Nunatta Environmental Services in Iqaluit NU NWB# 1BR NUN-1217

Memo to: Nunavut Water Board

From: Jim Wilson, General Manager, Nunatta Environmental Services Inc., Iqaluit, NU

Re: Application to Reconstruct and Rehabilitate Cells # 1 and # 2 at Nunatta's land farm in Iqaluit, NU, 2013 - 2014

Date: June 14, 2013

Background

Nunatta Environmental Services Inc began in 1999 and in 2002 it bought the land it calls home on the Federal Rd, Iqaluit NU. This Land was bought from a local building company who had constructed 2 geotextile lined cells on the property to store contaminated soil removed from a building site in the down town area.

Proposal

This memo is to describe and seek approval from the Nunavut Water Board for our plans to reconstruct and rehabilitate these two older cells over a two year period beginning in the forthcoming summer of 2013.

Records show a 20 mil liner was ordered from Layfield in August 2000 so it would have been installed in the summer of 2001. The other cell was constructed prior to this time. We are unsure of the year but we have to assume it too was constructed using 20 mil material. We have reason to believe these 2 liners have to be replaced after conversation with Layfield the manufacturer of the geotextile liners. According to the Layfield representative the life expectancy on 20 mil liners is approx 8-9 years. This life

expectancy period has been exceeded and we believe they could pose a problem in the near future as the material degrades. This spring we have noticed small cracks and holes appearing on the top of the cell walls where liner is constantly exposed to sunlight and have concluded the liners are failing and need to be removed from service. As the cells exist now there is a layer of heavy clay based soil over a 6 inch layer of clean sand which has not been disturbed as long as the current management has operated Nunatta Environmental Services. There are no files or records prior to this that speak about how much material was left undisturbed when aeration took place within the cells, but we are convinced the floor material is sealed. Our fear is at some point the liner will crack or tear under either soil or water levels and we will not be able to detect it right away. These locations are where liner is exposure to sunlight has weakened the plastic liner. A crack or tear in this location will be very hard to detect and will only be visible when runoff water has dried up. By the time the fracture is detected we will likely have experienced leaching of contaminated water into the sub-soils layer. The new standard is for cell liners to be constructed out of 30 mil material. We feel it is to our advantage to go with 40mil for the added strength and added life expectancy. 40mil should extend liner life to 25 years. With the added thickness of the oversize liner and the use of LP16 a non woven cloth under the liner and on top of the liner security against leaks, the result will be more than double of that of a plain liner of same thickness. Layfield recommends use of LP8 non woven cloth under the liner as standard installation practice to protect against puncture and allow liner to be pulled into position easier reducing tears and wrinkles. After consulting with engineers at Layfield we determined the use of cloth top and bottom of liner to be the strongest possible solution for sharp cornered rocks and deep freezing conditions of the Arctic Climate.

There are two reasons for improving cell #2 before work on cell #1

1st. Replace the existing 20 mil liner with a new improved 40 Mil liner, by adding a protective layer both below and on top of the new liner this will further guard against punctures and leakage.

2nd. To expand cell #2 to an equipment usable length. At present our screening plant is so long it does not permit loaders to move around in the cell to remove rocks and cobbles and there is no place to stack aerated material. This cell is basically useless as a place to aerate soil or even store soil for cleaning, as a result it is used as a road into cell #3 and we house rocks and cobbles until they can go to crushers. Another problem encountered with this cell is water control due to uneven wall height around the perimiter. This limits water capacity, resulting of a lot of monitoring and pumping in spring of the year during snow melt and after heavy rains. Construction of a new cell

with better wall designed would eliminate a lot of risk associated with this old design and small size.

For this reason it is best to start by removing rocks and soil, then dig up the liner from Cell #2 as it is the least functional cell at the landfarm. Reshaping of the berm walls and increasing the length to 70 meters then install LP16 cushion material and 40 Mil liner are the improvements we wish to do. The width will remain the same and part of the existing retaining wall will be used again. This will ensure safer storage of hydrocarbon contaminated soils and will permit proper aeration and working of soils, speeding up remediation and allowing us to release soils sooner. It will also ease water management and containment of oil-impacted water within the containment berm.

Cell #1 which I believe was constructed of the same 20 mil material and a year or two earlier will then be emptied of contaminated soil this soil can go into cell #2. Cell #1 liner will be removed removed and replaced with new 40 Mil liner but not this year. Plans are do this next summer. With Cell #2 completed this summer we will have storage for the soils removed from cell #1 so as not to contaminate existing soils held in cell #3 and #4.

We would like to ask the board if they could consider this at this time to allow us to plan the replacement of the liner of cell #1 next summer with no modifications to size. The outside dimension would remain the same as existing cell but the walls would be made even in height to allow better water handling and one corner would be sump to permit water pumping from one location instead of 3 or 4 as it is now. Our plans are to replace liners in both #1 and #2 cells and making improvements to these cells to allow modern soil remediation techniques to be used.

