T : 855-919-2225
F : 418-668-0652

Almiq Contracting Ltd.

1340, Ulu Lane, P.O. Box 2140, Iqaluit (Nunavut) X0A 0H0

ADDENDUM No. 1 : CHANGE REQUEST LICENSE # 8BC-NNF1418

SURFACE & WASTEWATER MANAGEMENT PLAN

Date: 2016-05-05

To: NWB – Manager of Licensing

Re: Addendum No. 1

A revision to the above-referenced plan has been made.

The sand produced on site for specific purposes such as concrete and aggregates for access road is not meeting the fine particles requirements asked (too high percentage of fine particles). As a consequence of this unpredictable situation, we will need to wash the sand/aggregates. The process will respect the conditions of the water license and will stay within the quantities indicated in the license. However, we have to add a section to the Surface and Waste Water Management Plan.

Please find enclosed the addendum for sand washing.

Sincerely,

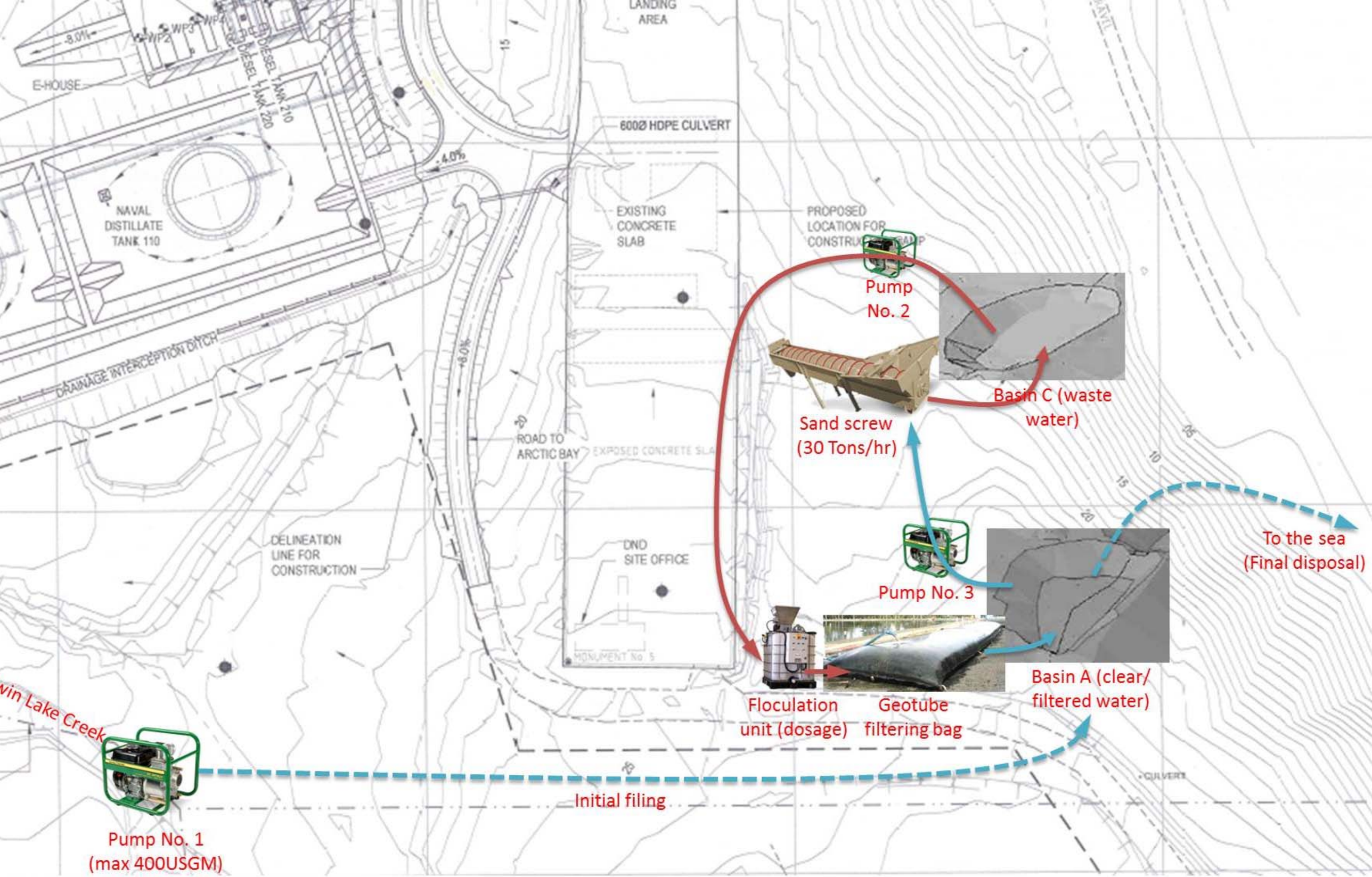
Marc Deschênes
2016.05.09
10:50:52 -04'00'

