September 8, 2017

Dear [Redacted: S. 40(1)]

Re: Your request for access to information under Part II of the Access to Information and Protection of Privacy Act, 2015 [Our File #: MAE/66/2017]

On August 22, 2017, the Department of Municipal Affairs and Environment received your request for access to the following records/information:

"Any Procedures (operating and safety) related to the operation of the Sulphur Prilling Plant in Come By Chance, NL. Operated under Newsun Enterprises Inc."

I am pleased to inform you that a decision has been made by the Deputy Minister for Department of Municipal Affairs and Environment to provide access to some of the requested information.

However, some of the information contained within the records has been refused in accordance with the following exceptions to disclosure, as specified in the Access to Information and Protection of Privacy Act, 2015 (the Act):

"40. (1): The head of a public body shall refuse to disclose personal information to an applicant where the disclosure would be an unreasonable invasion of a third party's personal privacy."

As required by 8(2) of the Act, we have severed information that is unable to be disclosed and have provided you with as much information as possible. In accordance with your request for a copy of the records, the appropriate copies have been enclosed.

The Access to Information and Protection of Privacy Act requires us to provide an advisory response within 10 days of receiving the request. As this request has been completed prior to day 10, this letter also serves as our Advisory Response.
Please be advised that you may appeal this decision and ask the Information and Privacy Commissioner to review the decision to provide partial access to the requested information, as set out in section 42 of the Act (a copy of this section of the Act has been enclosed for your reference). A request to the Commissioner must be made in writing within 15 business days of the date of this letter or within a longer period that may be allowed by the Commissioner. Your appeal should identify your concerns with the request and why you are submitting the appeal.

The appeal may be addressed to the Information and Privacy Commissioner as follows:
Office of the Information and Privacy Commissioner
2 Canada Drive
P. O. Box 13004, Stn. A
St. John's, NL A1B 3V8
Telephone: (709) 729-6309
Toll-Free: 1-877-729-6309
Facsimile: (709) 729-6500

You may also appeal directly to the Supreme Court Trial Division within 15 business days after you receive the decision of the public body, pursuant to section 52 of the Act (a copy of this section of the Act has been enclosed for your reference).

Please be advised that responsive records will be published following a 72 hour period after the response is sent electronically to you or five business days in the case where records are mailed to you. It is the goal to have the responsive records posted to the Completed Access to Information Requests website within one business day following the applicable period of time. Please note that requests for personal information will not be posted online.

If you have any further questions, please feel free to contact me by telephone at 709-729-7183 or by e-mail at lisas@gov.nl.ca.

Sincerely,

Lisa Sullivan
IM/ATIPP Analyst
Access or correction complaint

42. (1) A person who makes a request under this Act for access to a record or for correction of personal information may file a complaint with the commissioner respecting a decision, act or failure to act of the head of the public body that relates to the request.

(2) A complaint under subsection (1) shall be filed in writing not later than 15 business days

(a) after the applicant is notified of the decision of the head of the public body, or the date of the act or failure to act; or

(b) after the date the head of the public body is considered to have refused the request under subsection 16(2).

(3) A third party informed under section 19 of a decision of the head of a public body to grant access to a record or part of a record in response to a request may file a complaint with the commissioner respecting that decision.

(4) A complaint under subsection (3) shall be filed in writing not later than 15 business days after the third party is informed of the decision of the head of the public body.

(5) The commissioner may allow a longer time period for the filing of a complaint under this section.

(6) A person or third party who has appealed directly to the Trial Division under subsection 52(1) or 53(1) shall not file a complaint with the commissioner.

(7) The commissioner shall refuse to investigate a complaint where an appeal has been commenced in the Trial Division.

(8) A complaint shall not be filed under this section with respect to

(a) a request that is disregarded under section 21;

(b) a decision respecting an extension of time under section 23;

(c) a variation of a procedure under section 24; or

(d) an estimate of costs or a decision not to waive a cost under section 26.

(9) The commissioner shall provide a copy of the complaint to the head of the public body concerned.
Direct appeal to Trial Division by an applicant

52. (1) Where an applicant has made a request to a public body for access to a record or correction of personal information and has not filed a complaint with the commissioner under section 42, the applicant may appeal the decision, act or failure to act of the head of the public body that relates to the request directly to the Trial Division.