In the past many landfarms were built to store contaminated soils. Staff at Nunatta have discovered new methods to reduce the remediation time in hydrocarbon contaminated soils to a few years longer than it takes in a southern climate. These new methods are being tested by University of Saskatchewan Soil Toxicology department and we will have documented proof when trials finish in 2015. In the mean time we have just received permission to release the soils from our finishing cell #3. Permission was granted By Robert Eno Head of Environment, Government of Nunavut. These soils were delivered to our facility from above ground storage tank leaks and equipment failures over past years. These hydrocarbon-impacted soils underwent remediation by Nunatta Environmental at its Iqaluit Landfarm. Through diligent aeration, constant tilling and rotation of these soils, Nunatta estimates that in less than 5 years this material will be remediated to meet CCME standards. We feel this is a major accomplishment given the climate we live and work in. Our plan is to continue to improve on soil remediation technique and this will allow us to share this improved procedure with communities, mines and businesses which have landfarms with slow or no degradation. These

stagnant piles of contaminated soil end up sitting in place for many years before they are pushed out and covered without proper treatment. Finding methods to reduce time and simplify the process is what has to happen and we feel Nunatta is on the forefront of this work.

Respectfully submitted,

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James Wilson, VP Operations

cc. Pitseolak Shoo, President, Nunatta Environmental Services Inc.

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ᑎᑎᕋᕐᑕᖅ: ᓄᓇᕗᒻᒥ ᐃᒪᓕᕆᓂᕐᒧᑦ ᑲᑎᒻᒪᔨᓄᑦ

ᐅᕙᖓᕐᓱᓂ: ᔨᒻ ᐅᐃᓪᓴᓐᒥᑦ ᐊᖏᔪᖅᐸ ᑐᖏᓕᐊ ᓄᓇᑦᑕ ᐊᕙᑎᓕᕆᔨᖏᑕ ᑎᒥᖓᓐᓂᑦ ᐃᖃᓗᓐᓂ ᓄᓇᕗᒻᒥ

ᐅᕐᓱᐊᓗᒧᑦ ᑯᕕᕕᒥᓂᕐᒥᑦ ᓯᐅᕋᖃᐅᑦ #1 ᐊᒻᒪᓗ #2 ᓄᓇᑦᑕ ᐊᕙᑎᓕᕆᔨᖏᑕ ᑎᒥᖓᑦ ᓯᐅᕋᖃᐅᑎᖓᑦ

ᐊᓯᑦᔨᓇᐊᖅᑲᕐᓂᖏ ᑕᑯᐊ ᒪᕐᕈᒃ ᑕᒐ ᑕᓐᓇ ᑐᑦᓯᕋᐅᑎᐅᕗᖅ ᐊᓯᑦᔨᒍᒪᓪᓗᑎᒃ ᐊᕐᕋᒍ 2013 ᐊᒻᒪᓗ 2014

ᐅᓪᓗᑎᓪᓗᒍ ᑎᑎᕋᕐᑯᑦ ᔪᓂ 14, 2013

ᖃᓄᐃᓕᖓᓚᐅᕐᓯᒪᓂᒥᓂᖓ

ᓄᓇᑦᑕ ᐊᕙᑎᓕᕆᔨᖏᑕ ᑎᒥᖓᑦ ᐱᕆᐊᓚᐅᕐᓯᒪᕗᖅ ᒪᑐᐃᓚᐅᕐᓯᒪᕗᖅ 1999ᒥ ᐊᒻᒪᓗ 2002ᒥ ᓇᔪᕐᑕᖓ ᒪᓐᓇ ᓂᐅᕕᐊᖑᓚᐅᕐᓯᒪᕗᖅ ᓯᐅᕋᑦᑕᕐᕕᐅᑉ ᓴᓂᐊᓂ ᖃᖅᑲᒥᐅᑦ ᒥᑦᓯᓂᓐᓂ. ᑕᓐᓇ ᓄᓇᐅᔪᖅ ᓂᐅᕕᐊᓇᔭᐅᓚᐅᕐᓯᒪᕗᖅ ᐃᓪᓗᓕᐅᕐᓂᕐᒥᑦ ᓇᒻᒥᓂᓕᓂᑦ ᑕᒃᑯᐊᓗ ᓴᓇᔪᒥᓂᐅᓪᓗᑎᒃ ᒪᕐᕈᓂᒃ ᐅᕐᓱᐊᓗᒻᒧᑦ ᑯᕕᕕᒥᓂᕐᒥᑦ ᓯᐅᕋᖃᐅᑎᐅᔪᓐᓂᒃ ᑕᒃᑯᐊᓗ ᐊᕿᑦᓯᕕᒥᓂᐅᓪᓗᑎᒃ ᐊᐅᑦᑕᔪᐸᐅᔾᓗᒥ ᖃᓪᓗᓇᕐᑕᒥᑦ ᓱᕐᓗ ᐅᕐᓱᐊᓗᒃ ᓯᐊᒻᒪᓂᐊᖏᒻᒪᑦ ᓄᓇᒧᑦ ᐃᖃᓗᓐᓂ ᑯᕕᑦᓯᑲᓪᓚᖅᑲᓚᐅᕐᓯᒪᓐᓂᕐᖓᑦ.

ᑐᑦᓯᕋᐅᑎᐅᔪᖅ ᐃᒪᐃᓕᖓᓂᖓ

ᐅᓇ ᑎᑎᕋᕐᑕᕗᑦ ᑐᑭᓯᑦᑎᑦᓯᕆᐊᕈᑎᐅᕗᖅ ᐊᐱᕆᐅᑎᐅᓪᓗᓂᓗ ᓴᓇᕆᐊᕈᓐᓇᕐᒪᖓᑦᑕ ᒪᕐᑭᔪᓐᓂᒃ ᐱᑐᖃᐅᔪᓂᕐᐸᓐᓂᒃ ᓯᐅᕋᖃᐅᑎᐅᔪᓐᓂ ᐅᕐᓱᐊᓗᒧᑦ ᑯᕕᕕᒥᓐᓂᔪᓂ ᑕᒃᑯᐊ ᒪᕐᕈᓂ ᐊᕐᕋᒍᔪᓂᒃ ᑲᒪᒋᔭᐅᓚᔭᕐᑯᖅ ᐱᕆᐊᕐᓗᑎᒃ ᐊᐅᔭᒥ 2013 ᐊᐱᓇᕗᒧᑦ ᓄᓇᕗᑦ ᐃᒪᓕᕆᓂᕐᒧᑦ ᑲᑎᒻᒪᔨᖏᓐᓂ.

