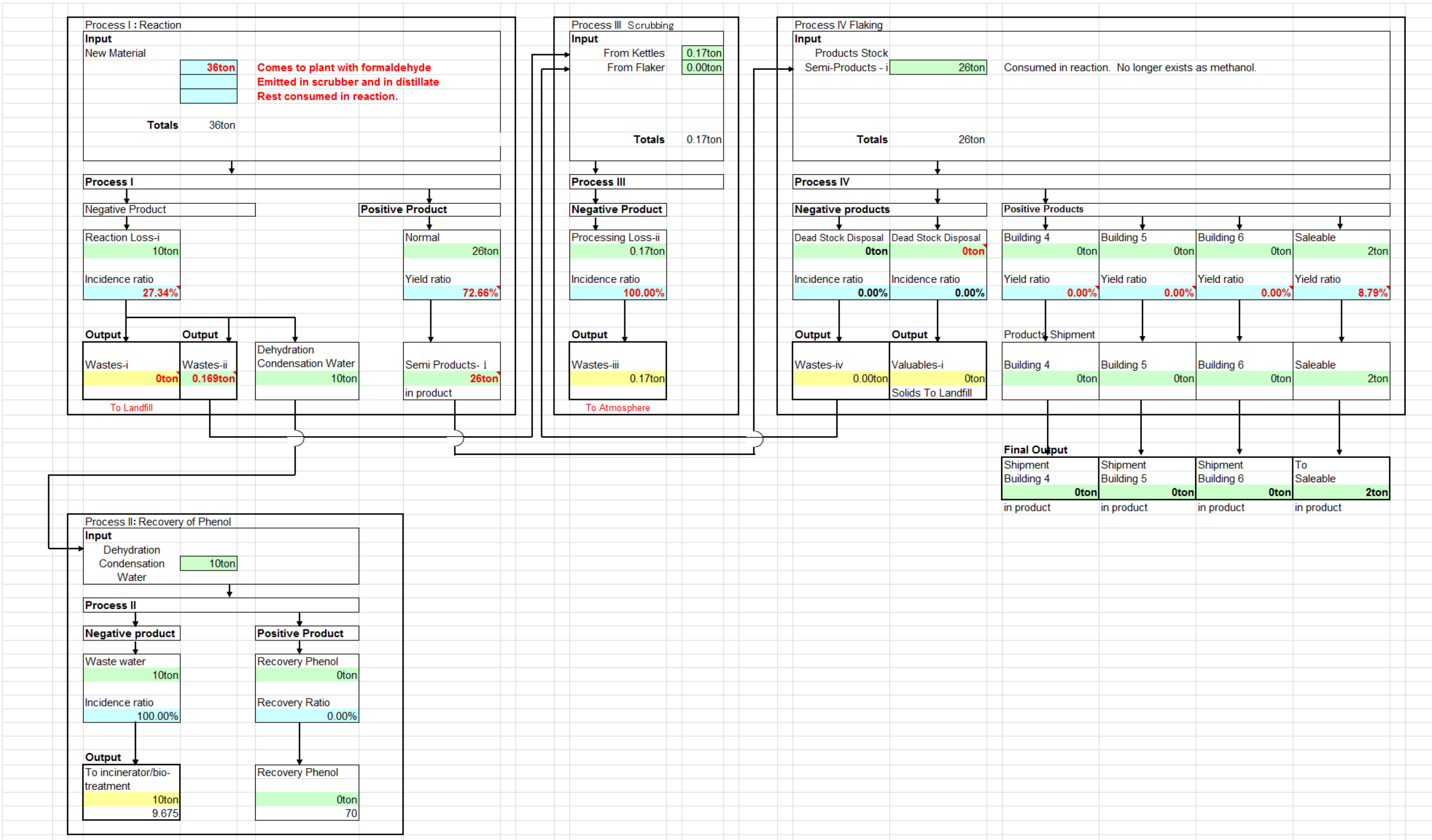


Methanol NPRI Calculations (Uses 2011 Data)

Methanol	CAS: 67-56-1				
Amount MPO:					
Building 3	Pounds Used (lbs)	Total Into Plant			
Formaldehyde 52% - 10928	3969181	36009.807	kg	36.010	tonnes
Use 2.0% in formalin (Based on historic data)	**Total MPO**	**36009.807**	**kg**	**36.010**	**tonnes**
Air Emissions:	Rate from CofA (g/s)	Total Emissions			
Building 3	0.008	168.912	kg	0.169	tonnes
From diesel engine:		0.000	kg	0.000	tonnes
From natural gas combustion:		0.000	kg	0.000	tonnes
From propane heaters:		0.000	kg	0.000	tonnes
	Total Air Emissions:	**168.912**	**kg**	**0.169**	**tonnes**
Other Releases:					
Distillate (0.5% Methanol by test)	Destination	Total Distillate		**Methanol Emitted**	
Recycle	Tembec	0.00	kg	0.000	tonnes
Bio	Lanxess	650,000.00	kg	3.250	tonnes
Incinerator	Clean Harbours	145,000.00	kg	0.725	tonnes
	Niagara Falls	1,140,000.00	kg	5.700	tonnes
	Total	**1,935,000.00**	**kg**	9.675	**tonnes**

