NWB Annual Report **Year being reported:** 2022

License No: NWB 1BR-NUN1828 **Issued Date:** April 11, 2018
Expiry Date: April 10, 2028

Project Name: Nunatta Environmental Services Inc. "Landfarm"

Licensee: Nunatta Environmental Services Inc. "NESI"

Mailing Address:
1575 Federal Road
P.O. Box 267, Iqaluit,
Nunavut
X0A 0H0

Name of Company filing Annual Report (if different from Name of Licensee please clarify relationship between the two entities, if applicable):

General Background Information on the Project (*optional):

NESI owns and operates a Hydrocarbon Impacted Soil Landfarm on the outskirts of Iqaluit, Nu. Operations consists of accepting soils impacted with petroleum products at various concentrations at the geosynthetic lined platform and using indigenous soil microorganisms and unique soil farming practices break down compounds into, water, carbon and hydrogen sulphide.

Licence Requirements: the licensee must provide the following information in accodance with

A summary report of water use and waste disposal activities, including, but not limited to: methods of obtaining water; sewage and greywater management; drill waste management; solid and hazardous waste management.

Water Source(s): Rain and melt water. Hydrocarbon contaminated.
Water Quantity:
- Quantity Allowable Domestic (cu.m)
- Actual Quantity Used Domestic (cu.m)
- Quantity Allowable Drilling (cu.m)
- Total Quantity Used Drilling (cu.m)

Waste Management and/or Disposal

No water was released into the environment 2021

Additional Details:

A list of unauthorized discharges and a summary of follow-up actions taken.

Spill No.: (as reported to the Spill Hot-line)
Date of Spill:
Date of Notification to an Inspector:
Additional Details: (impacts to water, mitigation measures, short/long term monitoring, etc)

Revisions to the Spill Contingency Plan

Additional Details: No revisions to the Spill Contingency plan

Revisions to the Abandonment and Restoration Plan

Additional Details: Abandonment and Restoration plan updated

Progressive Reclamation Work Undertaken

Additional Details (i.e., work completed and future works proposed)

Results of the Monitoring Program including:

The GPS Co-ordinates (in degrees, minutes and seconds of latitude and longitude) of each location where sources of water are utilized;

Additional Details: No water was drawn from source

The GPS Co-ordinates (in degrees, minutes and seconds of latitude and longitude) of each location where wastes associated with the licence are deposited;

Additional Details:

Results of any additional sampling and/or analysis that was requested by an Inspector

Additional Details: No requests by Inspector

Any other details on water use or waste disposal requested by the Board by November 1 of the year being reported.

Additional Details: No request by NWB

Any responses or follow-up actions on inspection/compliance reports

Additional Details: (Dates of Report, Follow-up by the Licensee)

Any additional comments or information for the Board to consider

Date Submitted: February 28, 2023
Submitted/Prepared by: James H. Wilson for Nunatta Environmental Services Inc.
Contact Information:
Tel: 867-979-1488
Fax: 867-979-1478
email: jim@nunatta.ca

GPS Coordinates

GPS Coordinates for water sources utilized

Source Description	Latitude			Longitude		
	Deg °	Min ′	Sec ″	Deg °	Min ′	Sec ″

GPS Locations of areas of waste disposal

Location Description (type)	Latitude			Longitude		
	Deg °	Min ′	Sec ″	Deg °	Min ′	Sec ″
Treated water discharge point	68	32	46.47	63	45	49.9

Soils accepted at Landfarm in 2022

Project #	Customer	Cubic Metres	Date	Contaminant
22-42	coop building 164	17.50	Jun 14/2022	heating fuel
22-54	Dept of Environment building #1555	117.0	06/23/2022	Diesel fuel
22-00	CAPS nunavut	28.0	11/18/2022	Heating fuel
22-61	Angela Akpik	22.0	7/22/2022	Heating fuel
	Tower Arctic Rocks	2.0	06/24 2022	Hydraulic oil
	Tower Arctic Soil	2.0	6/25/2022	Diesel/soil
	Tower Arctic soil/rocks	1.0	8/5/2022	hydraulic oil
	Total Soils 2022	**189.50**		

Soils removed from Landfarm 2022

Project #	Customer	Cu/M
	No soils removed from the cells at Nunatta landfarm in 2022	

Cubic meters
Total removed

Water/Snow received at Landfarm 2022

SNOW

Project #	**Customer**	**Cu/m**	**Date**	**Contaminant**
22-42	Coop building 154 spill	1.5	May 15, 2022	Heating oil
	Total cu/M received in 2022	1.5		

WATER

Project #	**Customer**	**Litres**	Date	Contaminant
	NCL construction Ltd	11,000	July 16 2022	hydrocarbons
	Total litres received 2022	11,000		

Soils contained in Landfarm cells freezeup 2022

Cell #	Dimension	Cell reference	Soil in progress	Rocks	Protective layer	Total soil contained	Soil remediated and ready to remove.
	Meters		**cubic meters**	**C/m**	**C/m**	**C/m**	
1	60X30		750	400	687	1837	0
2	50X25		0	0	400	400	0
3	90X30		460	10	1062	1532	260*
4	60X30		600	80	800	680	0
		Totals	**1810**	**490**	**2949**	5249	