ᑎᑎᖅᑲᑎᒍᑦ ᓇᓗᓇᖏᓚᖅ ᑎᑭᓴᐃᓚᐅᕐᓯᒪᔪᒥᓂᐅᔪᒧᑦ 20-mil ᐃᑦᔪᑎᕆᔪᒥ ᑎᑭᓴᐃᕕᒻᒥ ᓚᐃᕕᑦᑯᓐᓂᒃ

ᐊᐅᒍᓯ 2000ᖑᑎᓪᓗᒍ ᐊᒻᒪᓗ ᑕᓐᓇ ᓯᐅᕋᖃᐅᑎᐅᔪᖅ ᐊᕿᑦᑕᐅᓴᖑᐊᕐᑐᒥᓂᒃ 2001-ᒥᑦ. ᐊᐃᐸᖓᓕ ᓯᐅᕋᖃᐅᑎᐅᔪᖅ ᐊᕿᑦᑕᐅᔪᒥᓂᐅᔪᖅ ᑕᓐᓇ ᐊᕿᑦᑕᐅᓚᐅᕐᑎᓐᓇᒍ. ᓇᓗᓇᓐᑐᖅ ᖃᖓᒃᑯᑦ ᐊᕿᑦᑕᐅᔪᒥᓂᐅᒻᒪᖓᖅ ᑭᓯᐊᓂ ᐊᐅᑦᑕᔪᖓ ᖃᓪᓗᓇᕐᑕᐅᔪᖅ ᐃᑦᔪᑎᕆᓂᖓ ᑕᐃᒪᐃᑦᑐᓴᐃᓐᓇᐅᒍᓇᐅᕗᖅ.