(2) An appeal shall be commenced under subsection (1) not later than 15 business days

(a) after the applicant is notified of the decision of the head of the public body, or the date of the act or failure to act; or

(b) after the date the head of the public body is considered to have refused the request under subsection 16(2).

(3) Where an applicant has filed a complaint with the commissioner under section 42 and the commissioner has refused to investigate the complaint, the applicant may commence an appeal in the Trial Division of the decision, act or failure to act of the head of the public body that relates to the request for access to a record or for correction of personal information.

(4) An appeal shall be commenced under subsection (3) not later than 15 business days after the applicant is notified of the commissioner's refusal under subsection 45(2).
Potential copyright material

If you wish to obtain a copy please contact the ATIPP Office at (709) 729-7072 or atippoffice@gov.nl.ca.
October 27, 1997

Minister of the Environment
P.O. Box 4750
St. John's, Newfoundland
A1C 5T7

Attention: Director of Environmental Assessment

Dear Sir:

Please find enclosed a registration pursuant to section 6 of the Environmental Assessment Act. If you require additional information please contact the undersigned at (709) 739-4036.

One set of full size drawings accompany the registration to be kept with the original filing. Other agencies can review these, as required, for their assessment.

Thank you for your attention in this matter.

Yours truly,

Monty Dyke
Registration Form  
Pursuant to Section 6 of  
The Environmental Assessment Act

Name of Undertaking: Sulfur Prilling Plant, Come by Chance

PROPOENENT:

1. NewSul Limited  
c/o Ocean Management & Trading Co. Ltd.

2. 179 Water Street  
St. John’s, Nfld.  
P.O. Box 23058  
Churchill Square Post Office  
St. John’s, Nfld.  
A1B 4J9

3. Bruce Dyke  
President  
Bus: (709) 739-4036

4. Monty Dyke  
Manager  
Bus: (709) 739-4036

THE UNDERTAKING:

1. Nature of the Undertaking  
A sulfur prilling plant and associated materials handling equipment is proposed for the reforming of molten sulfur into small pellets or prill for safe and efficient transportation to the marketplace.

2. Purpose/Rationale/Need for the Undertaking  
Safe and efficient transportation of solid sulfur requires it to be formed into small, uniform pellets or prill to prevent dusting, fire and explosion during handling and shipping. The Wet Prilling process proposed is a purely physical process wherein molten sulfur is reformed into small pellets or prill.
The proposed plant will also remelt the existing inventory of solid sulfur stored on block, in concert with the molten sulfur, for processing into prill.

The combined reformed product will be loaded into bulk cargo vessels for transport to export markets.

DESCRIPTION OF THE UNDERTAKING:

1. Geographical Location
   The proposed plant will be located on North Atlantic Refining Limited (NARL) property in Come by Chance adjacent to the existing sulfur storage pad. See attachments.

2. Physical Features
   See attachments.

3. Construction Period
   The construction period would be approximately three (3) to four (4) months (weather permitting), with the first activity beginning within 30 days of the company receiving commitment from the Atlantic Canada Opportunities Agency, Department of Development and Rural Renewal and Business Development Bank.

   The first stage of construction would be the building foundation including the underground sulfur storage tank. We would hope to commence this activity before the winter frost sets in.

   The second stage of construction would be the erection for the building and installation of processing equipment.

   The final stage would be the installation of a conveyor system to move the product to temporary storage and from there to bulk cargo vessels.

4. The Operation
   The operation is broken down into five (5) basic steps:
   • breakup of block sulfur and transfer to storage tank.
   • storage/remelting
   • prilling
   • dewatering
   • storage and load out

   Block Break Up and Transfer
   The solid block will be mechanically broken up by a rubber tired, front end loader for feeding into the sulfur storage tank containing molten sulfur. A small crusher feeding the storage tank may be required to produce a uniform size for melting efficiencies.
Storage/Remelting
Molten sulfur along with an approximate equal part of solid sulfur will be held in the underground storage tank for processing. A twelve (12) hour residence time (overnight) will be sufficient to remelt the solid sulfur. Mixing and circulation within the tank is achieved by an impeller to assist in remelting and to ensure uniform heat distribution. Temperatures are maintained by a closed circuit heater exchange coils recirculating a heat transfer medium (Therminol) through a fuel fired boiler system.