* pending

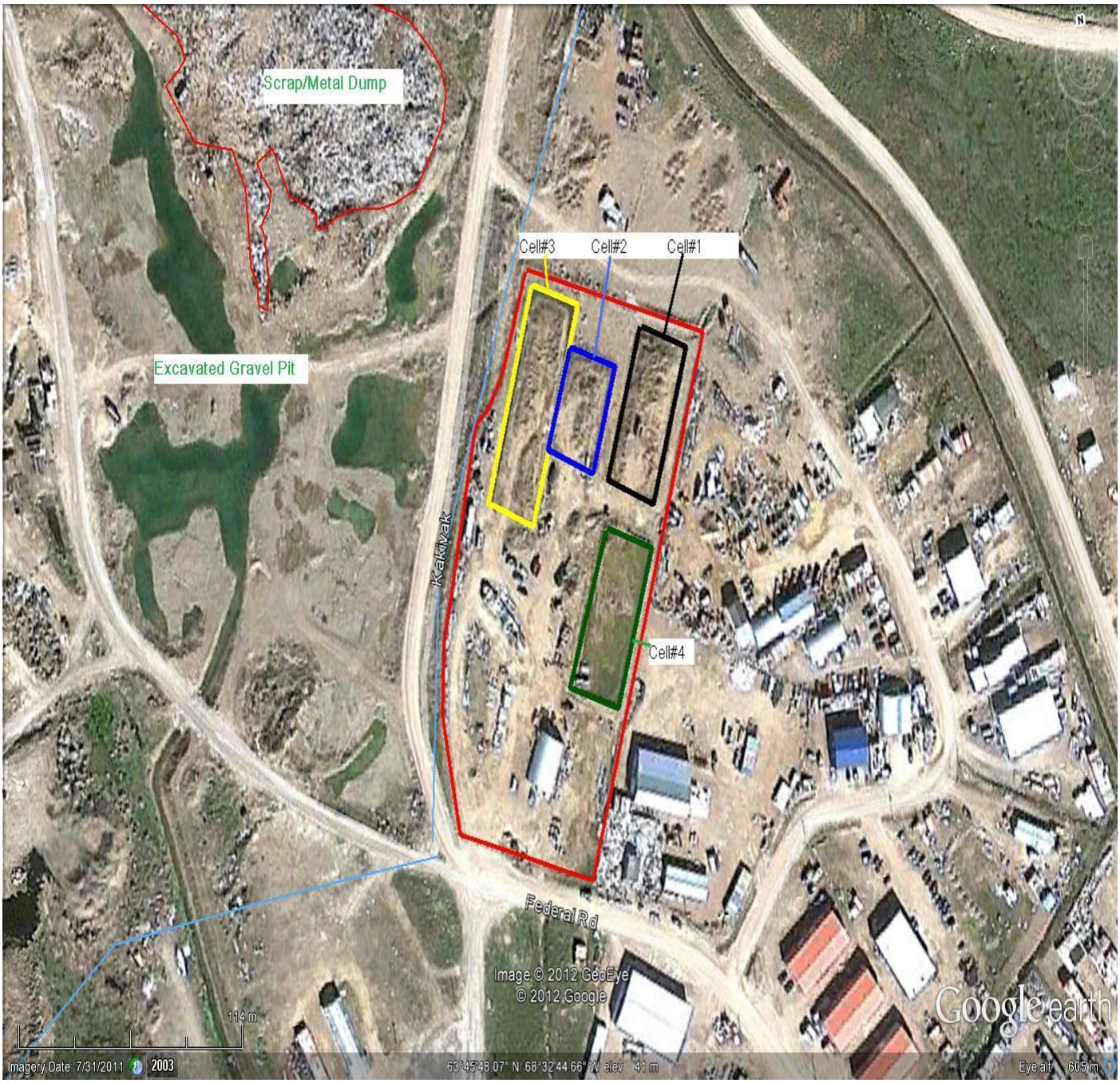
During the screening of summer of 2022 we removed a lot of rocks and cobbles
These will be removed to be crushed as soon as we are able
Volume of rocks not in calculations above