ᑐᑭᓯᓯᒪᓕᕐᑯᒧᑦᑐ ᑎᑭᓴᐃᕕᕕᓂᑎᓐᓂᑦ ᐅᖃᕐᓯᒪᕗᑦ ᐅᕙᑎᓐᓄᑦ ᑕᒃᑯᐊ ᒪᕿᔪᒃ ᐱᑐᖄᐅᓂᕐᐸᖕᒍᔪᒃ ᐊᓯᑦᔨᕆᐊᖅᑲᕆᐊᖏᒃ. ᑕᒃᑯᐊ ᑎᑭᓯᐃᕕᕆᓱᕗᑦ ᐅᖃᕐᓯᒪᕗᑦ ᑕᒃᑯᐊ ᐊᐅᑦᑕᔪᐸᐅᔭᑐᐃᑦ ᖃᑦᑐᓇᕐᑕᐃᑦ ᓱᕐᑐ ᐃᓄᓯᖅᓱᖕᒍᕗᑦ 8-ᓂᒃ ᐅᕙᑐᓐᓂᑦ 9-ᓂᒃ ᐊᕐᕋᒍᓂᒃ ᓱᕐᑐ ᐊᓕᑦᑐᓴᐃᓕᕐᓱᑎᒃ ᑭᑦᓚᓴᕋᐃᓕᕐᓱᑎᒃ ᓱᕐᑐ ᓯᐅᕋᖅ ᐅᕐᓱᐊᑐᐃᓐᓇᖅ ᓯᐊᒻᒪᐸᑦᓕᐊᓕᒍᓐᓇᕐᖓᑦ ᐅᕐᓱᐊᑐᐃᓐᓇᐅᖏᑐᒧᑦ. ᒪᓐᓇᐅᔪᖅ ᐅᐱᕐᖓᓴᖅ ᖃᐅᔨᓚᐅᕐᑯᒧᑦ ᑕᒃᑯᐊ ᒪᕿᒃ ᓯᐅᕋᖃᐅᑎᐅᔪᒃ ᐊᓕᑐᕐᓂᖃᓕᕐᓂᖏᓐᓂᑦ ᓱᕐᑐ ᐊᑭᓐᓇᖏᓂ ᑕᒃᑯᐊ ᐱᐅᖏᓕᒪᑎᒃ ᐊᓯᑦᔨᕆᐊᖃᓕᕐᑐᒐᑐᐊᒃ. ᒪᓐᓇᐅᔪᖅ ᐊᖏᔪᖃᖓᑦ ᓄᓇᑦᑕ ᐊᕙᑎᓕᕆᔨᖏᑕ ᖃᐅᔨᒪᕗᖅ ᓯᐅᕋᖃᐅᑎᔪᑦ ᓄᑕᖕᒍᓂᕐᓴᐃᑦ ᐊᑕᓂ ᐊᕿᓯᒪᕕᐅᕗᑦ ᒪᕐᕋᓚᓕᒥᑦ ᑕᑦᓱᒪᑐ ᖃᖓᒍᑦ ᐃᑦᔨᑎᕆᔨᒥᑦ ᐃᓯᒐᐅᐸ ᐊᕙᖓᓂ ᓯᐅᕋᕐᒥᑦ ᓴᓗᒪᔨᒥᑦ ᐃᓕᓯᒪᕕᐅᑦᑐᓂ ᓱᕐᑐ ᑭᑦᓚᑦᓯᒪᖏᑐᑦ ᐊᐅᑦᑕᔪᐸᐅᔭᑐᖏᑦ ᖃᑦᑐᓇᕐᑕᐃᑦ. ᑕᒃᑯᐊ ᓯᐅᕋᖃᐅᑎᐅᔪᑦ ᐃᑐᐊᓂ ᓯᐅᕋᖏᑦ ᐅᕐᓱᐊᑐᐃᓇᐃ ᓴᓗᒪᓴᕐᑕᐅᓱᖕᒎᒪᑕ ᓯᐅᕋᖏᑦ ᐊᐅᓚᑎᑕᐅᑦᑐᑎᒃ ᓱᕐᑐ ᑲᐃᕙᓂᐊᕐᖓᑦ ᐊᐅᓚᐅᑎᐸᐅᔭᑦᑐᒨᑦ ᑎᐸᐃᕐᓯᐊᓇᔭᐅᑦᑐᑎᒃ ᑭᓯᐊᓂ ᓇᑐᓇᕐᑐᑦ ᓇᑦᓕᖏᑦ ᓴᓗᒪᑦᓚᑕᕐᒪᖓᑕ ᐅᕙᑐᓐᓂᑦ ᓱᓕ ᓴᓗᒪᐃᒻᒪᖓᑕ ᓇᑐᓇᐃᕐᑕᐅᖃᑦᑕᖏᓐᓂᑯᖏᓐᓄᑦ ᑎᑎᕋᕐᓯᒪᔪᑎᒧᑦ ᑭᓯᐊᓂᓕ ᖃᐅᔨᒪᓚᑐᐊᕐᑐᒧᑦ ᐊᐅᑦᑕᔪᐸᐅᔭᑐᖏᑦ ᑭᓪᓚᐃᓐᓇᐅᖏᑦᑐᐃᑦ. ᐃᓱᒪᑐᑎᕆᔭᕗᑦᓕ ᖃᐅᔾᓵᐅᑎᕆᓂᖏᑯᑦᑕ ᐊᓕᑦᑐᓚᓗᒥᓂᕐᒥᑦ.
ᐊᐅᑦᑕᔪᐸᐅᔭᑐᖏᑦ ᓯᕿᓂᕐᒨᑦ ᓵᖏᓕᒍᓇᕐᖓᑦ ᑭᓕᓕᒪᖏᓂ ᓯᐅᕋᖃᐅᑎᔪᑦ ᑕᒃᑯᓴᐅᖏᓐᓇᖓᑦ ᓯᕿᓂᕐᒨᑦ ᑭᓯᐊᓂᓕ ᐃᒻᒪᓱᖕᒍᒥᒪᑕ ᐊᒻᒪᑐ ᑭᑦᓚᓂᖃᑕ ᑕᑯᑦᓴᐅᓚᔭᖏᒻᒪᑦ ᑭᑦᓚᑐᒥᓂᖅ ᐃᒪᖃᓐᓂᖏᓄᑦ ᑭᓯᐊᓂᓕ ᓴᑐᐊᖃᑕ ᖃᐅᔾᓚᔭᕋᑕ ᑭᑦᓚᑐᖃᕐᓂᖃᑦ ᐊᒻᒪᑐ ᓇᑐᓇᐳᓂᑕᐃᓇᕐᑐᓂ ᑭᑦᓚᐅ ᐊᑕᒍ ᑕᐃᒪ ᐅᕐᓱᐊᑐᐃᓐᓇᐅᓕᕐᑯᖅ. ᒪᓐᓇᐅᔪᖅ ᒪᓕᒐᖃᕐᐳᖅ ᐊᐅᑦᑕᔪᐸᐅᔭᑐᐃᑦ ᖃᑦᑐᓇᕐᑕᐃᑦ ᐃᑦᔨᑎᕆᓂᖏᑦ 30-mil ᖏᕆᐊᖃᕐᐳᑦ. ᐃᓱᒪᕆᔭᖃᕐᑯᒧᑦᓕ ᐅᕙᑎᓄᑦᑐ ᐊᑐᑎᖃᓚᖓᓪᒪᓇᑦᑐᓂ 40-mil-ᓂᒃ ᐃᑦᔪᓂᓕᒻᒥᑦ ᐊᑐᕈᑦᑕ ᐊᑯᓂᑲᓐᓂᖅ ᐱᐅᓚᔭᕆᐊᖏᓐᓂᒃ ᐊᑐᑯᑕᓐᓂᕐᓴᕆᑐᑎᒧᑦᑐ 25-ᓂᒃ ᐅᑭᐅᓂᒃ ᐊᑐᕈᓐᓇᑐᒍ. ᑕᐃᒪᓐᓇ ᐃᑦᔨᑎᕆᔨᒥᒃ ᐊᑐᕈᑦᑕ ᐊᒻᒪᑐ ᑕᑦᓱᒪ ᐊᑕᒍᑦ ᐊᑐᕈᑦᑕ LP16-ᒥᑦ ᖃᑦᑐᓇᕐᑕᒥᑦ ᐊᒻᒪᑐ ᐊᐅᑦᑕᔪᕋᑐᐸ ᖃᖓᒍᑦ ᐱᐅᓂᕐᓴᐅᒻᒪᕆᓚᔭᓕᕐᑯᖅ. ᑎᑭᓴᐃᕕᕆᓱᕗᑦ ᐅᕐᓱᐊᑐᐃᓇᐃ ᐅᖃᕐᓯᒪᕗᑦ LP8 ᖃᑐᓐᓇᕐᑕᖅ ᐊᐅᑦᑕᔪᕋᑐᐸ ᐊᑕᓄᕐᑐᒍ ᐱᓚᔭᕆᐊᖓ ᑭᑦᓚᒍᓇᐃᓕᑐᓂ ᐊᐅᑦᑕᔪᕋᑐᒃ ᐅᕙᑐᓐᓂᑦ ᐃᒧᑦᑐᒍᓇᐳᓂᕐᑐᓂ. ᐅᖃᓕᒪᖃᑎᖃᓚᐅᕐᑎᑦᑐᑕ ᓚᐃᕕᑦᒥᐅᓂᑦ ᑎᑭᓴᐃᕕᕆᓱᑎᓂᒃ ᐅᖃᕐᓯᒪᕗᑦ ᐊᐅᑦᑕᔪᕋᑐᐸ ᖃᖓᒍᑦ ᐊᒻᒪᑐ ᐊᑕᒍᑦ ᐱᐅᓂᕐᐸᐅᓚᔭᕆᐊᖓ ᐅᔭᕋᕋᓚᑦᑐ ᑭᑦᓚᐃᒍᓇᒥᒪᑕ ᐊᒻᒪᑐ ᓄᓇᕗᑦ ᐃᑭᓇᕐᑐᐊᑐᓱᖕᒍᑎᑦᑐᒍ.

