

Appendix E

Incinerator Standard Operating Procedure (SOP)

Incinerator Operating Procedure, Isachsen HAWS

NOJV SOP:

Ver: 1

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1.0 SOP Introduction

1.1 Purpose Statement

The purpose of this Standard Operating Procedure (SOP) is to describe the steps required to safely operate the two Ketek incinerators 9570A and 9570B stored at Isachsen HAWS and to provide a reference for setup and disassembly of these incinerators.

At the end of this SOP, the user will be able to:

1. Setup incinerators 9570A and 9570B
2. Safely operate the incinerators
3. Identify common incineration issues and solutions
4. Properly disassemble and safely store incinerators 9570A and 9570B

1.2 Intended User of this Document

This SOP is intended for any person tasked with operating or assisting in incinerator operations.

1.3 Who are the Participants

1.3.1 Assignee:

The project manager or field superintendent role will indicate if an employee is required to operate or assist in operation of incinerators. They will direct the employee to read over the SOP. They will also be responsible for selecting the incineration area and empty drum storage locations

1.3.2 Assigned:

The employee assigned to help setup, disassemble, monitor, and or assist in the incineration of fuel via incinerator 9570A or 9570B.

1.4 Applicable Industry Standards or Required Certifications

- No standards are required for the current SOP.
- Understanding the signs of a spill or fuel line leak

1.5 List of Minimum Required Equipment for this Process

- A forklift or fork equipped vehicle
- Waste fuel
- Clean diesel fuel for pilot burner ignition and/or operation
- A fuel storage/mixing tank
- A clear storage tank for oily water fuel separation
- Personal hand radio or communications device for safety and spill reporting

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- Portable secondary fuel containment capable of holding 110% volume discharge from the largest fuel storage/mixing tank
- Spill kit(s)
- Min 8000 watt generator: Capable of outputs Voltage: 125/250VAC, Phase: 1PH, Amp: 30, Freq: 60Hz)
- Incinerator components (see attached Incinerator Setup figure at the end of the SOP)

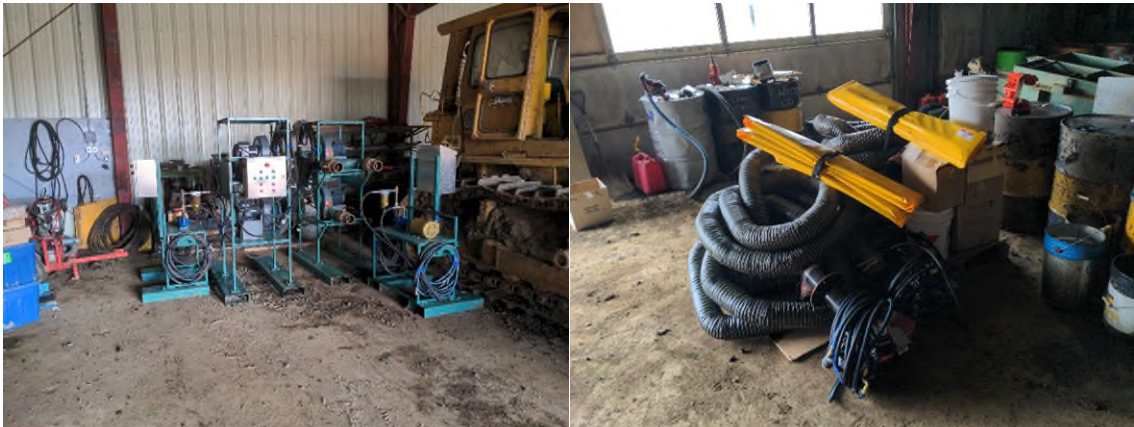
2.0 Incinerator Setup/Disassembly

2.1 Storage Locations of Incinerator Components:

The incinerator components are stored in the following locations:

1. In the New Garage near the back south wall are the main control panels, and waste fuel control panels. To the east of the bay doors, are the pilot burners air intake hoses, portable spill containment berms, fittings, spare chamber cement, and some additional pails (Figure 1 below).

Figure 1: New Garage - Incinerator Components Storage Location



2. To the east of the Runway Tanks are the two incineration chambers (Figure 2 below).
Note: The storage locations may change from year-to-year. Any change in storage locations for the components should be documented at time of disassembly.