Map Overview

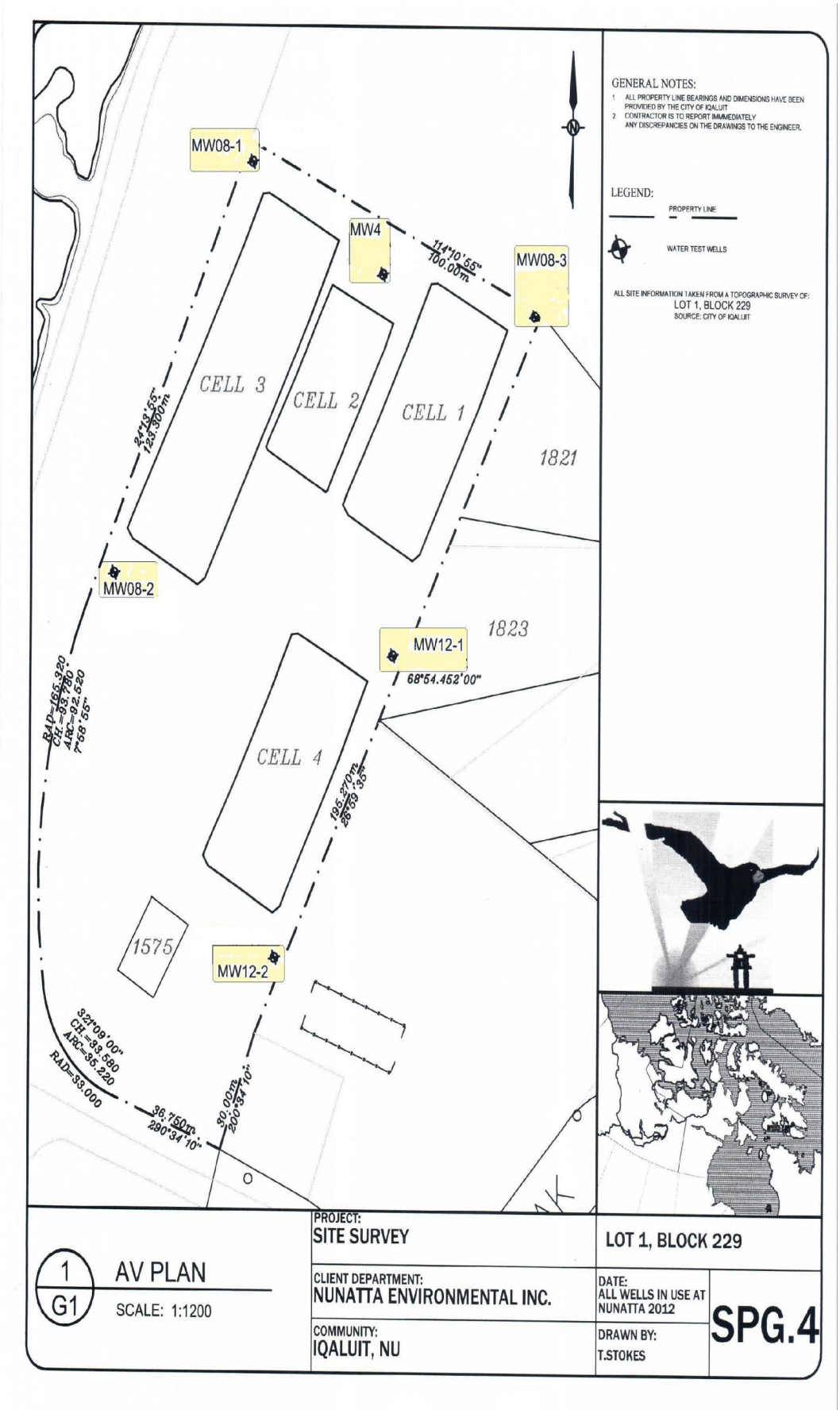
Landfarm


Blue: Gravel pits
Red: metal Dump
Nunatta Landfarm
Kakivak
Federal Rd
Industrial Park
Image © 2012 GeoEye
© 2012 Google
Google earth
408 m
Imagery Date 7/31/2011
2003
63°45'59.24" N 68°32'48.98" W elev 52 m
Eye alt 1.82 km

Landfarm Details



Monitoring Well Locations



2022 Monitoring Summary

Summer of 2022 was brighter than last few years but more wind than normal. Temperatures were cool and bugs were not an issue except on a couple days. This is unusuall for us at Nunatta. We are located next to the old metal dump and we have many places of standing water and this breeds lots of bugs in a normal year. this year was an exception. Cool winds and lots of moisture but not heavy rain. Misty mornings and some short rains did keep us from working soil as much as we like during summer months.

We did manage to get some soil from cell 1 through the screening plant but due to the discharged rocks and we did not have any place to put them we were forced to stop. Plans to have construction company remove them to crush into 3/4 gravel did not happen due to a large amount of late season construction in Iqaluit. Thes will be removed in summer of 2023.

Cell #4 we screened out half of the soil and placed the soil into cell #3 with plans to remove it in summer of 2023.

Again the smaller stone removed during this screening process created a large pile right up to the stacker belt and forced us to stop. These will be removed during the summer of 2023 again to be crushed into clear 3/4 stone.

No water sample were

Water pumped within landfarm cells 2022

Date	Action	From	Destination	Litre

No water was pumped within Nunatta landfarm during the summer of 2022
In the spring of the year we had very little water collect in our cells what water we had evaporated off early in the summer and for the first time ever we saw our cells dry
We saw no need to even transfer water from cell to cell

For this reason no water was pumped out of the landfarm into the environment

No water released in to the environment in 2022

Total pumped	**0**
Total Cu/M	**0**

Consruction of cell #2

In 2013 Nunatta Environmental applied for and was approved for an extension and replacement of liner for cell #2. The cell was used for rocks and cobbles removed from the screening process. The liner used in cell #2 was only 20 mm and Nunatta felt this liner should be brought up to the 30 mm minimum standard & at the same time the cell could be made longer to accommodate our equipment. Nunatta purchased 40 mil liner and #16 cloth to make it better than code. Liner is on site in Iqaluit. Permission was granted for the summer of 2014 construction season but due to cold weather and no place to put all the rocks stored in that cell delayed the work. The summer of 2019 we found a local construction company to remove the rocks to be crushed in 3/4 gravel.

Since 2018 Nunatta Staff has been busy dealing with large projects in all parts of Nunavut. To do this work we have to we waway during the summer months. When Covid hit we thought this would be a good time to work on the landfarm bringing cell #2 up to code with a new thicker liner.
The lockdown of southern travelers made extra work for Nunatta who were on the road all summer doing work in Grise Fiord, Umingmaktok, Bathurst Inlet, Cape Dorset and the landfarm got missed.
This trend has continued to 2022 with our staff working remotly most of the summer months.
In fall of 2022 Quilliq Energy approached Nunatta to see if they could have all their consumables stored at Nunatta inside a lined cell. This was due in part to the water crisis that happened in Iqaluit over the summer then diesel fuel was found indrinking water samples and at one point it was asked if it could be coming from items stored at the Quilliq energy power plant located next to the water treatment plant.
So everything was cleaned up and removed from site and oils, glycols, and waste were moved to Nunatta Landfarm cell #2. Since then it has been decided Quillic energy was not the cause of the contamination contamination.
In the mean time Quilliq energy has concluded it is much easier to have consumables delivered and watse removed when required rather than try to store it all on site.
Nunatta has cell #2 full of drums and totes but still has plans to replace the liner should a warm summer with less remote work come into play in the near future.

TABLE 1 **CLIENT: Nunatta Environmental Services Inc.**
PARACEL LABORATORIES **ATTENTION: Jim Wilson**
WORKORDER: 2225433 **PROJECT: Spring Landfarm Samples 2022**
REPORT DATE: 06/23/2022 **REFERENCE: Standing Offer**