Methanol Process Mass Balance (Building #3, Resin Manufacturing) (Uses 2011 Data)

The mass balances shown in all the mass balance figures for methanol are approximately equal.

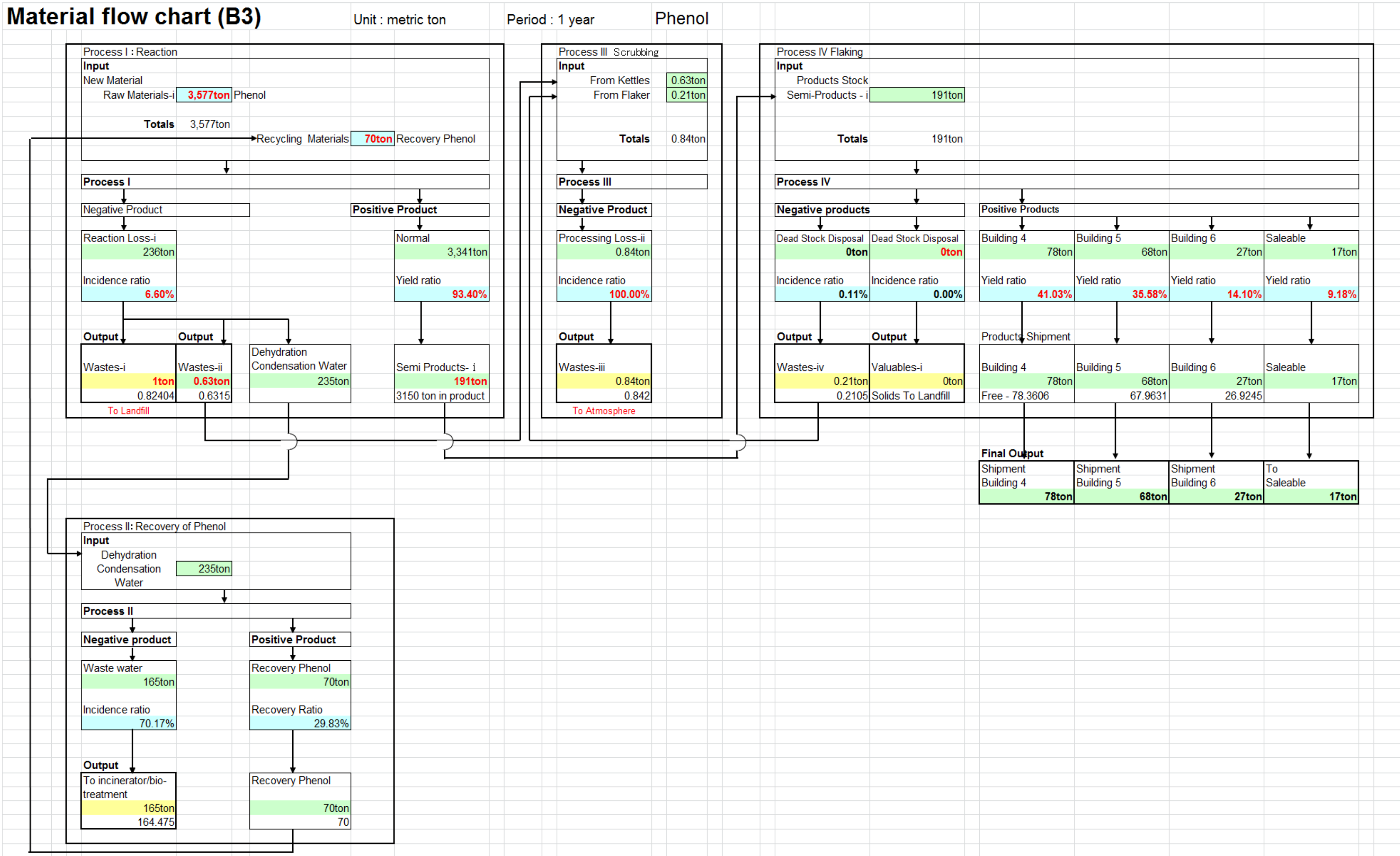


Phenol NPRI Calculations (Uses 2011 Data)