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Figure 2: Near Runway Tanks - Incineration Chamber Storage Location



3. For future incineration operations, mixing tanks, a spill containment berm, oily water fuel separation totes, generators and clean diesel fuel will be found.

Note: These items have not yet been mobilized to site yet. These components should be stored in the New Garage for long term storage and documented along with the rest of the incinerator parts following incineration operations.

2.2 Setup:

The following steps will detail how to setup the incinerators as per the Incinerator Setup figure provided in **Appendix A** of this SOP.

Note: The use of rig mats to prevent ground rutting is advised as Isachsen can be extremely muddy and repeated vehicle traffic can quickly make the ground condition horrendous.

1. Using a fork-equipped vehicle move all the incinerator parts to the designated incineration area chosen by the project manager or field superintendent. Use rig mats wherever possible to prevent ground rutting as noted above.

Note: The exact incinerator location may vary but the incineration chambers must have a clear 6 meter radius around due to the high operating temperature.

The main incinerator components are shown below in Figure 3 for reference.

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Figure 3: Main Control Panel with attached blowers (left), Waste Fuel Pump Control Panel, pump attached (middle left), Incineration chamber (middle right) and Pilot Burner (right)



Figure 4: Clean Diesel and waste fuel for pilot burners (left), Proposed Mixing Tank (middle left), proposed oily water fuel separation tote (middle right) and proposed Field Generator (1 required for each incinerator setup) (right)



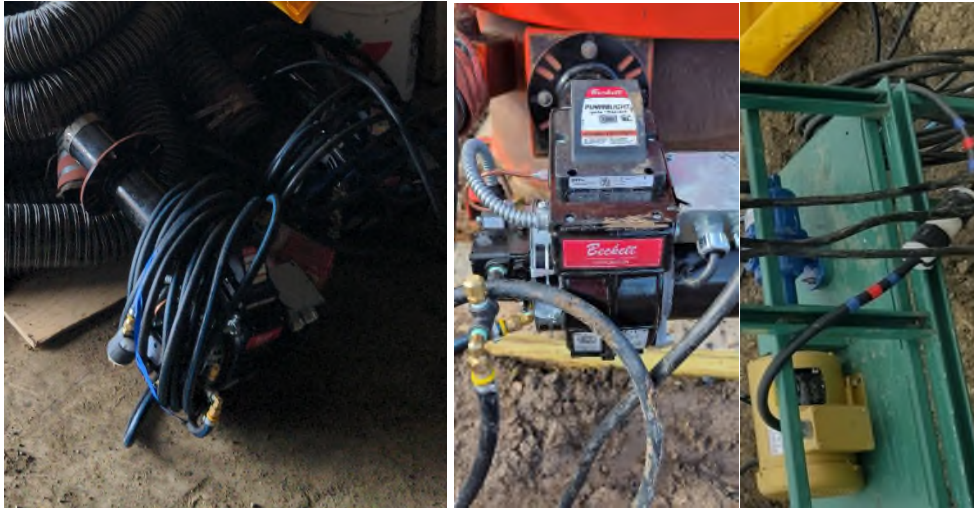
2. Setup the spill containment berm(s) as needed. Position all the fuel containing tanks/totes inside the berm using the fork-equipped vehicle. The spill containment berm must contain 100% of the volume in the largest mixing tank as well as an additional 10% of the total fuel volume contained within the berm. See **Appendix A** for the Incineration Setup with the spill containment arrangement shown.
3. Arrange the other non-fuel containing control panels and incineration chambers as illustrated with consideration for the incineration chambers to have a 6-meter clear radius.
4. Install the pilot burners on the incineration chambers. First mount the pilot burner to the burn chamber using the bolts found within one of the Canadian Tire 5 G pails used for incineration parts located in the New Garage. The fuel line of the pilot burner should then be connected to a clean diesel source. The power cord from the pilot burner attaches to the main control panel.

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Complete this step for both incineration chambers. There is a spare pilot burner within the New Garage in case one pilot burner fails.

Note: The power lines are labelled and colour coated with electrical tape, the ends of the same colour and label should be connected together.