Parameter	Units	MDL	Regulation	Sample			
				Cell #1 FR-1	Cell #1 M-2	Cell #1 RR-3	Cell #1 RL-4
Sample Date (m/d/y)			**Select Reg**	**06/14/2022 08:45**	**06/14/2022 08:45**	**06/14/2022 08:45**	**06/14/2022 08:45**
Physical Characteristics							
% Solids	% by Wt.	0.1	REGS	92.5	95.2	97.1	95.8
Microbiological							
Heterotrophic Plate Count	CFU/g	1000	REGS	4000	3000	1000	7000
Metals							
Antimony	ug/g dry	1.0	REGS	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Arsenic	ug/g dry	1.0	REGS	3.4	4.3	3.1	3.1
Barium	ug/g dry	1.0	REGS	46.4	41.7	34.2	38.9
Beryllium	ug/g dry	0.5	REGS	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Boron	ug/g dry	1.0	REGS	2.0	2.0	2.3	2.1
Cadmium	ug/g dry	0.5	REGS	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Chromium	ug/g dry	5.0	REGS	31.1	29.3	24.4	23.9
Cobalt	ug/g dry	5.0	REGS	8.1	7.2	6.2	6.3
Copper	ug/g dry	5.0	REGS	19.5	18.1	13.2	13.3
Lead	ug/g dry	1.0	REGS	17.2	10.6	13.1	17.0
Molybdenum	ug/g dry	1.0	REGS	1.3	1.1	ND (1.0)	ND (1.0)
Nickel	ug/g dry	5.0	REGS	12.6	11.2	9.9	9.8
Selenium	ug/g dry	1.0	REGS	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Silver	ug/g dry	0.3	REGS	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)
Thallium	ug/g dry	1.0	REGS	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Tin	ug/g dry	5.0	REGS	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)
Uranium	ug/g dry	1.0	REGS	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Vanadium	ug/g dry	10.0	REGS	58.2	56.7	50.7	46.6
Zinc	ug/g dry	20.0	REGS	58.8	52.1	49.6	52.7
Volatiles							
Benzene	mg/kg dry	0.02	REGS	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
Ethylbenzene	mg/kg dry	0.05	REGS	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Toluene	mg/kg dry	0.05	REGS	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
m/p-Xylene	mg/kg dry	0.05	REGS	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
o-Xylene	mg/kg dry	0.05	REGS	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Xylenes, total	mg/kg dry	0.05	REGS	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Hydrocarbons							
F1 PHCs (C6-C10)	mg/kg dry	7	REGS	ND (7)	ND (7)	ND (7)	ND (7)
F2 PHCs (C10-C16)	mg/kg dry	4	REGS	ND (4)	32	ND (4)	227
F3 PHCs (C16-C34)	mg/kg dry	8	REGS	58	205	136	402
F4 PHCs (C34-C50)	mg/kg dry	6	REGS	71	202	166	639
F4G PHCs (gravimetric)	ug/g dry	50	REGS	N/A	326	216	950
Semi-Volatiles							
Acenaphthene	mg/kg dry	0.02	REGS	N/A	N/A	N/A	N/A
Acenaphthylene	mg/kg dry	0.02	REGS	N/A	N/A	N/A	N/A
Anthracene	mg/kg dry	0.02	REGS	N/A	N/A	N/A	N/A
Benzo[a]anthracene	mg/kg dry	0.02	REGS	N/A	N/A	N/A	N/A
Benzo[a]pyrene	mg/kg dry	0.02	REGS	N/A	N/A	N/A	N/A
Benzo[b]fluoranthene	mg/kg dry	0.02	REGS	N/A	N/A	N/A	N/A
Benzo[g,h,i]perylene	mg/kg dry	0.02	REGS	N/A	N/A	N/A	N/A
Benzo[k]fluoranthene	mg/kg dry	0.02	REGS	N/A	N/A	N/A	N/A
1,1-Biphenyl	mg/kg dry	0.02	REGS	N/A	N/A	N/A	N/A
Chrysene	mg/kg dry	0.02	REGS	N/A	N/A	N/A	N/A
Dibenzo[a,h]anthracene	mg/kg dry	0.02	REGS	N/A	N/A	N/A	N/A
Fluoranthene	mg/kg dry	0.02	REGS	N/A	N/A	N/A	N/A
Fluorene	mg/kg dry	0.02	REGS	N/A	N/A	N/A	N/A
Indeno [1,2,3-cd] pyrene	mg/kg dry	0.02	REGS	N/A	N/A	N/A	N/A
1-Methylnaphthalene	mg/kg dry	0.02	REGS	N/A	N/A	N/A	N/A
2-Methylnaphthalene	mg/kg dry	0.02	REGS	N/A	N/A	N/A	N/A
Methylnaphthalene (1&2)	mg/kg dry	0.04	REGS	N/A	N/A	N/A	N/A
Naphthalene	mg/kg dry	0.01	REGS	N/A	N/A	N/A	N/A
Phenanthrene	mg/kg dry	0.02	REGS	N/A	N/A	N/A	N/A
Pyrene	mg/kg dry	0.02	REGS	N/A	N/A	N/A	N/A
Quinoline	mg/kg dry	0.10	REGS	N/A	N/A	N/A	N/A
PCBs							
PCBs, total	ug/g dry	0.05	REGS	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)