Phenol (and its salts)	CAS: 108-95-2				
Amount MPO:		Total Phenolic Resin Produced: 3812 tonnes			
Building 3	Pounds Used (lbs)				
Phenol - 10783 (99.8-100%)	7886335	3577380.358	kg	3577.380	tonnes
	Total MPO	**3577380.358**	**kg**	**3577.380**	**tonnes**
Air Emissions:	Rate from CofA (g/s)	Emissions			
Building 3	0.2005	841.611	kg	0.842	tonnes
Building 4	0.13701	2133.246	kg	2.133	tonnes
Building 5	0.0066	109.961	kg	0.110	tonnes
From diesel engine:		0.000	kg	0.000	tonnes
From natural gas combustion:		0.000	kg	0.000	tonnes
From propane heaters:		0.000	kg	0.000	tonnes
	Total Air Emissions:	**3084.818**	**kg**	**3.085**	**tonnes**
Other Releases:					
Distillate (8.50% Phenol) average tested	Destination	Total Distillate		**Total Phenol**	
Recycle	Tembec	0.00	kg	0.000	tonnes
Bio	Lanxess	650,000.00	kg	55.250	tonnes
Incinerator	Clean Harbours	145,000.00	kg	12.325	tonnes
	Niagara Falls	1,140,000.00	kg	96.900	tonnes
	Total	**1,935,000.00**	**kg**	**164.475**	**tonnes**
Landfill (By formulation mass balance)	Destination	Total Landfill Volume		Total Phenol	
5.40% is Phenol	Secure	15,260.00	kg	0.82404	tonnes
1.05% is Phenol	Non-Secure B4	147,066.00	kg	1.544193	tonnes
2.00% is Phenol	Non-Secure B5	132,882.00	kg	2.65764	tonnes
	Total	**295,208.00**	**kg**	**5.025873**	**tonnes**
Note not all of B4 and B5 landfill was from housekeeping. Total contribution from housekeeping was 47 MT in B4 (rest was contaminated product)					
Total for B5 was 77 MT. There was a total of 6 MT identified as good material. The rest was due to obsolete product.					

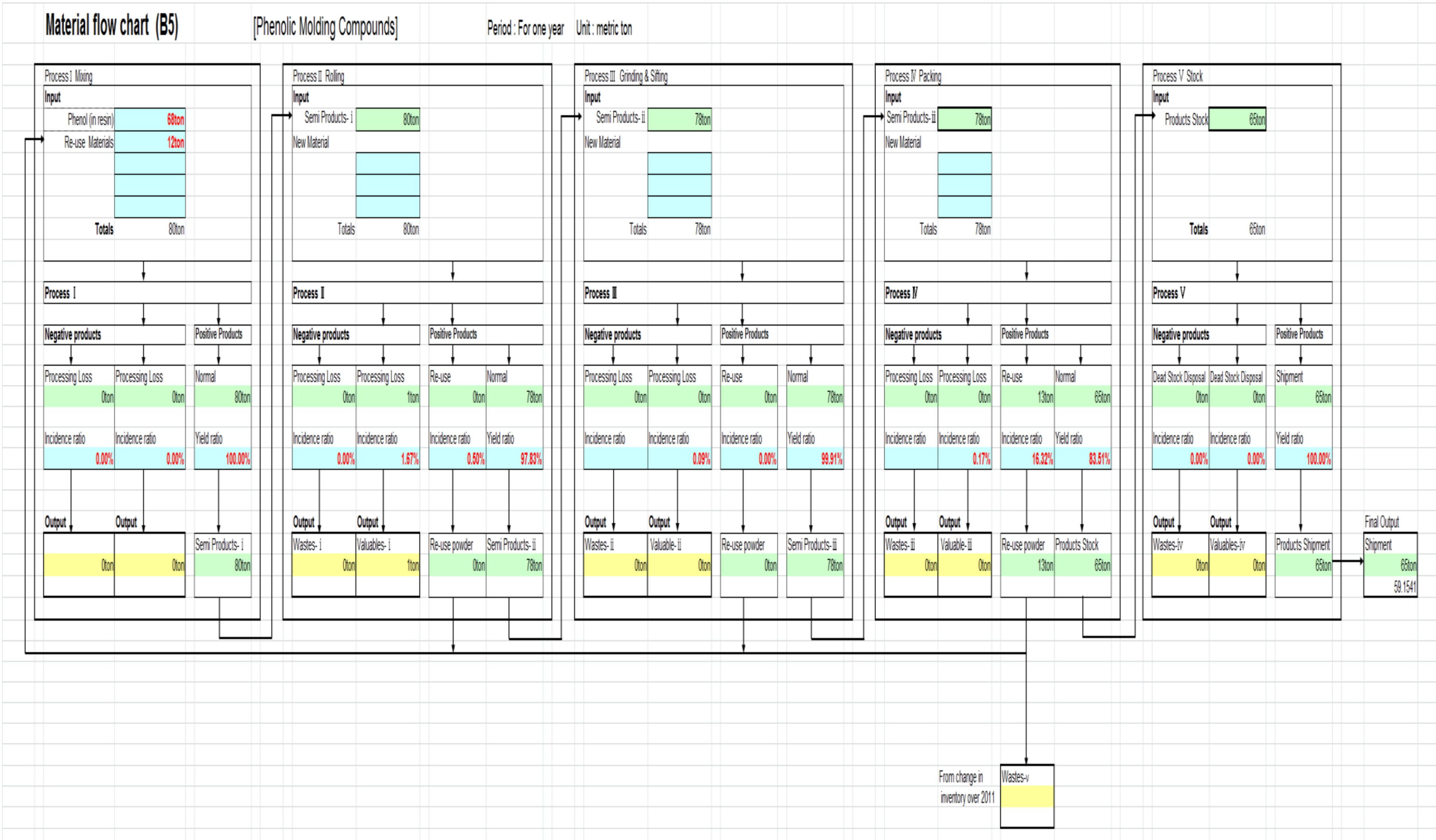
Phenol Process Mass Balance (Building #3, Resin Manufacturing) (Uses 2011 Data)