Figure 5: Unattached pilot burner (left), attached pilot burner (middle), Example of colour coated power connections (right)



5. Setup of the waste fuel control panel. The waste fuel panel comes pre-attached with a fuel pump and filter. The intake line of the pump should be submerged/connected to the fuel mixing tank and output connected just left of the pilot light on incineration chamber (Figure 6 below). Use some plumbers tape on the fitting to prevent leakage. Lastly, connect the power line and data line to the main control panel in the same manner as 2.2 Setup Step 4 above.

Figure 6: Waste fuel connection valve on incineration chamber



6. Setup of the main control panel. Two blowers come pre-attached to the control panel. There are three air hoses and 12 gaskets and hose clamps (see Figure 7 below) used for operation. The upper blower contains a hose splitter for evenly distributing airflow between two air lines and

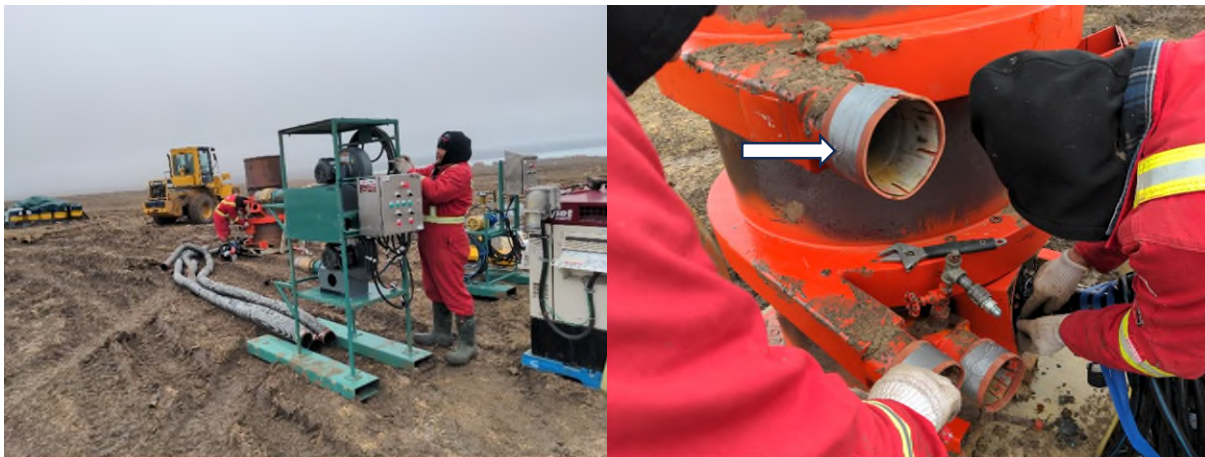
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these air lines connect to the two top air connections on the incinerator chamber. The air hose from the bottom blower connects to the bottom air connection on the incineration chamber. When connecting the air hoses, place the air hoses over the gaskets then use the padded hose clamps to tighten down the connection.

Note: The air hoses are quite fragile and there are no extra currently on site. Do not over tighten the hose clamps. Just tighten them enough to keep the hose from sliding off the connection port.

7. Lastly connect the remaining power line to the generator. This is the only power cord that is labelled but uncolored.

Figure 7: Main control panel, and uninstalled incineration hoses (left), Air hose gaskets on incineration chambers air connections (right)



At this point everything should be connected as per the Incinerator Setup Diagram provided in **Appendix A**.