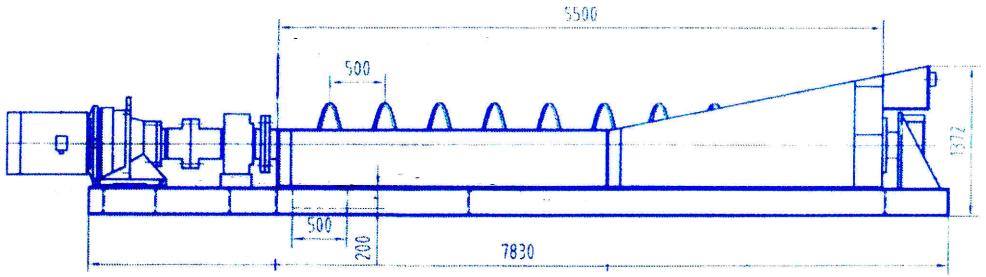
Marc Deschênes
Project Manager

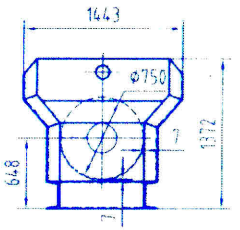
2.8 Water used for Sand Washing

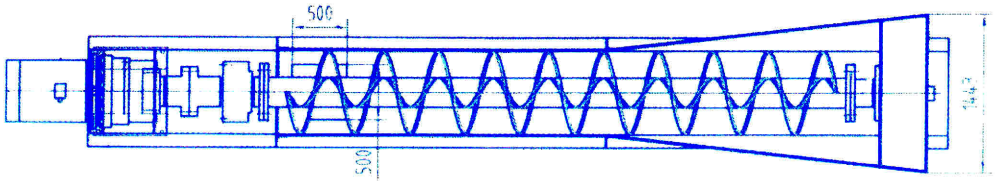
License / Background / Description info	In order to be compliant with the specified gradation, the percentage of fine particles in the aggregates shall be lower than a certain value. Following the production of non-compliant sand, content of fine particles shall be lowered. Approximately 3800 cubic metres of sand have to be washed. The method employed for washing the sand is a sand screw, in which water is added. The fines particles are then trapped into the water and compliant sand is resulting from the process. The effluent from the sand screw is collected in a retention basin, pumped into a geotube filtration system, combining the action of a polymer (flocculant) on fine particles with filter bags which then retain the agglomerated particles. The water coming from the filtering process will be gathered into a retention basin and reintroduced into the sand washing process to create a loop [for the duration of the washing process]. Filter bags: The filter bags will thereafter allow a gradual flow of the clear water, while retaining the fine particles agglomerated under the action of flocculants. A liner will be installed under the bags to allow the collection and pumping of filtered water. The filter bags will be installed in two ponds. Flocculant: In addition to the compatibility of the flocculant with the fine particles, the other major criteria that governed the choice of the flocculant type is the environmental friendliness. The product chosen (CHEMFLOC CTT 7556) is commonly used in drinking water filtration process. Flocculation: A flocculant injection system (into the wastewater) will be installed ahead of the filter bags. This system will include a pump and flocculant feed regulator. The flocculants will be transported to the site into bags, in a powder form. This powder will then be mixed with water to obtain a flocculating solution. Flocculant is environmentally friendly and has negligible effects on the discharging environment. At the end, the material contained in the filter bags is of a solid consistency, which allows it to be handled and disposed of. The filtered water coming off the filter bag will be reused for sand washing, creating a loop. (See details on the drawing attached.)
Schedule of activity	2016
Qty of water to be used (approx.)	1000 m^3
Source	Twin Lakes Creek
Wastewater management / Mitigative Measures	The sand washing process will produce a volume of waste water equivalent to the volume of fresh water introduced in the process. This waste water will be processed and tested before being returned to local environment. A retention basin (A) will contain clear or filtered water downstream of the geotube bags while another basin (B) will contain the effluent downstream of the sand screw. During the operation phase, a total of 700m^3 of water will be maintained in the washing loop, including 400 m^3 in the basin A and 300 m^3 in the basin B. Water losses will mainly be the result of the water trapped in the washed sand, but also the result of evaporation.