The mass balances shown in all the mass balance figures for phenol are approximately equal.

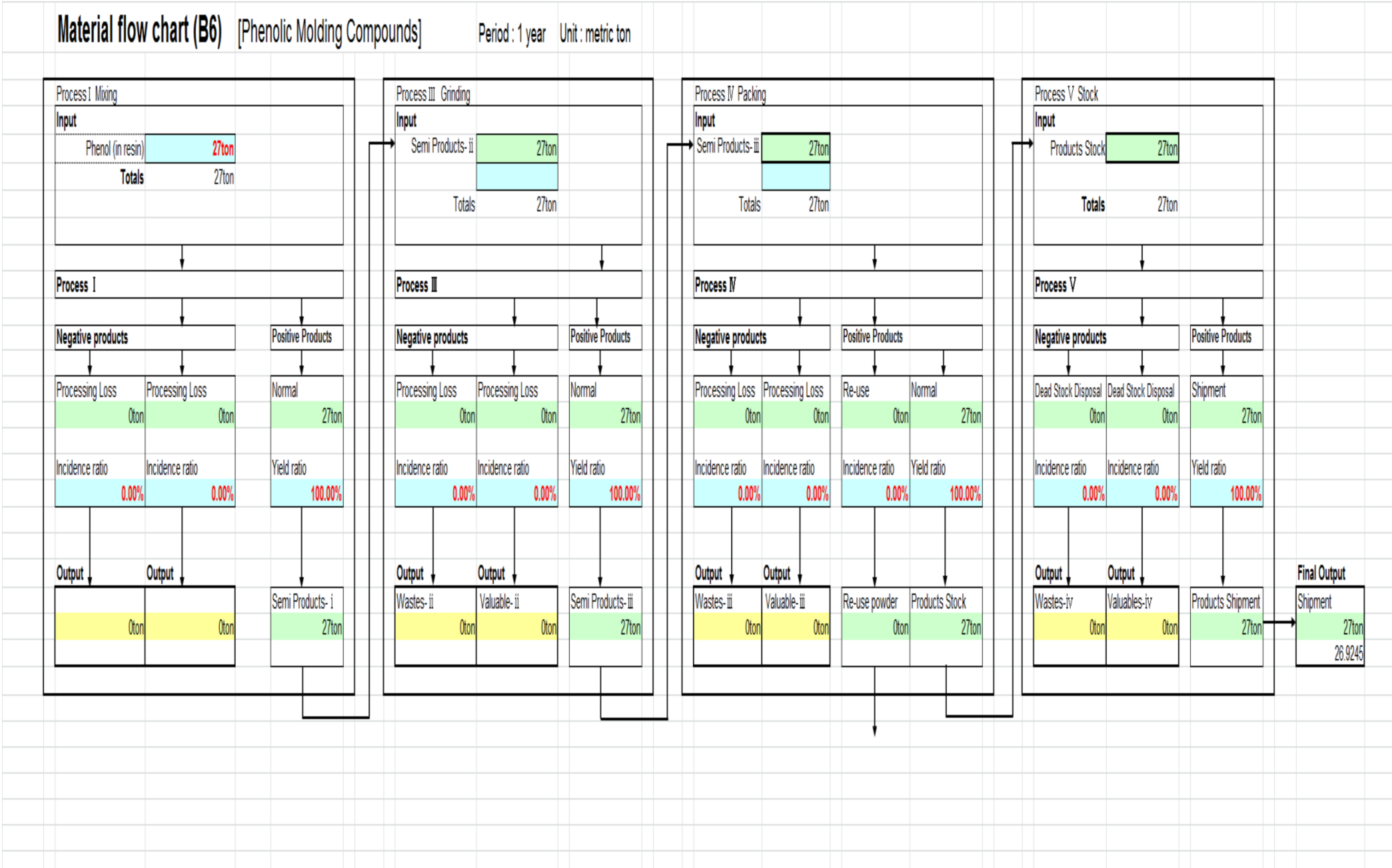


Phenol Process Mass Balance (Building #4, Piston Moulding Compound Manufacturing) (Uses 2011 Data)

Phenol Process Mass Balance (Building #5, Glass Filled and General Purpose Molding Compound Manufacturing) (Uses 2011 Data)



Phenol Process Mass Balance (Building #6, Powder Resin Manufacturing) (Uses 2011 Data)

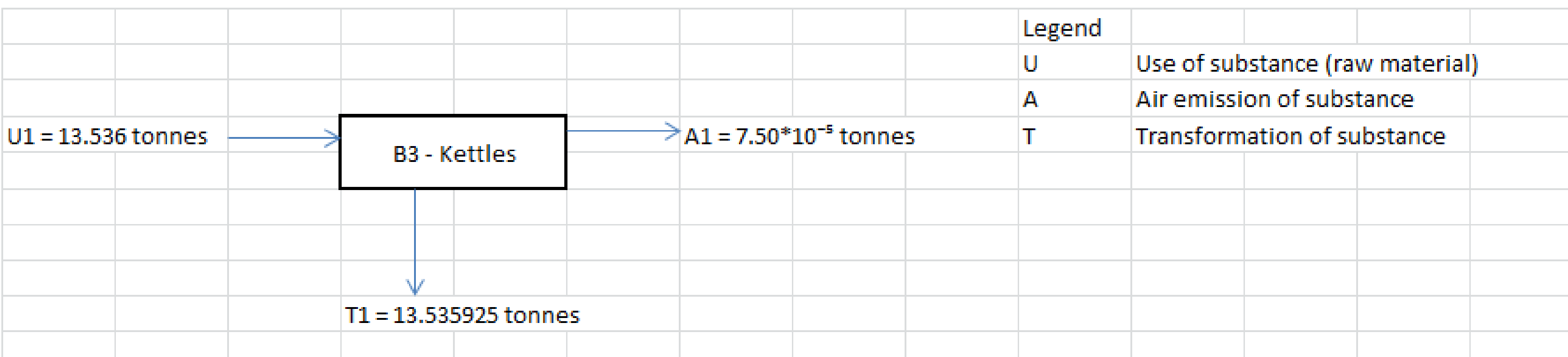


Sulphuric Acid NPRI Calculations (Uses 2011 Data)

Sulphuric Acid	CAS: 7664-93-9					
Amount MPO:						
Building 3	Pounds Used (lbs)					
Sulphuric Acid 66B - 10799 (10-100%)	29841	13536.403	kg	13.536	tonnes	
	Total MPO	13536.403	kg	13.536	tonnes	
Air Emissions:	Assume sulphuric is mass percentage of formaldehyde based on total sulfuric for pounds produced					
Building 3	% of Sulphuric Acid in total produced		Total Formaldehyde Emissions from B3		Sulphuric Emitted	
	0.003550809		0.021		0.000075	tonnes
From diesel engine:		0.000	kg		0.000	tonnes
From natural gas combustion:		0.000	kg		0.000	tonnes
From propane heaters:		0.000	kg		0.000	tonnes
			Total		**0.000**	**tonnes**

Sulphuric Acid Process Mass Balance (Building #3, Resin Manufacturing)

The mass balances shown in all the mass balance figures for phenol are approximately equal.