TABLE 1 **CLIENT: Nunatta Environmental Services Inc.**

PARACEL LABORATORIES **ATTENTION: Jim Wilson**

WORKORDER: 2225433 **PROJECT: Spring Landfarm Samples 2022**

REPORT DATE: 06/23/2022 **REFERENCE: Standing Offer**

Parameter	Units	MDL	Regulation					
				Cell #3 MR-1	Cell #3 RM-2	Cell #3 RL-3	Cell #3 RR-4	Cell #3 FR-5
Sample Date (m/d/y)			**Select Reg**	**06/14/2022 08:45**	**06/14/2022 08:45**	**06/14/2022 08:45**	**06/14/2022 08:45**	**06/14/2022 08:45**
Physical Characteristics								
% Solids	% by Wt.	0.1	REGS	94.6	93.7	94.5	94.8	94.6
Microbiological								
Heterotrophic Plate Count	CFU/g	1000	REGS	ND (1000)	9000	4000	9000	10000
Metals								
Antimony	ug/g dry	1.0	REGS	N/A	N/A	N/A	N/A	N/A
Arsenic	ug/g dry	1.0	REGS	N/A	N/A	N/A	N/A	N/A
Barium	ug/g dry	1.0	REGS	N/A	N/A	N/A	N/A	N/A
Beryllium	ug/g dry	0.5	REGS	N/A	N/A	N/A	N/A	N/A
Boron	ug/g dry	1.0	REGS	N/A	N/A	N/A	N/A	N/A
Cadmium	ug/g dry	0.5	REGS	N/A	N/A	N/A	N/A	N/A
Chromium	ug/g dry	5.0	REGS	N/A	N/A	N/A	N/A	N/A
Cobalt	ug/g dry	5.0	REGS	N/A	N/A	N/A	N/A	N/A
Copper	ug/g dry	5.0	REGS	N/A	N/A	N/A	N/A	N/A
Lead	ug/g dry	1.0	REGS	N/A	N/A	N/A	N/A	N/A
Molybdenum	ug/g dry	1.0	REGS	N/A	N/A	N/A	N/A	N/A
Nickel	ug/g dry	5.0	REGS	N/A	N/A	N/A	N/A	N/A
Selenium	ug/g dry	1.0	REGS	N/A	N/A	N/A	N/A	N/A
Silver	ug/g dry	0.3	REGS	N/A	N/A	N/A	N/A	N/A
Thallium	ug/g dry	1.0	REGS	N/A	N/A	N/A	N/A	N/A
Tin	ug/g dry	5.0	REGS	N/A	N/A	N/A	N/A	N/A
Uranium	ug/g dry	1.0	REGS	N/A	N/A	N/A	N/A	N/A
Vanadium	ug/g dry	10.0	REGS	N/A	N/A	N/A	N/A	N/A
Zinc	ug/g dry	20.0	REGS	N/A	N/A	N/A	N/A	N/A
Volatiles								
Benzene	mg/kg dry	0.02	REGS	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
Ethylbenzene	mg/kg dry	0.05	REGS	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Toluene	mg/kg dry	0.05	REGS	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
m/p-Xylene	mg/kg dry	0.05	REGS	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
o-Xylene	mg/kg dry	0.05	REGS	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Xylenes, total	mg/kg dry	0.05	REGS	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Hydrocarbons								
F1 PHCs (C6-C10)	mg/kg dry	7	REGS	ND (7)	ND (7)	ND (7)	ND (7)	ND (7)
F2 PHCs (C10-C16)	mg/kg dry	4	REGS	55	43	37	48	102
F3 PHCs (C16-C34)	mg/kg dry	8	REGS	238	196	139	180	353
F4 PHCs (C34-C50)	mg/kg dry	6	REGS	139	137	98	123	293
F4G PHCs (gravimetric)	ug/g dry	50	REGS	N/A	N/A	N/A	N/A	529
Semi-Volatiles								
Acenaphthene	mg/kg dry	0.02	REGS	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
Acenaphthylene	mg/kg dry	0.02	REGS	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
Anthracene	mg/kg dry	0.02	REGS	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
Benzo[a]anthracene	mg/kg dry	0.02	REGS	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	0.03
Benzo[a]pyrene	mg/kg dry	0.02	REGS	0.06	0.06	0.04	0.04	0.07
Benzo[b]fluoranthene	mg/kg dry	0.02	REGS	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
Benzo[g,h,i]perylene	mg/kg dry	0.02	REGS	0.03	0.03	0.03	0.02	0.17
Benzo[k]fluoranthene	mg/kg dry	0.02	REGS	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
1,1-Biphenyl	mg/kg dry	0.02	REGS	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
Chrysene	mg/kg dry	0.02	REGS	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	0.07
Dibenzo[a,h]anthracene	mg/kg dry	0.02	REGS	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
Fluoranthene	mg/kg dry	0.02	REGS	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	0.02
Fluorene	mg/kg dry	0.02	REGS	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
Indeno [1,2,3-cd] pyrene	mg/kg dry	0.02	REGS	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	0.03
1-Methylnaphthalene	mg/kg dry	0.02	REGS	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	0.04
2-Methylnaphthalene	mg/kg dry	0.02	REGS	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	0.06
Methylnaphthalene (1&2)	mg/kg dry	0.04	REGS	ND (0.04)	ND (0.04)	ND (0.04)	ND (0.04)	0.09
Naphthalene	mg/kg dry	0.01	REGS	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	0.03
Phenanthrene	mg/kg dry	0.02	REGS	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	0.02
Pyrene	mg/kg dry	0.02	REGS	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	0.04
Quinoline	mg/kg dry	0.10	REGS	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)
PCBs								
PCBs, total	ug/g dry	0.05	REGS	N/A	N/A	N/A	N/A	N/A

TABLE 1
PARACEL LABORATORIES
WORKORDER: 2225433
REPORT DATE: 06/23/2022

CLIENT: Nunatta Environmental Services Inc.
ATTENTION: Jim Wilson
PROJECT: Spring Landfarm Samples 2022
REFERENCE: Standing Offer