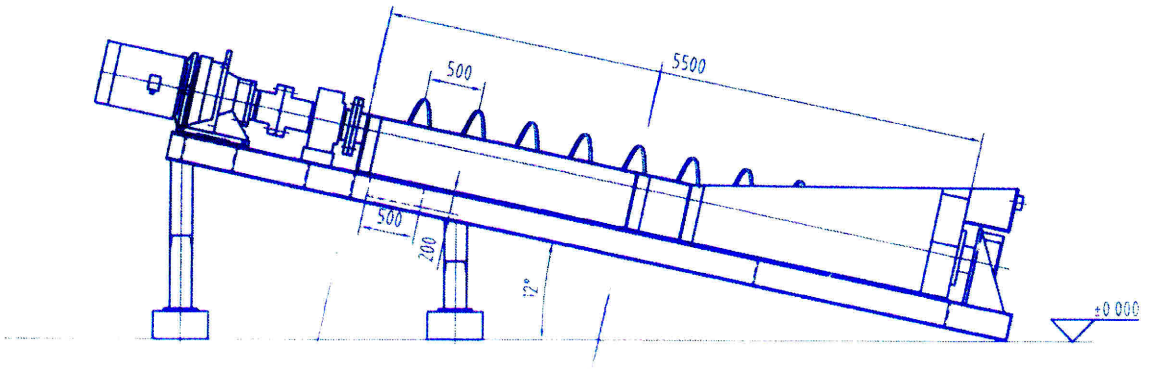
Monitoring and Testing	<u>Waste water processing :</u> Effluent shall be tested before being returned to local environment. Compliance with applicable regulations will include not exceeding the effluent quality criteria prescribed in the updated water board licence. An environmental specialist (Hudon Desbiens St-Germain Environnement inc.) was retained for the development of procedures for sampling and testing the effluent, but also a methodology for processing the stored effluent in the event that it does not meet effluent discharge criteria. Final disposal of water: The pumping and transport of the effluent from the basins to the sea (Strathcona Sound) will be carried out inside plastic pipes, eliminating the risk of erosion. <u>Solid waste management and demobilization :</u> a) After reaching the maximum containment capacity of filter bags, they can be cut and opened, their content offloaded, transported and disposed of as per unsuitable material management requirements. b) Filter bags waste material will be gathered, transported down South and disposed of as per manufacturer's recommendations. <u>Decommissioning of the sand screw:</u> At the end of the washing process, the sand screw will be cleaned and stored in a suitable location, before being transported down south by sealift. <u>Site reclamation:</u> The working area will be restored as per conditions prevailing before the beginning of the washing process. This includes the reclamation of retention basins.


E-HOUSE
NAVAL DISTILLATE TANK 110
DIESEL TANK 210
DIESEL TANK 220
DRAINAGE INTERCEPTION DITCH
LANDING AREA
600Ø HDPE CULVERT
EXISTING CONCRETE SLAB
PROPOSED LOCATION FOR CONSTRUCTION RAMP
ROAD TO ARCTIC BAY
DELINEATION LINE FOR CONSTRUCTION
DND SITE OFFICE
MONUMENT No 5
CULVERT
Pump No. 2
Sand screw (30 Tons/hr)
Basin C (waste water)
To the sea (Final disposal)
Pump No. 3
Basin A (clear/ filtered water)
Floculation unit (dosage)
Geotube filtering bag
Initial filing
Pump No. 1 (max 400USGM)


5500
500
1372
500
200
7830


1443
ø750
1372
648


500
1443
500


500
5500
500
200
12°
±0.000

TENCATE

Geotube®

INDUSTRIAL FABRICS
Dewatering Systems

Geotube® Dewatering Technology

Protective & Outdoor Fabrics
Aerospace Composites
Armour Composites
Geosynthetics
Industrial Fabrics
Synthetic Grass

TENCATE™
materials that make a difference

The Low Cost, High Volume Dewatering Solution

Geotube® dewatering technology has become the dewatering method of choice for organizations around the world. Geotube® dewatering technology is used for projects large and small, and there's good reason—simplicity and low cost.

There are no belts or gears. Geotube® containers are available in a variety of sizes, depending on your volume and space requirements. Geotube® systems can even be mounted in mobile roll-off containers that can be transported around your property as necessary. It's one of the most versatile dewatering technologies available.

And one of the most effective. Volume reduction can be as much as 90%, with high solid levels that make removal and disposal easy.

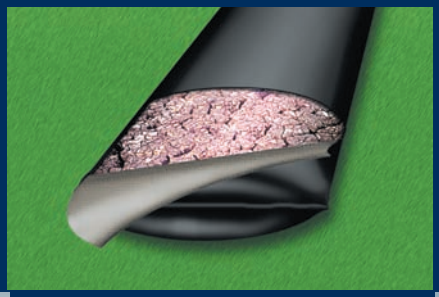
Sludge before (left) and after (right) treatment with Geotube® dewatering technology.

1. Filling

Sludge is pumped into the Geotube® container. Environmentally safe polymers are added to the sludge, which make the solids bind together and water separate.