3.0 Incinerator Operation:

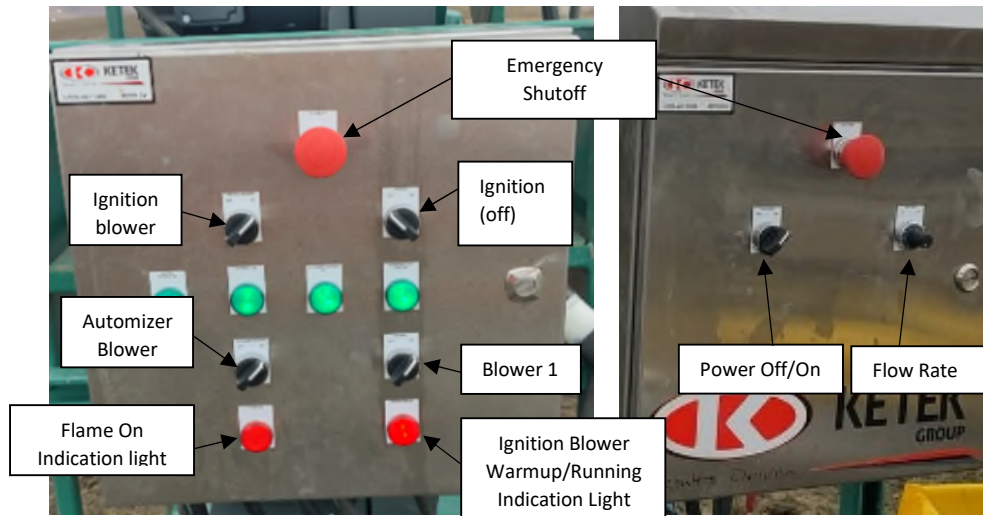
3.1 Startup:

The following steps describe how to properly commence the incineration of waste fuels. The incineration rate for waste fuels is 113 Liter per hour and the burn rate for the pilot burner is 16 Liter per hour. See the main control panel figure below for switch reference.

Note: When a switch is pointed to the left it is off. For example, the ignition switch is off in the photo (left) below.

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Figure 8: Control Panel Switch Layout. On/Off Indicator Lights in green. Main panel (left) waste fuel panel (Right)



1. Check all fuel, air and electrical lines for damage and ensure all connections are good prior to starting the incineration process.
2. Make sure the generator is topped up with fuel and that the emergency stop buttons on the main control and waste fuel panel are disengaged.
3. Turn the generator on.
4. Turn on the ignition blower switch on the top left of the control panel. This will start the pilot burner by providing a small amount of fuel & turning on the pilot burners built in blower.
5. Wait five minutes for the pilot burner to begin circulating air and fuel within the incineration chamber. During this time check for leaks in the fuel line that may be caused by the pilot burner startup.
6. After five minutes a red light on the bottom right corner will turn on. The ignition switch on the top right can now be switched on this will increase flame output of the pilot burner to an operational state.
7. Confirm that the flame has been lit. You should see hot air rising from the ignition chamber and maybe some steam.
8. Wait for 30 minutes to allow the burn chamber to heat up.
9. Now turn the Blower 1 switch on. Check to make sure the blower is operating properly then immediately turn on the Automizer Blower switch.
10. The waste fuel control panel will now be activated. Go over to the waste fuel panel and turn the switch on. Start at the lowest setting (flow rate) and adjust the fuel flow rate nob until the flame is just barely visible as seen in the Figure 9 photo below. This is the maximum flame height and incineration should be stopped if the flame goes too high above the chamber top while at the lowest flow rate.
11. If the fuel appears to be burning well, the incineration is self-sustaining and the ignition switch on the main control panel can and should be switched off to save burning the 16 liters per hour of clean diesel for the pilot burner.

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Note: If turning the ignition switch off causes the flame to go out within the next few minutes it should immediately be turned on again.

Figure 9: Waste fuel pump and control panel and burn chamber with ideal flame height shown



3.2 Shutdown/Cooldown:

The following steps describe the shut down procedure and the mandatory cool down period for the incinerators:

1. Turn the flow rate dial on the waste fuel control panel to the minimum setting.
2. Turn the waste fuel control panel off using the on/off switch.
3. Turn off the ignition on the main control panel. There should now no longer be any flame in the incineration chamber.

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4. For the next three hours allow the incineration chamber to cool by keeping the Blower 1, Automizer Blower and the Ignition blower switches on.
5. After three hours look for signs that the ignition chamber has cooled and the turn of all switches.

3.3 Troubleshooting:

Here is a list of some common issues that may occur and steps to rectify them:

Stoppage of Main Incineration Flame:

1. Firstly, always check that all the fuel line are securely connected and the waste fuel and clean diesel tanks and generator fuel supply are filled up. This is always the first thing to check. If any one of these fuel sources runs dry it could cause damage to the system.
2. If the incineration flame goes out while the ignition switch is off, this may be caused by oily water getting in to the waste fuel line or caused by fuel that is not combustible enough.