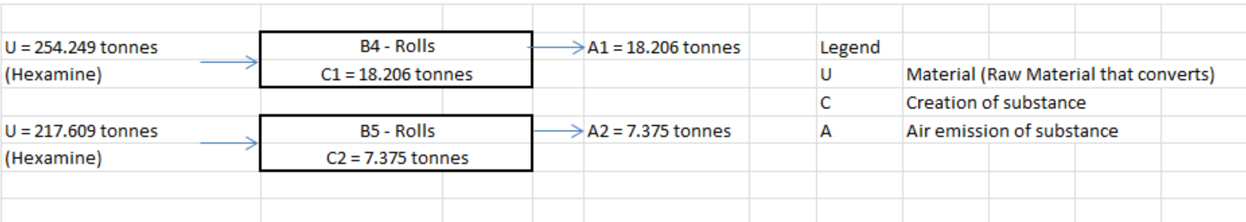


Ammonia NPRI Calculations (Uses 2012 Data)

Ammonia	CAS: 107-02-8				
Amount MPO:					
Building 4	Rate from CofA (g/s)				
DC-402	0.413	7066.760	kg	7.067	tonnes
DC-403	0.413	7066.760	kg	7.067	tonnes
DC-404	0.238	4072.370	kg	4.072	tonnes
Total B4				18.206	tonnes
Building 5					
DC-520	0.0008	14.121	kg	0.014	tonnes
DC-524	0.413	7360.383	kg	7.360	tonnes
Total B5				7.375	tonnes
	Total MPO	**25580.395**	**kg**	**25.580**	**tonnes**
From diesel engine:		0.000	kg	0.000	tonnes
From natural gas combustion:		65.603	kg	0.066	tonnes
From propane heaters:		0.000	kg	0.000	tonnes
			Total	**25.646**	**tonnes**
Report?	YES				

Ammonia Process Mass Balance (Building #4 and Building #5)

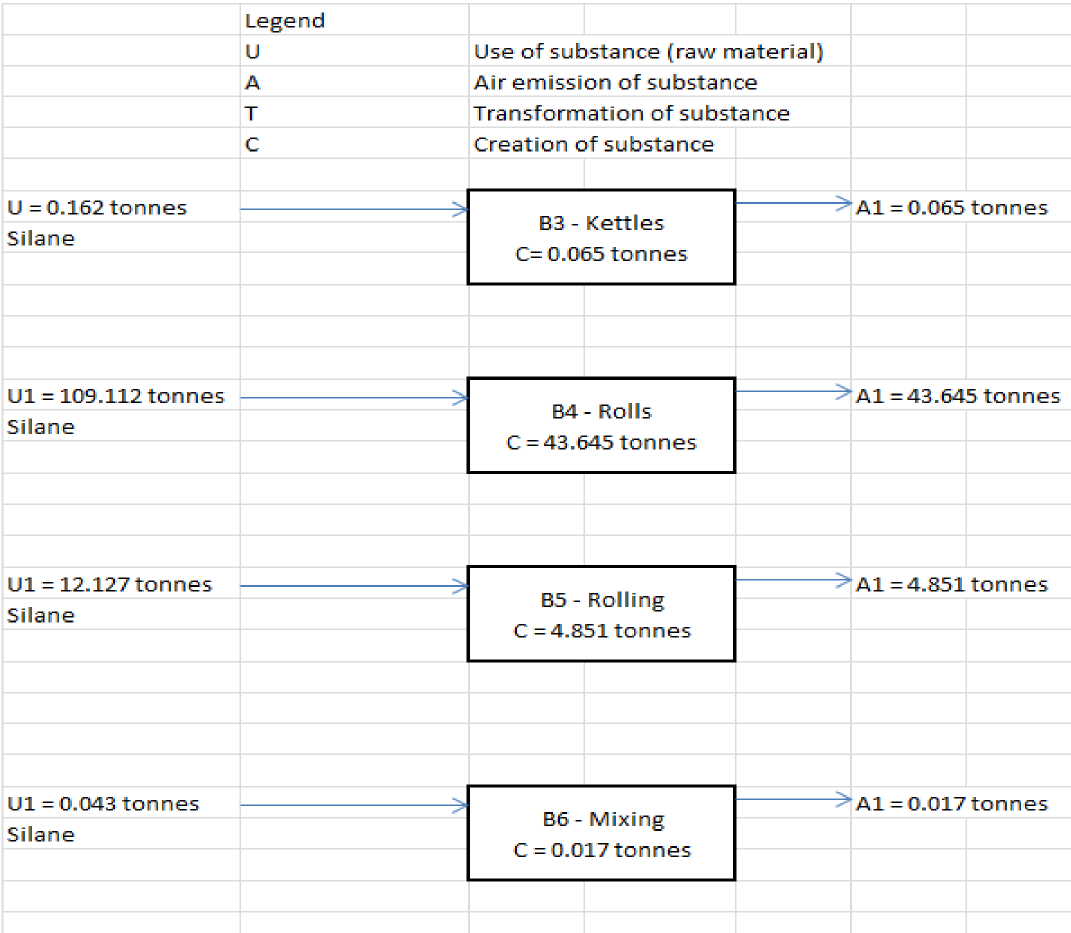
The mass balances shown are approximately equal. For ammonia the NPRI calculation gives the total from each dust collector source associated with the particular process building.