ᒪᕿᓂᒃ ᐱᑦᔨᑎᖃᕐᑯᒧᑦ ᐱᐅᓯᒋᐊᑲᓐᓂᕈᓐᓇᐅᑎᖓᓂᒃ ᓯᐅᕋᖃᐅᑦ #2 ᓯᐅᕋᖃᐅᑦ #1 ᑲᒪᒋᒋᐊᓚᐅᖏᑎᓐᓂ.

ᓯᕗᑦᓕᕐᐸᖅ: ᐊᓕᒍᓐᓇᕐᑯᖏᑦᑐᒍ ᓱᕐᑐ ᑯᑐᕐᕕᖃᕐᑯᓇᒍ ᐊᐅᑦᑕᔪᐸᐅᔭᑐᒃ ᒪᓐᓇᐅᔪᖅ 20-mil-ᓂᒃ ᐃᑦᔪᓂᖃᕐᖓᑦ ᐊᓯᑦᔨᕈᒪᕙᕗᑦ ᐃᑦᔪᓂᓕᒻᒥᒃ 40-mil-ᓂᒃ ᐊᒻᒪᑐ ᐊᑕᒍᑦ ᖃᖓᒍᑦᑐ ᐃᓕᓯᕕᕆᑐᒍ ᖃᑐᓐᓇᕐᑕᒥᑦ.

ᐊᐃᐸᖓ ᐱᑦᔨᑎᐅᔪᖅ: ᓯᐅᕋᖃᐅᑎᐅᔪᖅ #2 ᐊᖏᑦᓕᕆᐊᕈᒪᕙᕗᑦ ᓴᓕᒍᑎᓚᓐᓂᒃ ᐊᑐᕈᓐᕕᐅᓂᐊᕐᖓᑦ. ᒪᓐᓇᐅᔪᖅ ᒥᑭᑐᐊᕐᓂᖓᓄᑦ ᓴᓕᒍᑎᓚᐃᑦ ᐊᐅᓚᑎᑦᑐᕆᑦ ᑕᐃᑲᓂ ᐃᓂᖃᕆᒻᒪᑦ ᐊᒻᒪᑐ ᐊᐅᓚᐅᑎᐊᑐᒃ ᑲᐃᕙᒍᑎᑦᓯᔨ ᓯᐅᕋᕐᓂᒃ ᐃᓂᖃᕆᒥᒻᒪᑦ ᐊᒻᒪᑐ ᓯᐅᕋᐃᑦ ᐊᕕᑦᑐᕐᓯᒪᕕᖃᕆᒪᑕ ᑕᐃᑲᓂ ᐊᕕᑐᕐᓯᒪᑐᑎᒃ ᑎᐸᐃᕐᓯᒍᓐᓇᕐᖓᑕ ᓯᐅᕋᐃᑦ. ᑕᓐᓇ ᓯᐅᕋᖃᐅᑦ ᐊᑐᓇᐊᑐᐃᓐᓇᑎᑐᑦ ᐊᑐᕐᑕᐅᓱᖕᒍᕗᑦ ᐃᓯᒪᑐᓂ ᓯᐅᕋᖃᐅᑦ #3-ᒧᑦ ᑕᓐᓇᓕ ᐃᓂᖃᕐᕕᐅᒪᑦ ᐅᔭᕋᓄᑦ ᐊᒻᒪᑐ ᐅᔭᕋᕋᓚᓄᑦ ᓴᑐᒪᓴᐃᕕᐅᒪᑦᑐ ᑕᒃᑯᓄᖓ ᓴᑯᐃᓚᐅᖏᓂᑎᓐᓂ ᓯᖃᓕᕕᒧᑦ ᐅᔭᕋᓄᑦ ᓱᕐᑐ ᓴᑐᒪᔪᓕᕐᖓᑕ. ᑕᓐᓇᑐ ᓯᐅᕋᖃᐅᑎᐅᔪᖅ ᐃᒪᖃᓕᕋᐃᒻᒪᑦ ᓯᓚᑎᖓ ᐊᑦᔨᒋᖏᑐᐊᕐᓂᖏᓐᓄᑦ ᒪᐅᖓᑐᐃᓐᓇᖅ ᑯᕕᓂᐅᓴᒻᒪᑦ ᐃᒥᖓ. ᒥᑭᑐᐊᕐᓂᖓᓄᑦ ᑕᑕᓚᑦᓯᓂᐅᓴᓱᖕᒍᒻᒪᑦ ᐱᑐᐊᕐᑐᒥᑦ