Prilling
Molten sulfur is pumped from the storage tank through one of two sulfur pumps (primary and backup) through heat traced (jacketed) lines. The molten sulfur floods the prill head and exits through a series of holes in its base. The molten sulfur streams into a circulating water bath where, through the action of gravity and surface tension, it forms into discrete particles or prill and is transformed from a liquid to a solid state.

Dewatering
The prill slurry flows by gravity to a series of sieves and dewatering screens to separate the prill from process water. Process water is circulated to the hot well tank, cooling tower and cold well tank before reuse in the prilling tank. Fines (less that 1%) are removed and combined with the prill product which exits via conveyor to storage.

Storage and Load Out
Prill product exits the plant via conveyor to a radial stacker which will deposit the product onto a cleared portion of the existing storage pad or onto a temporary storage pad. Residual surface moisture and drain water will be reused as make up water in the prill process.

When ready for shipping, the prill product will be loaded into a hopper, feeding the load out conveyor system. The load out conveyor will move the product from the storage area directly to waiting bulk cargo vessels at the existing tug berth.

5. Occupations
Plant operations will require two (2) skilled operators, materials handling will require heavy equipment operators and laborers.

6. Project Related Documentation
• description of process of similar plant - prepared by proponent.
• description of plant/process equipment - prepared by proponent.
• plant and equipment layout drawings - prepared by proponent.
APPROVAL OF THE UNDERTAKING:

The establishment of this complex is subject to an agreement between the proponent and North Atlantic Refining Limited and participation of financing agencies including the Atlantic Canada Opportunities Agency, Department of Development and Rural Renewal, Business Development Bank and charter banks. In addition, as a corporation manufacturing and exporting from Newfoundland requires the standard jurisdictional permits and licenses.

SCHEDULE:

The approval for the undertaking is requested as soon as possible as the construction schedule would be greatly affected by a late approval and subsequent weather conditions.

FUNDING:

Funding has been requested from:

Atlantic Canada Opportunities Agency  Att: Mr. Adrian McCarthy
Dept. of Development & Rural Renewal  Att: Mr. Bern Madden
Business Development Bank  Att: Ms. Marina Lomand
Royal Bank of Canada  Att: Ms. Danielle Harris
WATER INTAKE/DISCHARGE SITES:

The information provided indicates the initial need for working water of 28,000 liters (7500 USG). Make up water due mainly to evaporative losses would be approximately 750 liters (200 US gallons) per hour operating time.

The source for fresh water will be met by North Atlantic Refinery Limited through it's existing supply. Drain water from the prill storage pile will also be reclaimed for make up of process water.

ROAD & MARINE ACCESS:

The plant will be located within 100 ft. of the roadway.

The prill storage area will be approximately 500 ft. from the point of loading. The existing shoreline property is owned by NARL who will grant right of way for loading equipment and facilities.

POTENTIAL RESOURCE CONFLICTS:

The levels of waste, emissions, by product or discharge generated by the plant have been detailed in the registration documents. These levels are controlled and minimized by the technology available from the process equipment supplier’s. As a result, there will be little or no resource conflict resulting from these operations.

PERMITS & APPROVALS:

The following Acts will be adhered to with contacts to be established with the respective departments when necessary:

- Occupational Health & Safety Act
- Employment & Labor Relations
- Boilers, Pressure Vessels & Compressed Gas
- Employment & Labor Relations
- Compressed Gas Act
- Employment & Labor Relations
- Electrical Regulations
- Employment & Labor Relations
- Industrial/Processing Approvals
- Environment & Lands
- Development Permit
- Municipal & Provincial Affairs
- Municipal Building Permits
- Municipal Council
- Review & Approval
- Fisheries & Oceans
- Review & Approval
- Federal Environment

In addition, Canadian Coast Guard has been contacted regarding the site/access for review/approval of loading operations.
1.0 INTRODUCTION

The following is intended to give the reader an overview of the environmental concerns associated with the proposed Sulfur Prilling Plant Facility at Come by Chance. It is our understanding that the proposed site has no specific environmental problems other than those addressed directly to North Atlantic Refining Limited (NARL) in relation to their existing operations.