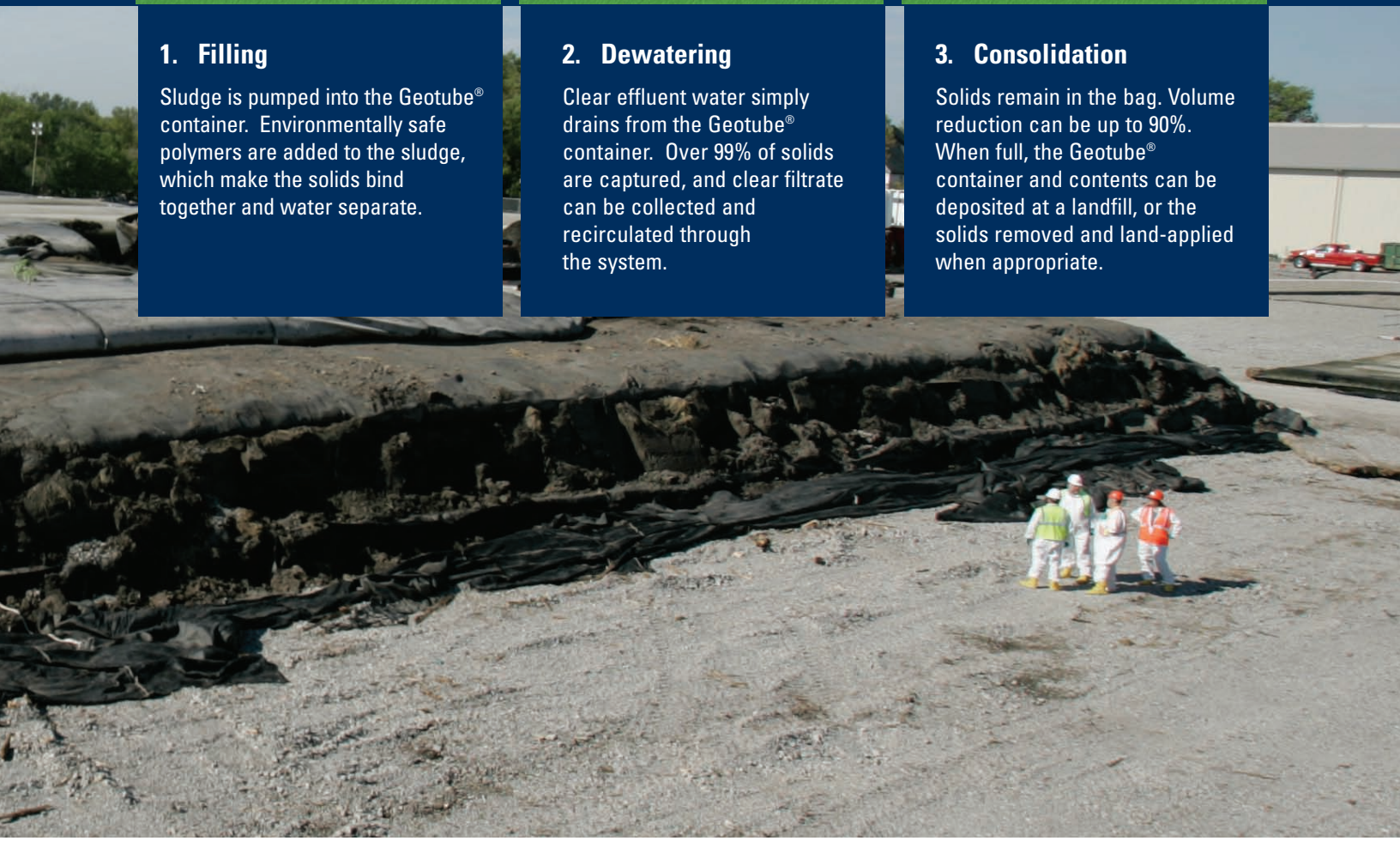
2. Dewatering

Clear effluent water simply drains from the Geotube® container. Over 99% of solids are captured, and clear filtrate can be collected and recirculated through the system.



3. Consolidation

Solids remain in the bag. Volume reduction can be up to 90%. When full, the Geotube® container and contents can be deposited at a landfill, or the solids removed and land-applied when appropriate.



Case Study

application	**Dewatering of PCB Contaminated Soil**
location	**Appleton, WI**
product	**Geotube® Dewatering Technology**

For more than 50 years, paper mills along the Fox River have contributed to the contamination of local waterways with PCBs. Geotube® dewatering technology is being used to dewater 750,000 to 1 million cubic yards of contaminated soil. Sixty-foot circumference Geotube® containers were stacked three and four layers high, and have kept pace with dredges operating in excess of 2,000 gallons per minute. Dewatered solids are in excess of 50%, and the process is much more cost-effective than belt presses or other methods of dewatering.

Environmental Remediation

Effective Containment for Large and Small-Scale Projects

Rivers, bays, harbors, marinas, ports, and dock facilities have been collecting contaminated sediments from industrial runoff for many years. In many cases, these sediments pose significant environmental hazards, and remediation is a difficult and expensive task.