Parameter	Units	MDL	Regulation	Cell #4 FR-1	Cell #4 MR-2	Cell #4 ML-3	Cell #4 RL-4
Sample Date (m/d/y)			**Select Reg**	**06/14/2022 09:00**	**06/14/2022 09:00**	**06/14/2022 09:00**	**06/14/2022 09:00**
Physical Characteristics							
% Solids	% by Wt.	0.1	REGS	92.8	92.7	93.0	93.7
Microbiological Parameters							
Heterotrophic Plate Count	CFU/g	1000	REGS	44000	59000	> 200,000	19000
Metals							
Antimony	ug/g dry	1.0	REGS	N/A	N/A	N/A	N/A
Arsenic	ug/g dry	1.0	REGS	N/A	N/A	N/A	N/A
Barium	ug/g dry	1.0	REGS	N/A	N/A	N/A	N/A
Beryllium	ug/g dry	0.5	REGS	N/A	N/A	N/A	N/A
Boron	ug/g dry	1.0	REGS	N/A	N/A	N/A	N/A
Cadmium	ug/g dry	0.5	REGS	N/A	N/A	N/A	N/A
Chromium	ug/g dry	5.0	REGS	N/A	N/A	N/A	N/A
Cobalt	ug/g dry	5.0	REGS	N/A	N/A	N/A	N/A
Copper	ug/g dry	5.0	REGS	N/A	N/A	N/A	N/A
Lead	ug/g dry	1.0	REGS	N/A	N/A	N/A	N/A
Molybdenum	ug/g dry	1.0	REGS	N/A	N/A	N/A	N/A
Nickel	ug/g dry	5.0	REGS	N/A	N/A	N/A	N/A
Selenium	ug/g dry	1.0	REGS	N/A	N/A	N/A	N/A
Silver	ug/g dry	0.3	REGS	N/A	N/A	N/A	N/A
Thallium	ug/g dry	1.0	REGS	N/A	N/A	N/A	N/A
Tin	ug/g dry	5.0	REGS	N/A	N/A	N/A	N/A
Uranium	ug/g dry	1.0	REGS	N/A	N/A	N/A	N/A
Vanadium	ug/g dry	10.0	REGS	N/A	N/A	N/A	N/A
Zinc	ug/g dry	20.0	REGS	N/A	N/A	N/A	N/A
Volatiles							
Benzene	mg/kg dry	0.02	REGS	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
Ethylbenzene	mg/kg dry	0.05	REGS	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Toluene	mg/kg dry	0.05	REGS	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
m/p-Xylene	mg/kg dry	0.05	REGS	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
o-Xylene	mg/kg dry	0.05	REGS	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Xylenes, total	mg/kg dry	0.05	REGS	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Hydrocarbons							
F1 PHCs (C6-C10)	mg/kg dry	7	REGS	ND (7)	ND (7)	ND (7)	ND (7)
F2 PHCs (C10-C16)	mg/kg dry	4	REGS	92	431	228	14
F3 PHCs (C16-C34)	mg/kg dry	8	REGS	166	383	166	87
F4 PHCs (C34-C50)	mg/kg dry	6	REGS	59	80	52	35
F4G PHCs (gravimetric)	ug/g dry	50	REGS	N/A	N/A	N/A	N/A
Semi-Volatiles							
Acenaphthene	mg/kg dry	0.02	REGS	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
Acenaphthylene	mg/kg dry	0.02	REGS	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
Anthracene	mg/kg dry	0.02	REGS	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
Benzo[a]anthracene	mg/kg dry	0.02	REGS	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
Benzo[a]pyrene	mg/kg dry	0.02	REGS	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
Benzo[b]fluoranthene	mg/kg dry	0.02	REGS	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
Benzo[g,h,i]perylene	mg/kg dry	0.02	REGS	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
Benzo[k]fluoranthene	mg/kg dry	0.02	REGS	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
1,1-Biphenyl	mg/kg dry	0.02	REGS	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
Chrysene	mg/kg dry	0.02	REGS	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
Dibenzo[a,h]anthracene	mg/kg dry	0.02	REGS	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
Fluoranthene	mg/kg dry	0.02	REGS	ND (0.02)	ND (0.02)	0.03	ND (0.02)
Fluorene	mg/kg dry	0.02	REGS	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
Indeno [1,2,3-cd] pyrene	mg/kg dry	0.02	REGS	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
1-Methylnaphthalene	mg/kg dry	0.02	REGS	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
2-Methylnaphthalene	mg/kg dry	0.02	REGS	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
Methylnaphthalene (1&2)	mg/kg dry	0.04	REGS	ND (0.04)	ND (0.04)	ND (0.04)	ND (0.04)
Naphthalene	mg/kg dry	0.01	REGS	ND (0.01)	0.03	ND (0.01)	ND (0.01)
Phenanthrene	mg/kg dry	0.02	REGS	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
Pyrene	mg/kg dry	0.02	REGS	ND (0.02)	0.02	0.05	ND (0.02)
Quinoline	mg/kg dry	0.10	REGS	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)
PCBs							
PCBs, total	ug/g dry	0.05	REGS	N/A	N/A	N/A	N/A

TABLE 1 **CLIENT: Nunatta Environmental Services Inc.**

PARACEL LABORATORIES LTD. **ATTENTION: Jim Wilson**

WORKORDER: 2241184 **PROJECT: Fall Landfarm Samples 2022**

REPORT DATE: 10/12/2022 **REFERENCE: Standing Offer**

Parameter	Units	MDL	Regulation	Sample			
				CELL #1- Front	CELL #1- Front-2	CELL #1- Middle	CELL #1- Back
Sample Date (m/d/y)			**Select Reg**	**10/03/2022 02:30**	**10/03/2022 02:30**	**10/03/2022 02:30**	**10/03/2022 02:**
Physical Characteristics							
% Solids	% by Wt.	0.1	REGS	94.0	90.8	95.5	95.1
Microbiological Parameters							
Heterotrophic Plate Count	CFU/g	1000	REGS	> 150000	47000	3000	3000
Metals							
Antimony	ug/g dry	1	REGS	ND (1)	ND (1)	ND (1)	ND (1)
Arsenic	ug/g dry	1	REGS	2	3	3	2
Barium	ug/g dry	1	REGS	44	34	28	25
Beryllium	ug/g dry	0.5	REGS	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Boron	ug/g dry	5.0	REGS	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)
Cadmium	ug/g dry	0.5	REGS	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Chromium	ug/g dry	5	REGS	21	23	23	19
Cobalt	ug/g dry	1	REGS	5	6	5	5
Copper	ug/g dry	5	REGS	21	12	11	11
Lead	ug/g dry	1	REGS	13	9	10	10
Molybdenum	ug/g dry	1	REGS	2	ND (1)	ND (1)	ND (1)
Nickel	ug/g dry	5	REGS	9	9	8	8
Selenium	ug/g dry	1	REGS	ND (1)	ND (1)	ND (1)	ND (1)
Silver	ug/g dry	0.3	REGS	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)
Thallium	ug/g dry	1	REGS	ND (1)	ND (1)	ND (1)	ND (1)
Tin	ug/g dry	5	REGS	ND (5)	ND (5)	ND (5)	ND (5)
Uranium	ug/g dry	1	REGS	ND (1)	ND (1)	ND (1)	ND (1)
Vanadium	ug/g dry	10	REGS	41	45	46	39
Zinc	ug/g dry	20	REGS	75	53	40	39
Volatiles							
Benzene	mg/kg dry	0.02	REGS	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
Ethylbenzene	mg/kg dry	0.05	REGS	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Toluene	mg/kg dry	0.05	REGS	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
m/p-Xylene	mg/kg dry	0.05	REGS	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
o-Xylene	mg/kg dry	0.05	REGS	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Xylenes, total	mg/kg dry	0.05	REGS	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Hydrocarbons							
F1 PHCs (C6-C10)	mg/kg dry	7	REGS	ND (7)	ND (7)	ND (7)	ND (7)
F2 PHCs (C10-C16)	mg/kg dry	4	REGS	145	70	88	46
F3 PHCs (C16-C34)	mg/kg dry	8	REGS	487	45	323	184
F4 PHCs (C34-C50)	mg/kg dry	6	REGS	267	52	296	194
PCBs							
PCBs, total	ug/g dry	0.05	REGS	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)