We further emphasize that the proposed project is put forth, with the complete knowledge and cooperation of NARL, to provide a facility which will allow for the eventual disposition of their accumulated inventory of stored sulfur, as well as produced sulfur on a continuous basis.

The environmental concerns with building and operating the plant premise fall into the following categories:
- environmental assessment
- air emissions
- water effluent

2.0 ENVIRONMENTAL ASSESSMENT

The requirements for an environmental assessment are discussed in The Environmental Assessment Act and the Environmental Assessment Regulations, 1984. The Act requires that “every proponent, shall, before proceeding with the final design of the undertaking, notify the Minister in writing, on a prescribed form, concerning the undertaking.” The Minister examines the information provided to determine if an environmental impact statement (EIS) is required, may be required or is not required. If an EIS may be required, more information is submitted to the Minister in an environmental review report. Based on this report, the Minister decides if an EIS is, or is not required. If in EIS is required, the proponent prepares the draft terms of reference for the purposes of an environmental assessment. This draft contains information on the process, effects on the environment, alternative methods, control measures, etc. Once the terms of reference are agreed upon, the proponent begins the environmental assessment which includes public meetings, and submits the environmental impact statement to the Minister by a mutually agreed upon deadline.

Nearly pure elemental sulfur is presently recovered by NARL, and stored on block as part of their ongoing emission abatement program. Future initiatives planned by NARL will result in increased sulfur recovered as further reductions in emission targets are met. In order to complete the process, a safe, efficient and environmentally sensitive means of sulfur disposal is required to meet these long term goals and to remove the existing inventory.

The proposed plant and facilities provide the mechanism to reform produced sulfur through a purely physical transformation process (i.e., partitioning a liquid stream into droplets with water cooling), thereby, producing a product of fairly uniform size for safe and efficient handling with added mechanical strength characteristics to prevent further abrasion and dusting problems.
Moreover, the product then conforms more closely to the customer’s requirements thus permitting the eventual sale and disposal of what is currently a waste by product with little, if any, intrinsic value.

This specific registration is thus a “part of the solution” to a larger issue which has been under close scrutiny by regulatory bodies for some time. We therefore, see that it may fall under an existing ongoing environmental assessment and should fall into the category of “is not required.”

3.0 AIR EMISSIONS

Air emissions are regulated by the Air Pollution Control Regulations, 1981. These regulations give standards for emitted contaminants at the point of impingement.

The facilities’ air emissions will be from the sulfur storage tank and prilling tower and consists of minute amounts of hydrogen sulfide (H2S - rotten egg smell) associated with the sulfur. If required, these emissions can be processed through a scrubber.

Some “dusting” is likely to occur under certain weather conditions (dry, windy) during removal of the block sulfur. Mitigating measures include the use of water misting during extreme weather conditions, full or partial enclosure of the hopper-crusher feed to the molten storage tank and/or ceasing these operations during extreme conditions. This activity (block removal) is scheduled to be complete within 18 months, or so, from startup, and is seen as a temporary situation. Minimal dusting problems are anticipated during vessel loading operations as all conveyors will be covered and/or enclosed.

The boiler used for recirculating the heat transfer medium to the sulfur storage tank and heat traced process lines will be oil fired with No. 2 diesel oil. Any exhaust/air emissions should fall within accepted standards for the type of boiler and fuel used.

4.0 WATER EFFLUENT

Wastewater discharges are controlled by the Environmental Control (Water & Sewage) Regulations, 1980. This regulation includes standards for discharge to bodies of water as well as sewer systems.

Process water is used in the prilling tank to absorb the heat of fusion released in converting the sulfur droplets from the liquid to the solid state. Approximately 7000 gallons are required to prime the system which is circulated at 350 g.p.m. within the closed loop system.

Process water is lost due to evaporative loss mainly in the cooling tower and as surface moisture on prill shipped to storage.

Make up water will be supplied from the main water supply and excess surface water (process water and rain water) which drains from the prills in storage.
Over time, process water will build up acidic levels. These levels will be monitored and a neutralizing agent will be added periodically to balance the pH.