Marine sediments can be contained and dewatered easily with the Geotube® dewatering technology. This can be accomplished at or very near the site by utilizing a dewatering basin where Geotube® containers can be stacked several layers high to maximize space. Geotube® units can be sized for large-scale or smaller applications, and effectively contain even hazardous materials, reducing their volume dramatically and saving thousands in disposal costs.

Dewatered sludge being removed from a Geotube® container with a backhoe.

Pulp and Paper
Multiple Uses

Geotube® dewatering technology is used for a variety of applications within pulp and paper mills, including:

- Primary and secondary lagoon cleanout
- Fly ash and alum sludge
- Contaminated sediments
- Continuous systems clarifier, sentrate, process waste stream
- Process rejects
- Separation dikes
- Emergency uses, such as cleanouts, spills, dumps, or exceeding discharge limits.

The rapidity with which a Geotube® dewatering operation can be set up has also been an advantage in paper mill applications, particularly in emergency situations where mills ran the risk of having to shut down.

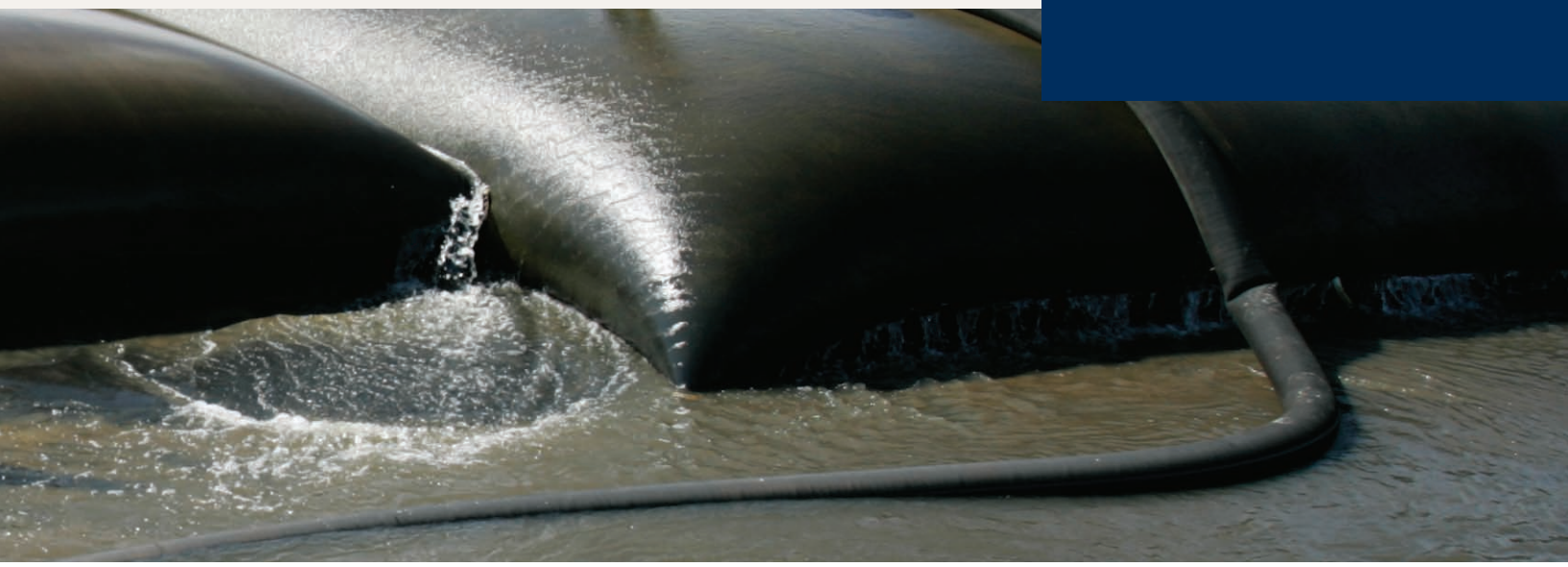
Geotube® containers in activated sludge basin at paper plant.

Case Study

application	**Cleanout of Black Liquor Lagoon**
location	**St. George, NB**
product	**Geotube® Dewatering Technology**

The black liquor sludge lagoon at the Lake Utopia paper mill was full and in danger of overflowing. To solve this problem, 1,400 linear feet of Geotube® containers were placed in a landfill area and were used to dewater and contain the material dredged from the lagoon.

The process took less than seven days. Over 19,800 cubic yards of material were dewatered, and they solidified within the Geotube® containers to more than 50% in about three months. The containers will remain in the landfill permanently.



Case Study

application	**Dewatering of Acidic Mine Tailings**
location	**Skytop Mountain, PA**
product	**Geotube® Dewatering Technology**

During the construction of I-99 in Pennsylvania, workers unearthed more than 700,000 cubic yards of pyritic rock left over from mining. The acid runoff from this material threatened local streams and groundwater. The solution: a process using Geotube® dewatering technology.