TABLE 1
PARACEL LABORATORIES LTD.
WORKORDER: 2241184
REPORT DATE: 10/12/2022

CLIENT: Nunatta Environmental Services Inc.
ATTENTION: Jim Wilson
PROJECT: Fall Landfarm Samples 2022
REFERENCE: Standing Offer

Parameter	Units	MDL	Regulation			
				CELL #3- Front	CELL #3- Middle	CELL #3- Back
Sample Date (m/d/y)			**Select Reg**	**10/03/2022 02:30**	**10/03/2022 02:30**	**10/03/2022 02:30**
Physical Characteristics						
% Solids	% by Wt.	0.1	REGS	93.0	92.6	93.0
Microbiological						
Heterotrophic Plate Count	CFU/g	1000	REGS	2000	1000	6000
Metals						
Antimony	ug/g dry	1	REGS	N/A	N/A	N/A
Arsenic	ug/g dry	1	REGS	N/A	N/A	N/A
Barium	ug/g dry	1	REGS	N/A	N/A	N/A
Beryllium	ug/g dry	0.5	REGS	N/A	N/A	N/A
Boron	ug/g dry	5.0	REGS	N/A	N/A	N/A
Cadmium	ug/g dry	0.5	REGS	N/A	N/A	N/A
Chromium	ug/g dry	5	REGS	N/A	N/A	N/A
Cobalt	ug/g dry	1	REGS	N/A	N/A	N/A
Copper	ug/g dry	5	REGS	N/A	N/A	N/A
Lead	ug/g dry	1	REGS	N/A	N/A	N/A
Molybdenum	ug/g dry	1	REGS	N/A	N/A	N/A
Nickel	ug/g dry	5	REGS	N/A	N/A	N/A
Selenium	ug/g dry	1	REGS	N/A	N/A	N/A
Silver	ug/g dry	0.3	REGS	N/A	N/A	N/A
Thallium	ug/g dry	1	REGS	N/A	N/A	N/A
Tin	ug/g dry	5	REGS	N/A	N/A	N/A
Uranium	ug/g dry	1	REGS	N/A	N/A	N/A
Vanadium	ug/g dry	10	REGS	N/A	N/A	N/A
Zinc	ug/g dry	20	REGS	N/A	N/A	N/A
Volatiles						
Benzene	mg/kg dry	0.02	REGS	ND (0.02)	ND (0.02)	ND (0.02)
Ethylbenzene	mg/kg dry	0.05	REGS	ND (0.05)	ND (0.05)	ND (0.05)
Toluene	mg/kg dry	0.05	REGS	ND (0.05)	ND (0.05)	ND (0.05)
m/p-Xylene	mg/kg dry	0.05	REGS	ND (0.05)	ND (0.05)	ND (0.05)
o-Xylene	mg/kg dry	0.05	REGS	ND (0.05)	ND (0.05)	ND (0.05)
Xylenes, total	mg/kg dry	0.05	REGS	ND (0.05)	ND (0.05)	ND (0.05)
Hydrocarbons						
F1 PHCs (C6-C10)	mg/kg dry	7	REGS	ND (7)	ND (7)	ND (7)
F2 PHCs (C10-C16)	mg/kg dry	4	REGS	56	34	34
F3 PHCs (C16-C34)	mg/kg dry	8	REGS	194	160	113
F4 PHCs (C34-C50)	mg/kg dry	6	REGS	164	147	80
PCBs						
PCBs, total	ug/g dry	0.05	REGS	N/A	N/A	N/A

TABLE 1
PARACEL LABORATORIES LTD.
WORKORDER: 2241184
REPORT DATE: 10/12/2022

CLIENT: Nunatta Environmental Services Inc.
ATTENTION: Jim Wilson
PROJECT: Fall Landfarm Samples 2022
REFERENCE: Standing Offer