CONSTRUCTION ACTIVITIES

The building area required is 1600 square feet. The underground molten storage tank will extend beyond the building boundary to allow solid sulfur to be deposited directly to the storage tank.

The plant will be situated within 50 feet of the block sulfur storage pad. Access is required for the front end loader to pick up solid sulfur and bring it to the plant input hopper. Additional space for approximately 2000 square feet will be required for external fuel tanks, parking and nominal equipment storage. A right of way of approximately 10ft. x 600 ft. will be required for stockpiling and loading conveyors.

Prill storage will be on the existing pad if a sufficient area can be reclaimed by moving a portion of the existing block.

At normal capacity, the plant will employ two (2) to three (3) people on a permanent basis with additional resources on an as needed basis. During the first 18-24 months, or so, or until the block is substantially reduced, additional resources will be required to work in the yard.

The water requirement for equipment is 750 liters per hour under full load during prilling operations. There will be a recirculating system of approximately 28,000 liters with zero overflow/discharge. Water supply for sprinkler systems, washroom and for potable use will be modest.

A septic tank system will be utilized to handle domestic waste.

ENVIRONMENTAL CONSIDERATIONS - SUMMARY

The proposed sulfur prilling plant for come by Chance, Newfoundland will consist of a molten storage and remelting tank, process equipment and materials handling equipment. The plant and process design is based on similar plants constructed by the proponent and operating in California, USA (within Los Angeles) under strict environmental criteria.

The status as we anticipate it will be, by site and plant, is as follows:

Site: The plant site is within the refinery complex, adjacent to the existing inventory of block sulfur. The operation of the plant will, over time, zero the inventory of block sulfur (currently estimated at 45,000 tons). Recovery and recirculation of drainage water will mitigate effects of long term storage. No problems are anticipated and the site will show an overall improvement over time.

Plant: Process water will be recirculated. Water losses are expected to be evaporative only. Air emissions will be scrubbed as necessary. No problems are anticipated as the process is purely physical.
NEWSUL

SULFUR PRILLING PLANT

Description of Process

Note 1. The information provided herein is confidential and proprietary to the proponents and is provided for environmental registration and assessment only.

Note 2. Parts of the process description includes or refers to the provision of a second prilling tower at 25 tph capacity. At this time the we do not feel that a second stage will be required.
DESCRIPTION OF PROCESS

Introduction:

The following sections overview the conceptual project and describe the processes and equipment involved. Plans are submitted describing the process and the plant layout as envisaged. The final plant and premise layout is under engineering review. One set of full scale drawings have been submitted with the Original Registration.

Molten Sulfur Delivery:

Molten sulfur is most commonly delivered to the facility by trucks equipped with insulated tank trailers. The unloading pipe is three inches in diameter and is oil traced to insure that sulfur does not solidify in the piping. The piping is sloped to facilitate the flow of sulfur into the tank by gravity. However, compressed air is available in the sulfur receiving area to permit the unloading of properly equipped trucks by displacement of the sulfur with compressed air applied to the free board volume of the delivery vessel. In such cases, less than one (1) atmosphere of pressure is used in displacing the sulfur.

The sulfur received at the plant is high purity material produced, primarily, as a by-product of the refining of crude oil. The sulfur is received at a temperature in the range between 270° and 280° Fahrenheit and with a specific gravity of 1.79.

The molten sulfur receiving pipelines, which terminate in the receiving trench, are equipped with camlock fittings and removable plugs which prevent vapors from escaping during periods of inactivity. The delivery vessels are similarly equipped with camlock fittings. Therefore, cargo discharge is accomplished by connecting flexible three (3) inch diameter hoses with mating camlock fitting between the delivery vessels and receiving pipes. The camlock fittings provide tight seals at connection points to assure that no liquids or vapors leak from the system. To facilitate the discharge of the molten sulfur from each delivery vessel, the dome on top of each tank is opened slightly to prevent the occurrence of a vacuum within, and implosion of, the delivery vessel. During unloading, the flow of ambient air into the displaced volume of the vessel prevents gaseous emissions from occurring through the slight opening.