Rectify by turning the waste fuel control panel off temporarily and turning the ignition switch back on. Wait until you see the flame again and then start the waste fuel control panel again, try to continue burning with the ignition on for a few minutes before attempting to turn it off again. If the flame goes out again, continue burning with the ignition switch turned on until a point where new waste fuel can be mixed.

3. If the incineration flame goes out while ignition switch is on, this may be caused by oily water getting into the waste fuel line or a damaged pilot light.

Rectify by first turning off the waste fuel pump on the control panel. Check that the power line is connected to the main control panel. If the flame doesn't reappear within a minute, you may have a pilot burner failure. Cool down the incineration chamber and then install the spare pilot burner. If the flame does come back on, try starting the waste fuel control panel again. If the waste fuel puts out the flame with the ignition burner running, then there is probably a high amount of oily water attempting to be burned. Try putting the waste fuel line into another mixing tank or more known combustible waste fuel product. If this solves the problem, pump the product out of the problematic mixing tank into a oily water separation tank and see if more fuel will decant out of the mixture. Try burning the fuel portion again.

If there is dark smoke coming from the incineration chamber:

1. The waste fuel supply line may need to have the particulate filter replaced or one of the blowers may not be operating properly and providing enough air to the system.

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Rectify by first turning off the waste fuel control panel. Check the blower for power and any malfunction. If there is a malfunction, stop incineration until the blower can be fixed or replaced. If the blowers are operating correctly, empty the contents of the filter into a bucket and recirculate it back into the mixing tank. Replace the filter and proceed. If black smoke persists, try decreasing the flow rate and turning the incinerator switch on. If nothing rectifies the issue, try a new fuel mixture and slowly use the problematic fuel to dilute other known pure fuel types. Or dispose of that mixed batch of waste fuel by other means than incineration.

4.0 Fuel Mixing

4.1 Oily Water & Fuel Separation:

The oily water & fuel separation process will be used to aid in the mixing of fuels with the goal to reduce water content making for favorable incineration conditions. The incineration system/process can operate with as much as 10% water content, and as long as a flame can be maintained while the ignition flame is running this shouldn't cause a problem.

To reduce the water, mixed/unknown fuels should be placed in a separate clear plastic tote and given 45 minutes for the fuel to decant from the water. There should be a visible floating phase of fuel above the water in the separation tote. Draw off the floating phase and put it into the incinerator mixing tanks for incineration. Pump the remaining oily water into a storage container. The water fraction will have to be either cleaned / treated on-site and tested to confirm that it meets surface water quality guidelines prior to releasing it on site, or sent off-site for disposal.

Note: Try not to exceed 10% volume of the oily water within the mixing tank. Use the fuel product inventory provided to help determine mixing ratios and avoid incineration down time.

Figure 10: Fuel and Water separation in a glass



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4.2 Volatile Fuel (Gasoline) Mixing:

Gasoline is too volatile for direct incineration within the system and will cause the flame to protrude out of the incineration chamber creating unnecessary safety risks. Gasoline should be mixed down to a 5% gasoline mixture with 95% diesel or jet fuel ratio (i.e. 1 part to 19). This ratio of gasoline to diesel/jet can be varied as long as the flame is kept under the maximum height. Use the fuel product inventory to help determine mixing ratios and avoid incineration down time.