The pyritic rock is crushed and treated with a neutralizing agent. Acid runoff from this process is collected in sediment ponds, which is treated and pumped through Geotube® containers. Water, clear and neutralized, flows from the Geotube® container without requiring further treatment.

Mining and Mineral Processing

Flexible Enough for Available Space

Mine tailings, coal sludge, and other materials can be managed and handled cost-effectively with Geotube® dewatering technology. Because Geotube® containers can be custom-sized to the application, they can be placed in available space between other structures, and removed once dewatering is complete. Geotube® dewatering technology is a cost-effective alternative to mechanical processes. It reduces disposal cost by consolidating higher solids with very little maintenance.

Gold mine tailings from barren and pregnant ponds dewatering in Geotube® containers.

Effluent can be pumped directly from the process; or if a clarifier/thickener is used, effluent from the underflow can be diverted through the Geotube® container, eliminating the requirement for an expensive mechanical dewatering device. Geotube® units can be used to capture fines, silts, and clays from the tailings effluent prior to discharge into the ponds or directly into streams. Geotube® units will separate and dewater the fines and allow disposal without expensive dredging and transporting operations. In some cases, conditioners or polymers are used to promote flocculation to improve solids retention and filtrate quality.

Geotube® containers can also be used to utilize the fines to build dikes and containment berms.

Power Generation

A Solution for Fly Ash and Bottom Ash

Power generation by-products such as fly ash and bottom ash can be a real challenge to remove and manage. But the simple technology of Geotube® dewatering allows facilities large and small to easily consolidate these materials—and make adjustments as needed based on volume.

Geotube® dewatering technology safely contains fly ash, preventing airborne particle contamination from windblown ash piles. The ash can then be used for road base applications or even to build up the berms around a lagoon to increase its capacity. In many fly ash operations, there is no need to add polymer to the dewatering process, making it simple and affordable.

Geotube® containers at fossil fuel power plant being used to dewater fly ash.

Case Study

application	**Dewatering of Boiler Ash**
location	**Camden, TX**
product	**Geotube® Dewatering Technology**

Geotube® dewatering technology was used for dewatering a lagoon containing approximately one million gallons of boiler ash, with solids 2.6% by dry weight. Previous dewatering attempts using a long stick Trac Hoe were only partially successful, and the sludge had been laid up on the bank of the lagoon to dry—not an ideal approach.

However, by using Geotube® dewatering technology, the facility was able to remove and dewater practically all the solids in the lagoon. After 30 days, the material had consolidated to 37% solids. It is estimated that this approach saved the power plant more than $60,000 annually.

Case Study

application	**Emergency Addition of 3x Septage Capacity**
location	**Rio das Ostras, Brazil**
product	**Geotube® Dewatering Technology**

The population of Rio das Ostras swells to three times its normal size during holiday season in Brazil, overloading the city's water treatment facilities. Geotube® dewatering technology was used to provide the extra capacity. In addition to dewatering units at the city's small wastewater treatment plant, a large scale septage receiving facility was constructed at the city's landfill, using 60-foot circumference x 200 foot long Geotube® containers.

The dewatering system was so efficient that effluent could be filtered through a reed bed and discharged into local waterways without additional treatment.

Water and Wastewater Treatment

For Applications Large and Small

Geotube® dewatering technology has been used in water and wastewater treatment applications including lagoon, tank, and digester cleanouts. It can provide dewatering and containment in one operation, with 85% to 90% reduction of BOD in the effluent.

Geotube® dewatering technology can be used seasonally, with solids safely stored onsite between uses. It works even with fine-grained sediments, and solids can be disposed of in a landfill or land applied. It can also be a very effective way of handling septage, either at a private receiving station or a municipal site.

Units available in sizes to fit drying beds. There is also a unit designed to fit in a roll-off box (Geotube® MDS) for convenience.

Geotube® unit in municipal wastewater treatment drying beds.

Light Industrial

Managing an Ongoing Challenge

For many industrial applications, dewatering is a necessary evil. It disrupts operations, adds cost, and requires complicated and expensive equipment. But this doesn't have to be the case. One of the real values of Geotube® dewatering technology is that it can provide a quick lagoon cleanout solution, or it can add capacity by making drying beds much more efficient.

In some cases, companies have dewatered the material in their lagoons using Geotube® dewatering technology, then used the solid-filled Geotube® containers as berms to expand the capacity of their lagoons. Dewatering efficiency can be improved because Geotube® containers protect the dewatered solids from becoming saturated again in wet weather. And Geotube® containers can be stacked on top of each other to further add capacity.

Water draining from a Geotube® container.

