ESG - Twillingate Shrimp Shell Drying Operation

Additional Information as Requested by the Minister of the Department of Environment

1. Design and Operational Details

Our plan is to operate 24 hours per day, 7 day a week. This will depend on the supply of raw material that we will receive on a daily basis from Notre Dame Seafoods. We forecast that trucking will take place between 8 am and 10 pm with an average of 3-4 trips per day from NDS to our location.

2. Schematic of Building

The drawings of the building and the equipment layout are presented in Appendix 1. The ventilation of the building will be natural using open loading doors at each end of the structure.

Appendix 2 shows the flowchart for the process. In the flowchart the protein isolate is referred to as "Shrimp Paste". The drying system is designed so that the shell material will continue to circulate in the heated air until the moisture is lowered to 13% as required by our customer. Then it is diverted to a compressor and compressed, wrapped and readied for shipment. It will be stored in the warehouse (the old Coast Guard building) adjacent to the drying facility until shipped. Protein isolate will be frozen and stored in the old BGI cold storage building adjacent to the drying facility. A small compressor will be installed to refrigerate a part of this building.

3. Raw Material Storage/Disposal

Raw material will be stored for very short periods in the front of the building prior to introduction into the dryer system. We have set aside 36 m2 inside the building for this perpose. We propose to transport 10 containers (10 MT) of shell waste per shift. Our dryer can process 2 MT per hour so no raw material will be stored for longer than 4 hours. Containers will remain sealed until used.

It should be noted that we plan to transport material from Notre Dame Seafoods to our facility and process immediately, so we do not anticipate any spoilage of our raw material. Moreover, Notre Dame Seafoods cannot process spoiled shrimp and so they would not be expected to produce any spoiled shell waste material. Unsuitable material would be disposed of as Notre Dame Seafoods has done in past years with their shell waste material, either dump at sea or bury in land fill.

4. Air Emissions

We have taken several precautions to mitigate any potential odour problem that might be expected from a shrimp shell drying operation. This includes the installation of a large waterfall steam purification system that will have very frequent water change rates (Appendix 3). This, coupled with charcoal scrubbers in our vent stack, reduced the fishy odour to undetected levels when we tested this system in China. I hasten to point out here that this statement is not wishful thinking but the result of ESG's research. Over a period of two years, we actually assembled the entire drying system (over 80 MT of equipment) in China and ran many trial runs of the system there before the equipment was disassembled and shipped to Twillingate. Our experience with all of these trials is that no odour problems are expected.

We have designed a very high efficiency burner system for our dryer and the emissions from our stack (40 feet above the building) will consist of Carbon Dioxide and Water. Odour from the shells will have been removed by the waterfall and scrubbers. We will also benefit from the fact that the prevailing winds at our site blow from the West-Southwest, effectively blowing out the harbour away from all residences and businesses, including the Seniors Home. This has been confirmed by several local fishermen and is referenced on the current website of "Newfoundland and Labrador Tourism, Government of Newfoundland and Labrador".

We are confident that any odour from our plant will be negligible, and certainly unremarkable, in a community with an operating fish plant and the offloading of many shrimp boats on a daily basis. Furthermore, ESG is committed to being a good corporate citizen of the town. If all out current efforts are not sufficient we will work with your department and the town to address any environmental issues.

5. Transportation/Spill and Odour Control

We will be transporting raw material by small straight flatbed truck (appendix 5) using standard fish boxes (appendix 5). The truck will transport 10-12 fish box container per trip. The containers are the same sealed fish boxes that are currently used to transport shell fish and ground fish throughout the province. There are literally thousands of these being used to transport fish products all over Newfoundland on a daily basis. These containers have a cover to prevent spillage. If we see any problems with leakage, we will use plastic bag liners inside the containers.

The route for trucking is shown in Appendix 6.

6. Alternative Transportation Methods Considered

The only method of transporting the raw material would be by truck. We have considered barging but this would create other problems. There is no means to off load the product that would not present significant pollution issues. If we were to use pumps, there would be raw

material left inside the barge and this would cause more odours over a period of time. Plus the raw material would be too dry and hard packed to pump using conventional technology.