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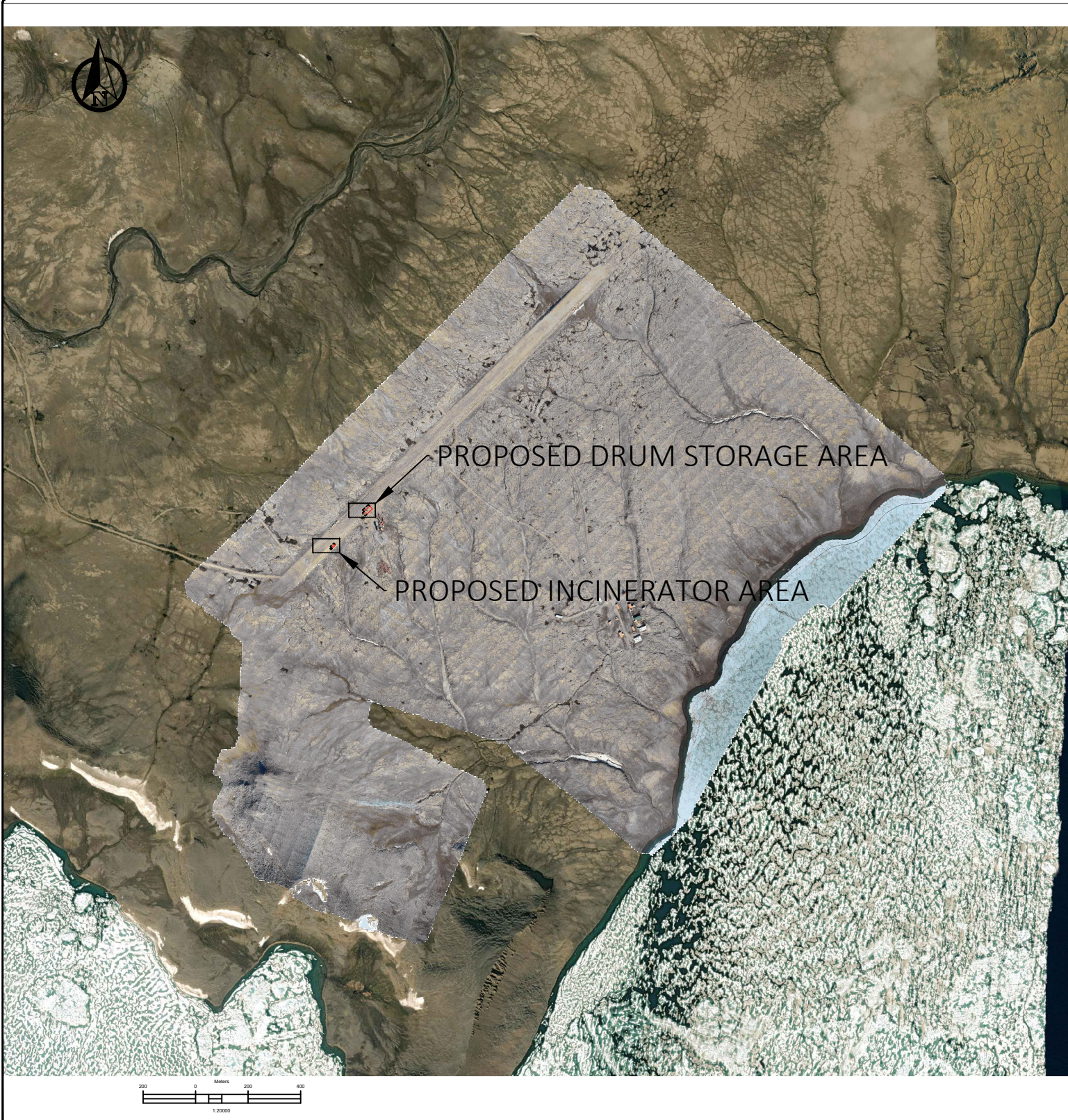
SOP Author / Date / Version #

Eric Grimminck/Nov 27 2024/#1

Peer Review / Date / Version #

Don Plenderleith/Nov 27 2024/#1

Appendix A: Figures (Proposed Incineration Location & Incinerator Setup)



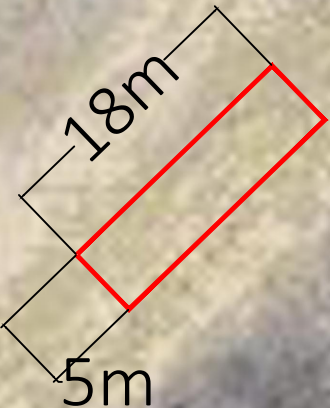
PROPOSED DRUM STORAGE AREA

Point Table				
Point #	Elevation	Northing	Easting	Description
1		8746956.62	531254.65	SE corner
2		8746946.57	531222.65	NW corner
3		8746935.78	531233.07	SW corner
4		8746967.40	531244.23	NE corner