ᓯᓚᓗᑦᑐᒥᓂᐅᑎᓪᓗᒍ ᐅᕙᓗᓐᓂᑦ ᐊᐳᑎ ᐊᐅᒻᒪᑦ ᐅᐱᕐᖓᑦᓴᒥ. ᐊᖏᓂᖅᓴᐅᓕᕐᑎᓪᓗᒍ ᑕᒪᓐᓇ ᐃᓱᒪᓗᒋᒋᐊᖅᑲᕈᓂᕋᔭᖅᑯᒍᑦ ᐊᑭᓐᓇᖏᑦᓗ ᐊᖏᓂᖅᓴᐅᓕᕐᑎᓪᓗᒋᑦ ᓯᐅᕋᖅᑲᐅᑎᐅᔪᑉ.

ᐅᑐᕐᓂᖅᑲᖏᓂᕐᐸᖑᒻᒪᑦ ᓯᐅᕋᖅᑲᐅᑦ #2 ᐱᐅᓂᕐᐸᖑᕗᖅ ᐊᕿᒋᐊᕐᓂᕐᒥᑦ ᐱᒋᐊᕈᑎᒋᓗᒍ ᐱᔭᕐᓗᒋᑦ ᓯᐅᕋᖓᑦ ᐅᔭᕋᖏᓪᓗ. ᓱᕐᓗ ᑭᓪᓕᖏᑕ ᐊᑭᓐᓇᖏᑦ ᐊᖏᓪᓕᒋᐊᕐᓗᒋᑦ ᐅᑐᑎᒥ 70-ᒨᖓᓗᒍ ᐊᒻᒪ ᐊᕿᓕᕐᓗᒍ LP16 ᖃᓪᓗᓇᕐᑕᖅ ᐃᑦᔪᓂᖅᑐᖅ ᐊᒻᒪᓗ ᖃᖓᓄᕐᓗᒍ 40-mil ᐃᑦᔪᓂᓕᒃ ᐊᐅᑦᑕᔪᕋᓗᒃ ᑕᒪᓐᓇ ᐊᑐᕈᒪᔭᕋᓗᐊᕗᑦ. ᑕᑭᓪᓕᒋᐊᕋᔭᖅᑐᖅ ᑕᓐᓇ ᓯᐅᕋᖅᑲᐅᑦ ᐃᓚᖓ ᑭᓪᓕᖓᑕ ᐊᑭᓐᓇᖓ ᐊᓯᑦᕿᕋᔭᖏᑐᓚᓗᐊᖅ. ᐊᖏᓪᓕᒋᐊᕈᑎᒍ ᐃᖅᑲᓇᐃᔭᕐᕕᒥᓗᒍ ᐊᑲᐅᓂᖅᓴᐅᒐᔭᕐᒪᑦ ᓱᑲᓐᓂᖅᓴᒥᓪᓗ ᓴᓗᒻᒪᖅᓴᐃᒍᓐᓇᕐᔪᓗᑕ ᓱᑲᓂᖅᓴᒥᓪᓗ ᓴᑯᐃᒍᓴᕐᑯᓪᓗᑕ ᓯᐅᕋᕐᒥ ᓴᓗᒪᓕᕐᑐᒥᑦ ᐊᓯᐸᕐᑯᓇᕐᑯᓗᒍᓗ ᐅᕐᓱᐊᓗᐃᓐᓇᖅ ᓯᐅᕋᖅ. ᐊᒻᒪᓗ ᐃᒥᓕᓇᓕᖃᐃᒍᑕ ᑕᑦᓯᒪ ᐃᓗᐊᓂ ᐃᒥᖅ ᐅᕐᓱᐊᓗᐃᓐᓇᖅ ᑕᑦᓯᒪ ᓯᓚᑕᓄᕐᑯᓇᒍ.