Case Study

application	**Dewatering Adhesive Production Residuals**
location	**Panama City, FL**
product	**Geotube® Dewatering Technology**

The residual material left over from Arizona Chemical's adhesive production process contains inorganic compounds and is too abrasive to dewater with a belt press. Geotube® dewatering technology proved a more effective solution.

The dewatered cake solids from Geotube® dewatering technology far exceeded any other form of dewatering previously utilized. This increase in efficiency saved 38% over belt press dewatering—plus a 50% reduction in time to complete the job. Because the dewatering efficiency was so much greater and the cake solids drier, there was a 40% reduction in disposal costs.

Case Study

application	**Farm Lagoon Cleanout**
location	**New Bern, NC**
product	**Geotube® Dewatering Technology**

A hog farm lagoon had reached capacity and was in need of cleanout. Geotube® dewatering technology was used as a simple, effective way of accomplishing this.

Solids at 4% were pumped from the lagoon. These dewatered to over 25% in the Geotube® container. The container retained 93% of solids, plus 78% of nitrogen and 90% of phosphorous.

The costs for dewatering were less than 1/2 cent per gallon of the sludge pumped.

Agriculture

Ideal for Swine, Dairy, Poultry, and Other Uses

Geotube® dewatering technology is an effective way for managing waste from Confined Animal Feeding Operations (CAFO's). It works for lagoon cleanout and closure, and manages nutrients very effectively (over 90% phosphorous and heavy metal removal; 50% or greater nitrogen reduction). It also controls odor and produces irrigation quality effluent water.

Geotube® dewatering technology is designated as a Practice Standard (Federal Practice Number 632) by the USDA NRCS (Natural Resource Conservation Service). As such it can qualify for up to 75% matching funds under the Environmental Quality Incentives Program (EQIP). Ask your TenCate Geotube representative for more details.

You can even set up a Geotube® dewatering system inline, so you prevent solids from entering a lagoon. You store water for irrigation, not waste you have to deal with later. The system doesn't interrupt other operations.

Geotube® dewatering technology used in agricultural applications qualifies for EQIP funding.

Aquaculture

Simple, Cost-Effective Waste Removal for Applications Large and Small

Now approved as a Best Management Practice for Aquaculture by the State of North Carolina, Geotube® dewatering technology works for fresh water or marine finfish, shrimp, and other aquatic species. It simplifies the process for water recirculation, and retains more than 99% of suspended solids.

Geotube® dewatering technology reduces nutrient loading in filtrate. It can be used continuously or intermittently year-round in most climates. It is ideal for lagoon, retention pond, and filter waste applications. It can be used for cage waste removal, benthic table waste cleanup, recirculation waste removal for hatcheries, and processing plant waste dewatering. Dewatered solids can be land applied or disposed of in a landfill.

Aquaculture benthic deposit water before and after Geotube® treatment.

Geotube® dewatering technology has been tested extensively in programs at North Carolina State University, Freshwater Institute, Mote Marine Aquaculture Park, and Virginia Institute of Technology. More importantly, Geotube® dewatering technology has been used in the field with solid success.

Test Your Material

A simple bench-scale test can determine if Geotube® dewatering technology is right for your application.

Our Geotube® Dewatering Test (GDT) uses an actual sample of the material you need dewatered. The results from this test have been proven to be an accurate indicator of how Geotube® dewatering technology will work in full-scale operation. You can effectively estimate effluent quality, solids, and dewatering rates.

See your TenCate representative to schedule a test for your material.

See Our Presentation

To learn more about this technology, we invite you to look at our CD presentation, which provides detailed information. We can even schedule "lunch and learn" sessions for larger groups. For details, visit www.geotube.com or call 888-795-0808.

TenCate™ develops and produces materials that function to increase performance, reduce cost and deliver measurable results by working with our customers to provide advanced solutions.

TenCate Geosynthetics N. America
3680 Mount Olive Road
Commerce, GA 30529
USA
Tel 706 693 1897
Toll free 888 795 0808
Fax 706 693 1896
Email: m.torre@tencate.com

TenCate Industrial Zhuhai Co., Ltd,
South of Nangang Road W,
Harbour Industrial Zone,
Zhuhai 519050
China
Tel: +86-756-886 1616
Fax: +86-756-886 1610
Email: info.zhuhai@tencate.com

TenCate Geosynthetics Europe
PO Box 9
7440 AA Nijverdal
The Netherlands
Tel +31 546 544811
Fax +31 546 544490
Email: m.terharmsel@tencate.com

TenCate Geosynthetics Asia Sdn Bhd
14, Jalan Sementa 27/91, Seksyen 27,
40400 Shah Alam
Selangor Darul Ehsan
Malaysia
Tel +60 3 5192 8568
Fax +60 3 5192 8575
Email: info.asia@tencate.com

3680 Mount Olive Road
Commerce, GA 30529

Tel 888 795 0808
Tel 706 693 1897

Fax 706 693 1896
www.geotube.com

QUALITY ASSURANCE GAI-LAP ACCREDITED LABORATORY

TENCATE™
materials that make a difference

CHEMCO inc.