PROPOSED INCINERATOR AREA

Point Table				
Point #	Elevation	Northing	Easting	Description
5		8746818.79	531114.55	SE Corner
6		8746809.88	531098.13	NW Corner
7		8746822.37	531111.08	NE Corner
8		8746806.28	531101.60	SW Corner



GENERAL NOTES

1. ALL MEASUREMENTS IN METRES UNLESS OTHERWISE NOTED

2. COORDINATE SYSTEM IS NAD83 (CSRS) / UTM ZONE 13N

LEGEND	
	PROPOSED AREA

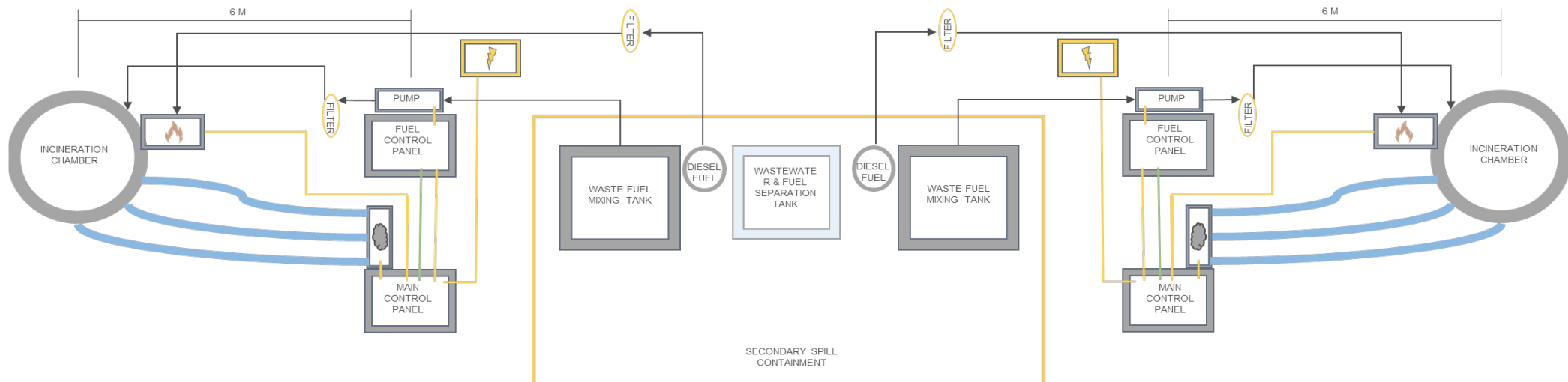


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ISACHSEN HIGH ARCTIC WEATHER STATION
ELLIF RINGNESS ISLAND, NUNAVUT
PROPOSED DRUM STORAGE AND INCINERATOR LOCATION
SITE OVERVIEW

OUTCOME PROJECT NUMBER: P2023-16	DRAWN BY: J.MILLS	SCALE: 1:20000
CLIENT PROJECT NUMBER: -----	CHECKED BY: E.GRIMMINCK	PUBLISH DATE: 2024-11-29
DRAWING NAME: P2023-16 ISACHSEN INCINERATOR SETUP.dwg	SHEET NUMBER: 01 OF 01	REV: 00



GENERAL NOTES	LEGEND	151 HOLLAND AVE SUITE 200 OTTAWA, ONTARIO K1Y 0Y2 t:613.729.2402		ISACHSEN HIGH ARCTIC WEATHER STATION INCINERATION SOP INCINERATOR 9570A & 9570B SETUP		
INCINERATOR SETUP BLUEPRINT APPLICABLE FOR INCINERATIONS 9570A & 9570B	- ELECTRICAL LINE - DATA LINE - POWER SUPPLY - BLOWER - PILOT BURNER - AIR LINE			OUTCOME PROJECT NUMBER:	DRAWN BY:	SCALE:
				NP2023-16	E.GRIMMINCK	1:110
				CLIENT PROJECT NUMBER:	CHECKED BY:	PUBLISH DATE:
				NP2023-16	K.VEITCH	2024-04-08
				DRAWING NAME:	SHEET NUMBER:	SHEET NUMBER:
				NP2023-16 ISACHSEN INC SETUP.dwg		01 OF 01