Ethyl Alcohol NPRI Calculations (Uses 2012 Data)

Ethyl Alcohol	CAS: 64-17-5								
Building 3	Pounds Used (lbs)						Ethyl Alcohol Emitted		
KBE-903 Silane - 10792 (100% silane)	357	161.934	kg	0.162	tonnes		0.064777	tonnes	
Building 4									
Premix - 32874 (16.70% silane)	1440341	109106.843	kg	109.112	tonnes		43.64472	tonnes	
Building 5									
Premix - 32874 (16.70% silane)	111675	8459.460	kg	8.460	tonnes		3.383937	tonnes	
KBE-903 Silane - 10792 (100% silane)	8085	3667.332	kg	3.667	tonnes		1.466999	tonnes	
Building 6									
Aerosil R972 - Z70018 (100% silane)	94	42.638	kg	0.043	tonnes		0.017056	tonnes	
			Total	**121.444**	**tonnes**				
Air Emissions:									
40% of Silane converts to Ethanol:				48.57748641	tonnes		48.57749	tonnes	
			Total	**48.57748641**	**tonnes**				
Report?	YES								

Ethyl Alcohol Process Mass Balance (Showing Each Building)
The mass balances shown are approximately equal.

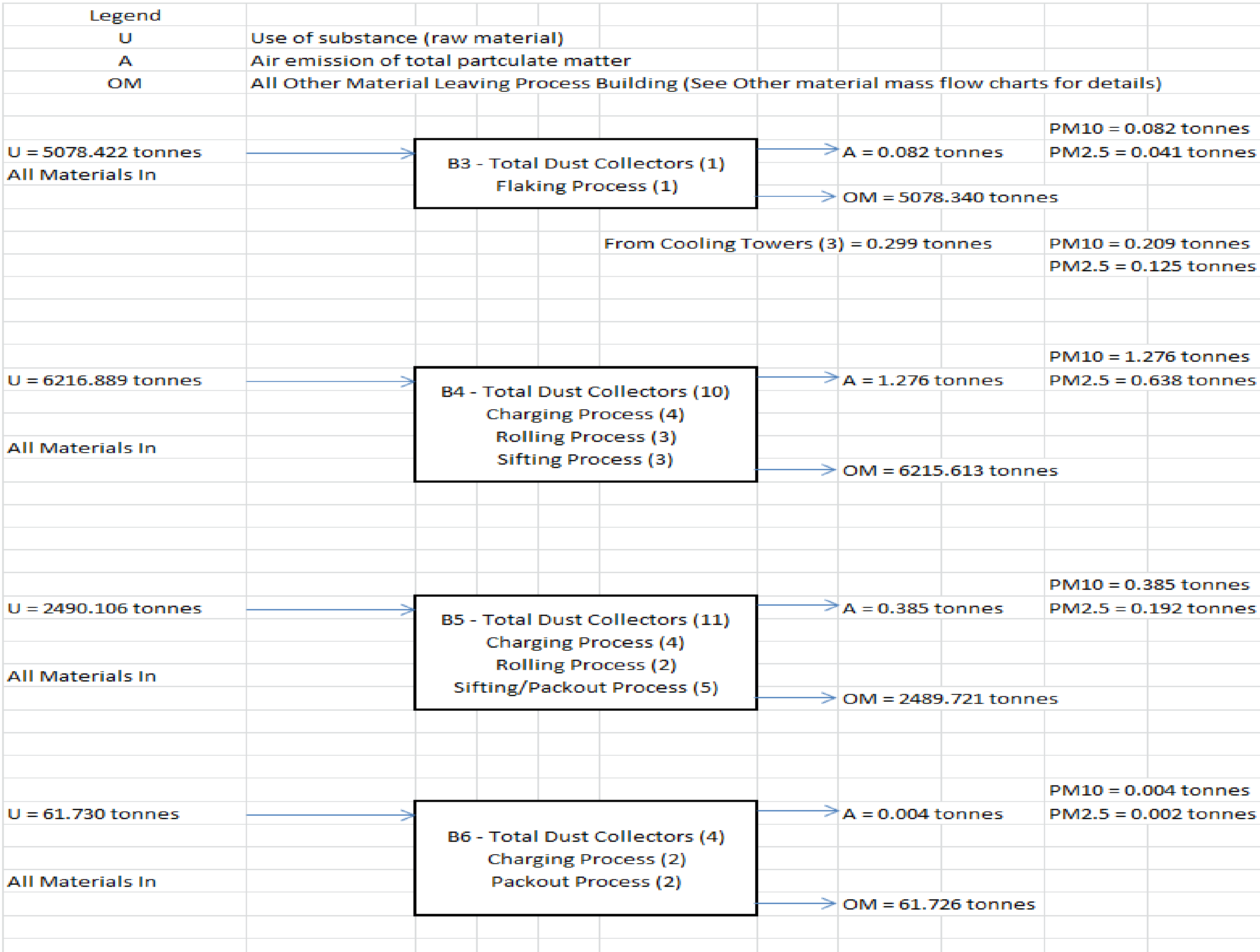


PM10 and PM2.5, Particulate Matter NPRI Calculations (Uses 2012 Data)