Parameter	Units	MDL	Regulation			
				CELL #4- Front	CELL #4- Middle	CELL #4- Back
Sample Date (m/d/y)			**Select Reg**	**10/03/2022 02:30**	**10/03/2022 02:30**	**10/03/2022 02:30**
Physical Characteristics						
% Solids	% by Wt.	0.1	REGS	92.2	91.0	92.9
Microbiological Parameters						
Heterotrophic Plate Count	CFU/g	1000	REGS	3000	10000	3000
Metals						
Antimony	ug/g dry	1	REGS	N/A	N/A	N/A
Arsenic	ug/g dry	1	REGS	N/A	N/A	N/A
Barium	ug/g dry	1	REGS	N/A	N/A	N/A
Beryllium	ug/g dry	0.5	REGS	N/A	N/A	N/A
Boron	ug/g dry	5.0	REGS	N/A	N/A	N/A
Cadmium	ug/g dry	0.5	REGS	N/A	N/A	N/A
Chromium	ug/g dry	5	REGS	N/A	N/A	N/A
Cobalt	ug/g dry	1	REGS	N/A	N/A	N/A
Copper	ug/g dry	5	REGS	N/A	N/A	N/A
Lead	ug/g dry	1	REGS	N/A	N/A	N/A
Molybdenum	ug/g dry	1	REGS	N/A	N/A	N/A
Nickel	ug/g dry	5	REGS	N/A	N/A	N/A
Selenium	ug/g dry	1	REGS	N/A	N/A	N/A
Silver	ug/g dry	0.3	REGS	N/A	N/A	N/A
Thallium	ug/g dry	1	REGS	N/A	N/A	N/A
Tin	ug/g dry	5	REGS	N/A	N/A	N/A
Uranium	ug/g dry	1	REGS	N/A	N/A	N/A
Vanadium	ug/g dry	10	REGS	N/A	N/A	N/A
Zinc	ug/g dry	20	REGS	N/A	N/A	N/A
Volatiles						
Benzene	mg/kg dry	0.02	REGS	ND (0.02)	ND (0.02)	ND (0.02)
Ethylbenzene	mg/kg dry	0.05	REGS	ND (0.05)	ND (0.05)	ND (0.05)
Toluene	mg/kg dry	0.05	REGS	ND (0.05)	ND (0.05)	ND (0.05)
m/p-Xylene	mg/kg dry	0.05	REGS	ND (0.05)	ND (0.05)	ND (0.05)
o-Xylene	mg/kg dry	0.05	REGS	ND (0.05)	ND (0.05)	ND (0.05)
Xylenes, total	mg/kg dry	0.05	REGS	ND (0.05)	ND (0.05)	ND (0.05)
Hydrocarbons						
F1 PHCs (C6-C10)	mg/kg dry	7	REGS	ND (7)	ND (7)	ND (7)
F2 PHCs (C10-C16)	mg/kg dry	4	REGS	195	58	42
F3 PHCs (C16-C34)	mg/kg dry	8	REGS	40	145	124
F4 PHCs (C34-C50)	mg/kg dry	6	REGS	47	86	65
PCBs						
PCBs, total	ug/g dry	0.05	REGS	N/A	N/A	N/A

2022 Water Sample Results

During the summer of 2022 no water samples were collected by Nunatta Staff
Ground did not thaw enough to gather samples from back wells
Front wells have remainerd dry due to removal of gravel next to our fence.
Pits floor is 4 meters lower than landfarm

Summary of Activities at Nunatta Environmental Services Inc. (NESI)

NWB licence 1BR-NUN-1828 Type "B"

Landfarm in Iqaluit for 2022 season

Water/ Snow

there was 1.5 cubic meters of contaminated snow delivered to our landfarm during the spring of 2022
this snow was placed in cell #1 on the soil and allowed to melt into the soil
There was 11 totes of 1000L removed from the fuel pipeline testing. no smell of fuel evident but we placed this into a hole dug in cell #4 soil piles and the water used to thaw frozen soil and wet the soil. By doing so strip any hydrocarbons out of the water. no water leached out of the soil soil but was eveaporated off by sun and wind.

Soils

during the year of 2022 Nunatta received only 189.5 cubic meters of contaminated soil.
Only 3 cubic meters were containated by hydraulic oil from ruptured hose on machine at new port being built in Iqaluit.
the balance of the soil was contaminated with P50 (diesel or heating oil)
this soil was placed in cell #1 and fertilizer was added and mixed in using excavator some soil was screened late in season and placed in Cell #4
Soil from cell #4 was screened and placed in cell #3 in small piles. This allows the soil to air out and allows oxygen and water into the soil to feed the
This exposes the soil to the elements and allows oxygen and water into the soil to feed the baceria and speed up remediation.
Late in the season the soil was excavated into a long pile to give as much surface area as possible and reduce foot print.

Test Wells

Monitoring Wells did not thaw out on the south east end or the south side of the property. Ones on north side are always dry due to excavation practices of the pit next door. The level of the pit floor ranges from 3 to 5 meters below the level of Nunatta landfarm. We test often to see if

Remediation practices

Nunatta Environmental Services has been improving soil remediation practices and each year find
ways of reducing the time the soil spends in our landfarm. With these practices of careful monitoring
and proper additions to the soil including innoculation of bacteria and enzymes from remediated soil
into the new soils, Nunatta has been able to reduce the remediation time to less than 1/2 of what it was 6 years ago.
Information gathered from soil sampling and testing in association with the University of Saskatchewan's
Soil Toxicology Department, Nunatta has been able to put them into practice at its landfarm.
We cannot thank Dr. Stephen Sciciliano enough for his assistance and for taking my phone calls and
answering my emails over the past few years.
Nunatta constructed 2 temporary cells in Baker Lake this summer and will be constructing a large one on the Petrolium
Products site in the summer of 2022 to remediate the soil recovered from the gasoline spill of 2021
We plan to do work on our own cell #2 if the summer allows us time to complete this project

Soil: Spring and Fall soil samples were taken and samples sent to Paracell Labs in Ottawa for analysis.
The results indicate hydrocarbon remediaton is progressing at a very generous rate compared to the last few years.
Nunatta believes this is due to much higher microbial activity.
Lab reports show microbial count exceeds the normal found in Baffin Island soils.
Soils not innoculated with old soil show plate counts of 2,000-4,000 .
Soils contained in cells 3 and 4 which have been screened, fertilizer added, and innoculated with
remediated soil show bacteria counts as high as TNTC (Too Numberous To Count).
These microbes are responsible for the breakdown of hydrocarbons into harmless components.
Managing and feeding microbes is the most important step in operating the Nunatta landfarm.
Previous management was storing soil and in doing so created a large healthy colony of the otherwise very sparce
populated bacteria responsible for making the enzyme that breaks down fuel in Arctic conditions