Molten Sulfur Storage:

The molten sulfur storage tank compensates for the temporary imbalances that are inevitable when a continuous process, such as the broiling process, is supplied with feedstock on a batch basis. Heating coils in the surge tank provide for the addition of heat from the a heat transfer oil (Thermol) to the molten mass, as needed, to prevent the sulfur from cooling to such an extent that solidification may occur. The heat transfer medium used to maintain the sulfur in the molten state through the head end of the process is supplied by the 50 horsepower oil boiler.
The boiler also provides oil for the oil traced and jacketed pipes and equipment to assure that sulfur does not solidify in the flow system during periods of shut-down. Oil is piped to and circulated around the heads of the prilling tanks to allow for the purging of the nozzles upon shut-down. Normally the molten sulfur will drain and self purge by gravity, however compressed air may also be used in the purging process.

Prill Production:

Molten sulfur is pumped from the surge tank to the head section of the prilling tanks, by use of a molten sulfur feed pump. One pump supplies the prilling tank installed in the initial stage of construction. A second pump acts as a backup to the primary system and can be placed in operation if a second prilling tank is installed at a later date. The sulfur is pumped through three inch diameter steel piping which is oil traced.

Each prilling tank is designed with the capacity to process about 25 tons per hour of sulfur. The sulfur feed systems, consisting of a molten sulfur feed pump, and the necessary associated piping handles approximately 50 tons per hour of sulfur. The facility design could, if required, handles two (2) sulfur feed systems, with each system providing a supply of molten sulfur to one of the two prilling tanks.

The plant will initially be constructed with one sulfur pumping system feeding molten sulfur to one prilling tank. This arrangement will result in a plant with processing capacity of 25 tons per hour until the second feed system and remaining prilling tanks are added to the facility.

During prilling operations, molten sulfur is pumped to and floods the head section of the prilling tower to provide the desired depth of liquid on the orifice plate. The orifice plate is a flat horizontal plate which is conducive to optimum prill formation. The pressure at the entrance is a critical factor in the formation of sulfur prills with the desired size, hardness, and shape characteristics.

As the molten sulfur flows through the openings in the orifice plate, the continuum of fluid above the plate is divided into numerous streams of desired diameter. Between the bottom of the orifice plate and the top surface of the prilling or cooling water, which fills the lower section of the prilling tanks, there is a void volume into which the individual streams fall. As the material flowing in each stream enters the temperature controlled cooling water, surface tension combines with gravity to force the stream into a series of segregated droplets.

This water quenching process cools the droplets, thereby effecting the change of the sulfur from the liquid state to the solid state. The rapid cooling produces beads or prills of sulfur which are approximately spherical in shape and are from 3/16 inch to 1/4 inch in diameter. The prills are characterized by excellent mechanical strength and tough surfaces which resist abrasion and erosion. Hence, the wet prilling process achieves the objective of producing a form of sulfur which can be stored and handled without the dust pollution and fire hazards which have characterized crushed sulfur for decades.
Process Water Circulation:

To accomplish the quenching process in the prilling tank, temperature controlled water at a temperature of 90° Fahrenheit is pumped into each prilling tank at a rate of approximately 350 gallons (1300 liters) per minute. While this flow rate is somewhat in excess of the rate of water flow that is actually needed to quench the sulfur entering the vessel, the tanks are equipped with overflow ports in the sides of tanks at a height which permits free overflow of any water in excess of that flow which maintains the desired water drain ring which encircles the upper section of the prilling tower.

Within each prilling tank the water and sulfur prills form a slurry which gravitates downward through the lower section of the tank and out the bottom discharge opening. The slurry flows from each prilling tank outlet onto, first a sloped stationary sieve, and then onto a dewatering screen. The screen is a 12 foot vibrating screen designed to enhance the flow of water vertically through the fine mesh screen while the dewatering sulfur prills vibrate down the face of the screen to a discharge chute. An eccentric drive mechanism powered by an electric motor induces the vibrating motion in the upper deck of each dewatering screen.