7. Liquid Discharge

Upon arrival at our plant, the shrimp shell waste material consists of 30% bulk liquid water containing protein, 35% water in the shell and the remaining material is shell material itself. Upon arrival at our plant the waste is subjected to squeezing under high pressure to remove the bulk water and 95% of the protein material. This process uses a patented two-roller press that we have tested exhaustively in China. One (1) is a rubber roller and one (1) is a stainless steel roller. The Stainless roller has many holes in the roller. When squeezing the shell waste, the protein and water passes through the holes and are separated from the shell itself. The shell comes out the other end. It removes essentially all of the bulk water and protein from the shells.

Most of the protein is then recovered from this liquid using a centrifugal decanter operating at 3500 X g. The protein will be collected and frozen in blocks for shipment to Aquafeed producers in New Brunswick.

The effluent will then be directed through a Minipore filter to a DB-5 Deep Bed Filter manufactured by Industrial Filters Company, a major US manufacturer of industrial filter systems. This filter system (see appendix 4) can remove all suspended solids greater than one micron (1.0 um) in size. Moreover, the design is such that the filter is self cleaning (so no disposal of used filters) and the material that is removed from the effluent (mostly smaller protein material and some small shell fragments) can be recovered and added to the protein recovered from the decanter. This additional protein product will offset the cost of purchase and operation of the filtration system.

The filtrate will be subjected to a final filtration through a "Clear Fast" industrial filter (appendix 4) that will remove any remaining suspended material greater than half a micron (0.5 um) in diameter. The small amount of material collected in this filter will have to be disposed of in the local landfill along with the diatomaceous earth (ground shells). However, this will be a very small quantity, likely less than twenty kilograms (<50 kg) per day and will, of course, contain no hazardous material since it is derived solely from the shell waste material from Notre Dame Seafoods and the ground shells used in the filters. Using this system, the discharge will not contain any suspended solids and the BOD content should be within the limits in the current legislation.

Maintenance of our system is important to ESG. We have in place an agreement with the manufacturer that they will allow one of their senior engineers to remain for six months after installation to train our own staff. They are also providing an extensive supply of spare parts. The filters that we are using will be maintained according to manufacturer's instructions.

It is difficult to estimate the frequency of change for the filters until we start operations. However, the disposable parts of these filters are made from either Diatomaceous Earth (ground shell fish), natural fibres or polyethylene. The former is non-toxic and easily disposed of while the later two are recyclable. Neither will contain any component other than those found in the shell waste from the shrimp plant. All spent filters will be submitted for analytical testing to verify that they do not contain hazardous material. Results will be provided to the Director of the Pollution Prevention Division for review before disposal is initiated.

Protein paste that is isolated from the shrimp shell waste material will be frozen in blocks and stored at -20°C. The blocks will be packaged, shrink-wrapped and shipped in Freezer containers. We would expect to ship one container of protein every two weeks.

8. Effects on Residents and Businesses

The business development will see fishery related activity restored to the area on the North Side of Twillingate. We anticipate that traffic will be minimal for the operation of our business - with material being trucked in during the days we are operational and trucked out when the process is complete.

We do not anticipate any negative or significant impact on the residents or businesses in the area. There may be a possibility of increased business at the Anchor Inn Motel located in the vicinity, either in the restaurant or with various company agents of our suppliers needing overnight accommodations. This may also be true for the R and J restaurant. ESG has also committed to cooperate with the Town of Twillingate to address any unforeseen concerns that may arise.

10. Choice of location

ESG were encouraged by the Municipality and the Harbour Authority to choose the site because the community wanted development on the site. In evaluating this site, we felt that it met our objectives and had the potential for future business opportunities. The current site is near the water, it has existing infrastructure and it is very well suited to our business plan. Also, the existence on site of two buildings that we could use reduced our cost and lead time. Our location is on the far end of the community and there are very limited number of residences or businesses in that end of Twillingate compared with the number located close to the Notre Dame Seafoods facility.

We did examine a number of other sites. One proposed site next to the shrimp plant would not be available for at least 3 years. A second site outside the community was judged unsuitable as it abutted the Town water supply area. A final location in the empty building just outside the community could not be purchased for anything close to a reasonable price.