SOLUTIONS AND ENVIRONMENTAL PRODUCTS
WATERS - SOILS - AIR

CHEMFLOC CTT 7556

MATERIAL SAFETY DATA SHEET

SECTION 1 Identification

Nom : CHEMFLOC CTT 7556
Synonym : cationic water-soluble polymer
Usage: Floculant

Company: Chemco inc.
124 de Hambourg
Saint-Augustin-de Desmaures
(Québec) G3A 0B3
Phone : 418-878-5422

Emergency Phone
613-996-6666 (24 hours)

SECTION 2 Hazard Identification

WHMIS Classification:

Class D2B

SECTION 3 Composition / information on ingredients

	CAS Number	%	Exposure Criteria
Hexanedioc-acid	124-04-09	1.0 – 5.0	>2000 mg/Kg (DL_{50} rat-oral)

SECTION 4 First-aid measures

Emergency & First Aid Procedures:

Inhalation: remove affected person to fresh air and treat symptomatically.
Ingestion: Do not induce vomiting. Seek medical attention immediately.
Skin Contact: wash off immediately with water for 30 minutes.
Eye Contact: flush with water for 30 minutes and seek medical attention.

Effects of Overexposure:
Inhalation: Dust may cause some respiratory irritation
Ingestion: May cause discomfort, nausea and vomiting
Skin Contact: may cause slight irritation
Eye Contact: may cause slight irritation and/or redness

Chronic Exposure
Carcinogenic Effects: None known.
Mutagenic Effects: None known.
Teratogenic Effects: None known.

SECTION 5 Fire-fighting measures

Flash Point (& Method Used)	Flammable Limits in Air % v/v		Auto Ignition Temperature
	Lower	Upper	
Not Applicable	N.A.	N.A.	N.A.

Extinguishing Media: Dry Chemical; Foam; CO_2, Water

Special Firefighting Instructions:
Wear self-contained breathing apparatus and full protective equipment. Use extinguishing techniques appropriate to the primary cause of the fire. Spills are very slippery.

Ususual Fire and Explosion Hazard:
None Known

SECTION 6 Accidental release measures

Action if Material is Released or Spilled:

Avoid runoff to storm sewers and ditches which lead to waterways. Avoid raising dust. Sweep up and shovel into suitable containers for disposal. Spills are very slippery.

SECTION 7 Handling and storage

Precautions to be taken in Handling and Storage:

Avoid eye and skin contact. Avoid creating dusty condition. Do not inhale. Keep container tightly closed in dry, cool and well-ventilated place.

Other Precautions:

For Industrial Use Only. Keep out of reach of children. Spills make floors slippery.

SECTION 8 Exposure Controls / personal protection

Ventilation Requirements	-	Use sufficient ventilation. Do not breathe dust.
Respiratory Protection	-	Wear a NIOSH approved respirator as necessary.
Eye Protection	-	Wear chemical goggles or safety glasses.
Gloves	-	Wear chemical resistant gloves.
Other Protective Items	-	Usual protective clothing and depends on the type of work performed.

SECTION 9 Physical et chimical properties

Boiling Point, 760 mm Hg	N.A.	Melting Point	N.A.
Freezing Point	N.A.	Vapor Pressure	N.A.
Specific Gravity	0.7	Solubility in Water	Form viscous solution
Vapor Density	N.A.	Evaporation Rate	N.A
% Volatiles	N.A.	pH (1% solution)	N.A.
Appearance and Odour	White solid, mild odour		

SECTION 10 Stability et reactivity

Stabilité	-	Stable.
Conditions to Avoid	-	Avoid humidity. Avoid temperature extremes.
Incompatibility	-	Strong Oxidizing agent.
Hazardous Decomposition Products	-	No decomposition expected under normal storage conditions.
Hazardous Polymerization	-	None
Conditions to Avoid	-	None

SECTION 11 Toxicological information

Not established.

SECTION 12 Ecological information

Not established.

SECTION 13 Disposal considerations

Waste Disposal Method :

Dispose according to federal, provincial and local regulations.

SECTION 14 Transport information

Transportation of Dangerous Goods Classification:

Not classified as a dangerous good under transport regulations.

SECTION 15 Regulatory Information

All components of this material are listed on the TSCA inventory and are included on the Canadian DSL.

SECTION 16 Other information

Prepared By: Claude Grenon, Chemist
Phone 418-878-5422

Definitions: N.A. = not applicable N.E. = not established

While to the best of our knowledge, the information contained on this MSDS is accurate at the time of preparation, we cannot guarantee the content. The user is responsible for determining whether the product is suitable for its intended conditions of use.