ᓯᐅᕋᖅᑲᐅᑦ #1 ᓴᓇᔭᐅᓚᐅᕐᓯᒪᕐᑯᖅᑐᖅ ᐊᕐᖁ ᐊᑕᐅᓯᖅ ᐅᕙᓗᑭᐊᖅ ᐊᕐᖁᒃ ᒪᕐᕈᖅ ᑭᖑᓂᐊᓂ ᐃᑦᔪᓂᖅᑲᕐᑐᓂ 20-mil-ᓂ ᓯᐅᕋᖏᓪᓕ ᐃᓗᐊᓂᑦᑐᑦ ᓯᐅᕋᖅᑲᐅᑦ #2-ᒧᑦ ᐱᔭᕐᑕᐅᓚᔭᕐᑐᑦ. ᐊᒧᓕᕐᓗᒍ ᐊᐅᑦᑕᔪᕋᓗᐊ ᐃᓕᓯᕕᒋᖓᕐᓗᒍ ᓄᑕᒥᑦ 40-ᓂᒃ ᐃᑦᔪᓂᓕᒥᑦ ᐊᐅᑦᑕᔪᕋᓗᒥᑦ ᑭᓯᐊᓂ ᑕᕙᓂ ᐊᕐᖁᖏᑐᒥᑦ. ᑲᒪᒋᒍᒪᔭᑦ ᐊᕐᖁᓚᕐᑐᖅ. ᓯᐅᕋᖅᑲᐅᓪᓕ #2 ᑕᕙᓂ ᐊᐅᔭᒥ ᑲᒪᒋᒍᒪᔭᑦ ᓯᐅᕋᖅᑲᐅᑦ #1 ᒥᑐᑦ ᐃᓂᖃᓚᕐᖓᑕ ᐱᔭᕈᑎᒍ ᐊᒻᒪᓗ ᓯᐅᕋᖅᑲᐅᑦ #3-ᒥᑐᑦ ᐊᒻᒪᓗ #4-ᒥᑐᑦ ᓯᐅᕋᐃᑦ ᐊᑦᑐᐃᑲᓐᓂᕐᑯᖏᑦᓯᒋᑦ ᐅᕐᓱᐊᓗᐃᓇᕐᓂᒃ ᓯᐅᕋᕐᓂᒃ 1-ᒥᑐᓂᒃ ᐊᒻᒪᓗ 2-ᒥᑐᓂᒃ.