11. Description of the Community

Twillingate is a historical fishing community located on the Northeast coast of Newfoundland. With a population of approximately 2500, this community continues to depend on the fishery as the primary economic activity with tourism activity offering great economic diversification in the community for spring and summer.

A shrimp processing plant is located in the centre of Town and provides approximately 140 jobs. This plant has been operational for 10 years and is located in the same site as the original plant which opened in the early 1960's. Shrimp product is frequently trucked in and out of the community by the plant owner- Notre Dame Seafoods.

12. Infrastructure in the vicinity

There are a number of structures within 2 km of the business site. Closest to the site is an old historical building - Hodge premises - which has been restored and is listed for sale by the owner. A nearby hotel also has a long history in the community. It is rumoured to be for sale as well - prior to this business development. There is a Seniors Complex approximately half a kilometre away to the above our location. We are aware of four recreational facilities that are barely within 2 km of our location (swimming pool (indoors), Hockey Arena, Ball field and a playground).

13. Records

ESG will maintain all records and other documents pertaining to equipment operations and maintenance (including filter replacement and waste characterization results) at the facility for not less than three years, beginning the day they were made.







Water Discharge System



A 40% water from the wet smrimp shoil, through sou degree C, becomes steam, which will pass through our special design water fall. (Dissolve the small particles and suspended molecular), the steam through chimney to the air. The water fall water (we change the fresh water every 6 hours) through UV light (kill the bacteria) and filter system, then discharge to the sea; B. 35% of wet shrimp shell through rotary oven becomes finished well;

C.25% of wet shrimp shell through our separation machine become 20% of water and 5% of protein: 20% of water through our UV light and filter system then discharge to the sea, 5% of protein through our centrifuge machine drying becomes our finished good, still has small quantity of water also through same UV light and filter system discharge to the sea.

Model No.	Flow Rate Capacity (GPM)	Filter Area (S.F.)	Tank Capacity (Gallons)	Length (A)	Width (B)	Inlet Height (C)	Shipping Weight (LBS)
DB-5	1-5	1-1/2	24	44"	20"	15-3/8"	225
DB-15	6-15	4	48	69	31	17-5/8	320
DB-24	16-28	8	90	65-1/2	43-5/8	17-5/8	580
DB-30	29-39	11	115	81-1/2	43-5/8	17-5/8	760
DB-40	40-50	15	130	97-5/8	43-5/8	17-5/8	940
DB-55N	51-60	17	160	114	43-5/8	17-5/8	1025
DB-55W	51-65	19	160	89	62	17-5/8	1025
DB-75	66-85	24	200	104	62	17-5/8	1420
DB-85	86-95	27	400	136	67-3/4	30	2400
DB-115	96-115	29	500	162	67-3/4	30	3010
DB-145	116-150	40	600	194	67-3/4	30	3750
DB-210	151-210	57	900	259	67-3/4	30	5250
DB-360	211-360	96	1370	380	67-3/4	30	7702
DB-450	361-450	113	1575	430	67-3/4	30	8655

Deep Bed Filter Specifications



Deep Bed Model Variations Models DB-5PS and DB-15 are compact versions of the Deep Bed. Because of their small size, some features of larger units are not included (dual drive, torque limiter, etc.).

Deep Bed Options All units are available in steel, stainless steel or non-metallic (plastic) materials.

Clear-Fast Filter

The CLEAR-FAST filter uses diatomaceous earth (filter powder) as the filtration media to filter liquids down to 1/2 micron (0.5 um).







Appendix 6 Trucking route

The route for transporting sheel material from Notre Dame Seafoods to our location is outlined in yellow on this aerial photo.

1 AU ESG Conede Inc hring proposed Site Existing Environment 1. Total distance from NDS Plant to ESGCINC Dry Shring plant is 2.2 Kms. 2. Infactevelouse within 2 Km of the proposed CON Site is: (A) 165 Residental properties (B) 28 Business properties. (c) 4 Recreational facilities. (d) 5 Others (chunches, Schools) 3. Please Note the highlited adea is the main Route from NDS plant to Paoposed site. (2.2 km) M COA MD R 0 B MD 7B use Core 0:0