Sulfur Fines Removal:

As this water separates from the sulfur prills on the dewatering screens, a small fraction consisting of about 1% of the sulfur flow passes through the screens as fines. The water, along with the suspended fines is contained and flows by gravity to the slurry pump feeding the fines screen, while the prills discharge onto a horizontal conveyor belt for transfer to the storage pile. The fines screen is a typical SWECO circular, horizontal, oscillating screen which recovers the preponderance of the fines and discharges them onto the belt conveyor, where they become incorporated into the bulk flow of standard prills being conveyed to storage. Process water is discharged to the Hot Well Tank for reuse.

Prilled sulfur is carried by a 24 inch wide horizontal conveyor belt to a point where it is transferred to a radial stacker which discharges onto a conical pile where it remains while awaiting shipment. Because small particles are characterized by much higher ratios of surface to volume than large particles, the sulfur fines have considerably more surface area on which to retain surface moisture. Measurements have shown that the fines typically retain moisture amounting to 18% of the weight of the dewatered fines. As a result, the high moisture content, combined with the fact that the fines become incorporated into the interior of the stored sulfur piles assure that the fines do not become an air pollution problem.

Due to the nature of the pumping duty involved, Wilden air-operated, double diaphragm pumps are used for handling the slurry of sulfur fines. The air which powers the pump is supplied by the plant air compressor.
**Water Make Up and Cooling:**

Process water flows within a loop in the process and is recycled until it is either lost by evaporation or by shipment from the facility as surface moisture (approximately 3%) on the sulfur prills. In either event, the losses must be replaced by fresh makeup water to maintain the heat absorbing capacity of the water mass used in the process. Process water used as quench water is received in the Hot Well Tank and must be cooled before being returned to the prilling tanks as quench water. Process water is recirculated back to the prilling tanks through a Cooling Tower and Cold Well Tank.

The water is discharged into the Baltimore Aircoil cooling tower. One tower has the capacity to cool 700 gallons per minute of water. Each tower is of the forced draft design which uses centrifugal blowers to force cooling air upward through the heat transfer casing section. The hot water enters the unit through a manifold system which distributes the water uniformly over the wet deck surface via spray nozzles. As the water flows downward through the heat transfer casing, the forming of the channels, in the PVC wet decking, guides the water flow through circuitous paths as the water gravitates to the sump or pan section. Since the packing is not flooded the cooling air flows from the pan upward through the channels in the wet decking in a pattern counter current to the water flow. The packing is designed to maximize the contact between the air and the water with a low enough pressure drop to optimize the balance between the power requirement and the heat transfer efficiency.

As the air contacts the hot water in the wet decking, a simultaneous process of heat transfer and mass transfer occurs. Sensible heat is transferred from the hot water to the cool air, but the more significant portion of the overall heat transfer is accomplished through the evaporation of water from the liquid phase to saturate the counter current flow of air. The combined latent and sensible heat transfer mechanisms take energy from the liquid phase, thereby resulting in the desired cooling of the water. The air forced through the cooling tower leaves the wet decking substantially saturated with water vapor. This exiting air passes through the mist eliminator section before leaving the cooling tower.

The cooled water exits the bottom of the wet decking and accumulates in the pan section from which it flows by gravity to the Cold Well Tank. The cooled water is subsequently pumped to the prilling towers, thereby completing the water recirculation loop.
Sulfur Prill Plant - Come By Chance, Newfoundland

Equipment List

NOTE: Certain equipment will be installed in phases with the first phase providing a 25 ton per hour system and a second phase boosting the capacity to 50 tons per hour, if and when warranted. For equipment items to be installed in stages, the number of items per stage is indicated.

A. Parker Industrial Packaged Oil Boiler, SB-101

The oil boiler used at the facility is a Parker 50 horsepower oil fired industrial packaged oil boiler. The boiler is of the oil tube design with 10 staggered passes of oil tubes providing a self-baffled heating surface which intersects the vertically rising combustion gases for high efficiency heat transfer. A synthetic oil, Therminol, will be used as the heat transfer medium.

The BTU output rating of the unit is 1,675,000 BTU per hour. The heating surface of the 10 pass oil tube system is 278 square feet. As a packaged unit, the boiler is equipped with automatic controls to assure the safe operation of the system.