ᓯᕗᓂᑎᓂᓪᓕ ᓯᐊᕈ ᓯᐅᕋᖅᑲᐅᑎᐅᔪᑦ ᐅᕐᓱᐊᓗᐃᓐᓇᕐᓂᒃ ᐃᓕᓯᕕᐅᑐᐃᓐᓇᖃᑦᑕᕐᓯᒪᕗᑦ ᓴᓗᒻᒪᓴᕐᑕᐅᒐᑎᒃ ᓯᐅᕋᖏᑦ. ᐃᖅᑲᓇᐃᔭᕐᑎᓪᓕ ᓄᓇᑦᑕ ᐊᕙᑎᓕᕆᔨᖏᓐᓂ ᖃᐅᔨᓯᒪᓕᕐᑯᑦ ᖃᓄᖅ ᓱᑲᓐᓂᖅᓴᒥᑦ ᓴᓗᒪᖅᓴᐃᓂᕐᒥᑦ ᓯᐅᕋᕐᓂᒃ ᓱᕐᓗ ᐃᓄᐃᑦ ᓄᓇᖓᑦ ᐃᑭᓇᓗᐊᕐᓂᖓᓄᑦ ᐊᑯᓂᑲᓐᓂᐊᓗ ᓴᓗᒻᒪᕈᓇᕐᖓᑕ ᑕᐅᑐᓪᓗᒍ ᖃᓪᓗᓇᑦ ᓄᓇᖓᑦ, ᖃᓪᓗᓇᓪᓕ ᓄᓇᖓᓂ ᓴᑲᓐᓂᖅᓴᒥᑦ ᓴᓗᒻᒪᐃᒍᓐᓇᕐᖓᑕ ᐅᕐᑯᓂᖓᓄᑦ ᑕᐅᓇᓂ. ᐃᖅᑲᓇᐃᔭᖅᑲᑎᖅᑲᕿᑦᑕᓚ ᐃᓕᓐᓂᐊᕕᔪᒥᑦ ᓴᑲᑐᐊᓐᒥ ᑕᑯᐊᓗ ᖃᐅᔨᓴᕐᑎᐅᓪᓗᑎᒃ ᖃᓄᖅ ᓱᑲᓐᓂᖅᓴᒥᑦ ᓯᐅᕋᖅ ᓴᓗᒻᒪᕈᓐᓇᕐᓯᒪᖕᒪᖅ ᑎᑎᕋᕐᓯᒪᔪᑎᒍᑦ ᑎᑎᖅᑲᑎᒍᑦ ᖃᐅᔨᒍᒪᕐᑯᒍᑦ ᐊᕐᖁ 2015 ᑕᓐᓇᓗ ᒪᓕᒐᓇᓕᕐᓗᒍ ᖃᐅᔨᓴᕐᓂᒥᓂᐅᔪᖅ. ᒪᓐᓇᐅᔪᕐᓕ ᖃᐅᔨᑎᑕᐅᓯᒪᓕᕐᑯᒍᑦ ᓯᐅᕋᖅᑲᐅᑦ #3-ᒥᑐᑦ ᐅᑎᕈᓐᓇᓕᓇᐊᖏᑦ ᓯᐅᕋᐃᑦ ᓄᓇᒧᑦ ᓱᕐᓗ ᓴᓗᒪᓕᕐᖓᑕ. ᐊᖏᓚᐅᕐᑯᖅ ᕋᐳᑦ ᐃᓄ ᐊᖏᔪᖅᑲᓇᔭᐅᔪᖅ ᓄᓇᕗᑦ ᒐᕙᒪᑯᖏᑕ ᐊᕙᑎᓕᕆᔨᖏᓐᓄᑦ. ᑕᒪᓐᓇ ᐅᕐᓱᐊᓗᐃᓐᓇᒥᓂᖅ ᓯᐅᕋᖅ ᐊᖏᕐᕿᓇᔭᓂ ᐅᕐᓱᐊᓗᒥᑦ ᑯᕕᑲᓪᓚᑐᕕᓂᕐᓄᑦ ᑕᑯᓐᓇᖓᕐᓯᒪᖅ ᓱᕐᓗ ᐅᕐᓱᐊᓗᖅᑲᐅᑎᖏᑦ ᑭᓪᓕᖅᑲᓕᕐᓂᕐᖓᑕ. ᑕᒪᓐᓇ ᓯᐅᕋᖅ ᓴᓗᒻᒪᓴᕐᑕᐅᓯᒪᖕᒪᖅ ᓄᓇᑦᑕ ᐊᕙᑎᓕᕆᔨᖏᓐᓄᑦ ᐃᖅᑲᓇᐃᔭᕐᑎᖏᓐᓄᑦ ᓯᐅᕋᖅᑲᐅᑎᖓᓂ ᐃᖅᑲᓐᓂ. ᐅᕐᓱᐊᓗᐃᓐᓇᖅ ᓯᐅᕋᖅ ᑎᐸᐃᕐᓯᕐᓗᒍ ᐊᒻᒪᓗ ᑲᐃᕙᒍᑎᒧᑦ ᑲᐃᕙᑎᖅᑦᑕᕐᓗᒋᑦ ᕿᑲᑐᐃᓐᓇᖏᓪᓗᑎᒃ ᓱᑲᓐᓂᖅᓴᕐᑯᖅ ᓱᕐᓗ ᐊᕐᕌᒍᐃᑦ 5 ᑐᖓᓂ ᓴᓗᒻᒪᕈᓐᓇᕐᑯᑦ ᖃᐅᔨᓴᕐᑎᒻᒪᕆᓄᑦ ᖃᓄᐃᓕᔭᐅᔪᓐᓂᕐᑯᓂ. ᑕᒪᓐᓇ ᖃᐅᔨᒪᓕᕐᑕᕗᑦ ᖃᓄᖅ ᓱᑲᓐᓂᖅᓴᒥᑦ ᓴᓗᒻᒪᓴᕐᓂᕐᒥᑦ ᐱᒻᒪᓇᐅᑎᐅᔭᓇᕿᕙᕐ ᓄᓇᑦᑕ ᐃᑭᓇᕐᑐᐊᓗᓐᓂᖓᓄᑦ. ᐸᕐᓇᐳᒧᓪᓕ ᕿᓂᓐᓇᓕᖓᐳᒧᓪᓗ ᖃᓄᖅ ᓱᑲᓐᓂᖅᓴᒥᑦ ᓴᓗᒻᒪᐃᒍᓐᓇᕐᓯᒪᖕᒪᑦ ᓯᐅᕋᕐᓂᒃ ᐅᕐᓱᐊᓗᐃᓐᓇᕐᓂᒃ ᐃᑲᔪᑲᓐᓂᕐᓂᐊᕐᑕ ᓄᓇᓕᓐᓂᒃ, ᐅᔭᕋᕐᓂᐊᕐᑎᓂᓪᓗ ᐊᒻᒪᓗ ᓯᐅᕋᖅᑲᐅᑎᔪᓂᒃ ᐅᕐᓱᐊᓗᐃᓇᕐᓂᒃ ᑕᒃᑯᐊ ᓯᐅᕋᖅᑲᐅᑎᐅᔪᑦ ᕿᑲᑐᐃᓐᓇᕐᑐᑦ ᓴᓗᒻᒪᐃᖅᑲᑦᑕᖏᑐᑦ. ᑕᒃᑯᐊ ᓯᐅᕋᖅᑲᐅᑎᐅᔪᑦ ᐊᒥᓱᐊᓗᓂᒃ ᐊᕐᖁᓂᒃ ᕿᑲᑐᐃᓇᖓᑕ ᓴᓗᒻᒪᓴᕐᑕᐅᓪᓚᕆᓚᐅᕐᓯᒪᓕᓚᑎᒃ ᓯᐅᕋᖅᑲᐅᒥᑦ ᐱᔭᕐᑕᐅᓚᐅᕐᑐᑎᒃ ᓴᑯᐃᔭᐅᓪᓗᑎᒃ ᓄᓇᒧᑦ ᓴᓗᓯᒧᑦ ᓴᐅᔭᐅᑐᐃᓐᓇᕐᑐᑎᒃ. ᓄᓇᑦᑕ ᐊᕙᑎᓕᕆᔨᖏᑦ ᕿᓂᓇᕐ ᖃᐅᔨᓴᐃᓐᓇᕐᑐᑎᒃ ᖃᓄᖅ ᓱᑲᓐᓂᖅᓯᒥᑦ ᓴᓗᒻᒪᐃᒍᓐᓇᕐᓯᒪᖕᒪᑦ ᓯᐅᕋᕐᒥᑦ ᐅᕐᓱᐊᓗᐃᓐᓇᒥᑦ.

ᑎᑎᕋᕐᑐᖅ

ᔨᒻ ᐅᐃᓪᓴᓐ

ᐊᖏᔪᖃᑉ ᑐᖏᓕᖓ ᐊᐅᓚᓂᕐᒧᑦ

ᑎᑎᖃᐅᑉ ᐊᑦᔨᖓᓂᒃ ᐱᑦᓯᐅᓚᖅ ᓱᒧᕐᑐᖃᕐᑯᖅ

ᓄᓇᑦᑕ ᐊᕙᑎᓕᕆᔨᖏᓐᓄᑦ.