TPM	CAS: *								
Air Emissions:									
	PM Emission Rate (g/s)	TPM Emitted						PM10	PM2.5
Building 3:	0.0063	81.832	kg		0.082	tonnes		0.082	0.041
Building 4:	0.0746	1276.466	kg		1.276	tonnes		1.276	0.638
Building 5:	0.0218	384.787	kg		0.385	tonnes		0.385	0.192
Building 6:	0.00106	3.618	kg		0.004	tonnes		0.004	0.002
Cooling Towers:	0.023	298.751	kg		0.299	tonnes		0.209	0.125
From diesel engine:		2.780	kg		0.003	tonnes			
From natural gas combustion:		38.952	kg		0.039	tonnes			
From propane heaters:		0.513	kg		0.001	tonnes			
			Total		**2.088**	**tonnes**			
Report?	NO								
PM10	CAS: *								
Air Emissions:									
	TPM Emitted (tonnes)	% PM10 in TPM			PM10 Emitted				
Buildings Total	1.747	100.000			1.747				
Cooling Towers	0.299	70.000			0.209				
From diesel engine:	0.003	100.000			0.003	tonnes			
From natural gas combustion:	0.039	100.000			0.039	tonnes			
From propane heaters:	0.001	100.000			0.001	tonnes			
			Total		**1.998**	**tonnes**			
Report?	YES								
PM2.5	CAS: *								
Air Emissions:									
	TPM Emitted (tonnes)	% PM2.5 in TPM		PM2.5 Emitted					
Buildings Total	1.747	50.000		0.873	tonnes				
Cooling Towers	0.299	42.000		0.125	tonnes				
From diesel engine:	0.003	100.000		0.003	tonnes				
From natural gas combustion:	0.039	100.000		0.039	tonnes				
From propane heaters:	0.001	100.000		0.001	tonnes				
			Total	**1.041**	**tonnes**				
Report?	YES								

Particulate Matter Process Mass Balance (All Buildings)

The mass balances shown are approximately equal. A breakdown of collectors in each process stage is given.



Planner Recommendations & Rationale

Planner: Connie Lum, TRSP#0089

Substances: Ammonia, Ethyl alcohol, Particulate Matter 2.5, Particulate Matter 10

Areas of Recommendation	Planner Recommendation	Rationale for Recommendation
Expertise relied on in preparing the plan	n/a	- no recommendations since Durez technical expertise prepared the plans
Identification and description of stages and processes including the description of how, when, where, and why a substance is used and/or created	n/a	n/a
Process flow diagrams	- Breakdown the sources of particulate matter, ammonia, and ethyl alcohol for each building. (i.e. Bulding 6: Receiving > Charging > Pulverizing > Blending > Packing/Shipping.)	- this helps to show the flow of substance and see where substance is used the most. - breakdown can identify where the highest potential for reduction is. - identifies the link between each process.
Data and methods used in toxic substance accounting	n/a	n/a
Analysis of input/output balances	n/a	n/a
Direct and indirect costs associated with the prescribed toxic substance	- break down the total costs to identify all relevant costs. (i.e. maintenance of equipment associated with substance, labour costs of operating process associated with substance, disposal costs of substance, filters, etc)	- helps to identify hidden costs which can significantly impact/improve the economic feasibility analysis, and ultimately the business case.
Options identified in the plan	n/a	- no recommendations since no options were identified for implementation for Phase II substances.
Reduction estimates prepared for each identified reduction option	n/a	- no recommendations since no options were identified for implementation for Phase II substances.
Technical and economic feasibility analyses	n/a	- no recommendations since no options were identified for implementation for Phase II substances.
Additional technically and economically feasible reduction options that were not included in the plan which might result in equal or greater reductions	For Reduction Category 7, consider option to regularly train staff with best practices and/or adding standard operating procedures for housekeeping; or storing and handling materials containing toxic substances.	- this is a simple technically and economically feasible reduction option that was not identified.
Implementation steps and timelines and whether they are likely to be achieved	n/a	- no recommendations since no options were identified for implementation for Phase II substances.