B. Molten Sulfur Storage Tank, D-104

Molten sulfur delivered to the plant is transferred into the 250 metric ton capacity molten sulfur surge tank. The tank is constructed of sulfur resistant, reinforced concrete and is poured in place as an underground structure. The tank is approximately 26 feet long, 20 feet wide, and 10 feet deep.

C. Molten Sulfur Feed Pumps, P-101

Molten sulfur is pumped to the prilling tanks by Crane Deming vertical sump pumps. Each pump can supply molten sulfur to two prilling tanks. Therefore, one operational pump and one standby unit serves the facility adequately during the initial phase of operation at 25 tons per hour capacity. If expanded to the 50 ton per hour capacity, one additional pump will be added to the equipment inventory so that a standby pump is always available for use in the event of a pump failure.

Each pump is a Crane Deming Model No. 4521 sump pump equipped with a 1½ inch discharge port. The pump impeller is 10⅛ inches in diameter. Each pump supplies 6700 gallons per hour of molten sulfur.
E. Sulfur Prilling Tanks, D-101

Each prilling tank will have the capacity to produce 25 tons per hour of prilled product. Each tank consists of a 4 foot cylinder or square section which constitutes the upper section of the quench chamber. Below this section each tank tapers on a 45 degree angle to the discharge port. The length of this section is 4 feet. The shape of the discharge section facilitates the gravity flow of the sulfur-water slurry out of the vessel.

One tank will be used to provide the 25 ton per hour capacity of the Phase I installation. The expansion of the plant capacity to the designed 50 ton per hour capacity, as needed, will be accomplished by the installation of one additional prilling tank.

F. Dewatering Screens, F-102

Each prilling tank is served by a dewatering screen, therefore, the facility is initially using one dewatering screen. If the operation is expanded to the full 50 ton per hour capacity, two dewatering screens will be used.

G. Fines Screen, F-103

The screen is a SWECO oscillating unit which uses a 48 inch diameter round, horizontal screen to separate the sulfur fines from the effluent water in the slurry. The overall height of the unit is 39 inches.

H. Water Pumps, P-103

The water pumps are pedestal mounted centrifugal pumps. The pumps are constructed of type 316 stainless steel and have 5 inch inlets and 4 inch outlets. Each unit pumps hot water through a water cooling circuit.

I. Cooling Towers, CT-101

The cooling towers are used to cool the quench water so that it can be recycled to the prilling tanks. The towers are sized to cool the hot water from the 120° Fahrenheit temperature characteristic of the hot water tank to the 90 ° Fahrenheit temperature desired in the prilling tank feed water. The fans force 49,425 cubic feet per minute of ambient air through each tower to provide the desired evaporative cooling. Each unit is approximately 8 feet wide, 12 feet long, and 11 feet high.
J. **Air Compressor**

The plant air compressor is a Joy Manufacturing Company Model TA025TAN rotary screw compressor. The compressor is equipped with a Model VCM125 after-cooler.

K. **Dewatered Prill Receiving Conveyor, BC-101**

A conveyor utilizing a 24 inch wide conveying belt is installed below the sulfur discharge ports of the dewatering screens. A 24 foot long horizontal section of the belt carries the prills from below the dewatering screens to a point where the conveyor proceeds an additional 10 feet up a slight incline to discharge material into conveyors or stacker for delivery to the storage area.

L. **Hot Well Tank, D-103**

The hot water tank is a 7.5 foot diameter plastic tank with a height of 10 feet. The tank is placed on the floor of the plant.

M. **Cold Well Tank, D-104**

The cold water tank is a 7.5 foot diameter plastic tank with a height of 10 feet. The tank is placed on the floor of the plant.

N. **Cold Water Pumps, P-104**

The cold water pumps are pedestal mounted centrifugal pumps. The pumps are constructed of type 316 stainless steel and have 5 inch inlets and 4 inch outlets. Each unit pumps an adequate flow to supply two prilling tanks.

O. **Fines Slurry Pump, P-102**

The consistency and properties of the fines necessitate the use of a pump specially designed for moving slurries with high solids loadings. The Wilden Model M-8 diaphragm pump was selected because of its proven ability to handle such products. The pump is operated by compressed air which actuates a single piston that drives the two pump diaphragms.
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