

**Technical Work Document**  
**for**  
**ATMOSPHERIC SCIENCES**  
**DEPARTMENT 8863**  
**Hydrogen Generation at the ARM Utqiagvik Site**

**November 20, 2019**



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## ATMOSPHERIC SCIENCES DEPARTMENT 8863

### Hydrogen Generation at the ARM Utqiagvik Site

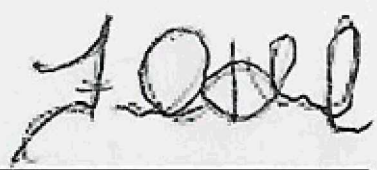
Next review date for this TWD:

#### Change/Review History

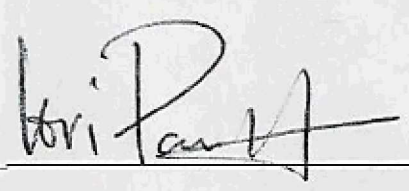
Section(s)	Effective Date	Summary
All		New TWD

**TWD Classification:** Controlled Activity

**NOTE: Keep Controlled Activity TWDs immediately available at work location while performing work.**

Prepared by:  11/18/19  
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Reviewed by: *Marc E Williams* 11/18/2019  
Marc Williams, 8517 Date

Approved by:  11.18.2019  
Lori Parrott, Manager, 8863 Date

## 1. PURPOSE, SCOPE, AND APPLICABILITY

### Purpose

Sandia National Laboratories/New Mexico (SNL/NM Atmospheric Sciences Department 8863) operates the ARM site at Utqiagvik, Alaska as part of the DOE Office of Science Atmospheric Radiation Measurement (ARM) research program. This TWD identifies the hazards, control measures, required training, and procedure for Hydrogen Generation at the Utqiagvik site.

### Scope and Applicability

This TWD applies to Hydrogen Generation by a HOGEN S20 manufactured by PROTON ON SITE. The Utqiagvik Hydrogen Fill System is intended for use by the authorized Sandia National Laboratories personnel and its contractors who are involved in research relating to the deployment of weather balloons for the Department of Energy's Atmospheric Radiation Measurement Program (ARM) <https://www.arm.gov/> and The National Weather Service (NWS) <https://www.weather.gov/>. Hydrogen is supplied from a hydrogen generation shelter and outdoor storage tank. The balloons are filled and released by a remote balloon launcher RBL commercially available from Vaisala. **This procedure does NOT cover nor authorize troubleshooting/repairs to the HOGEN or Vaisala systems.**



## 2. TRAINING AND QUALIFICATION

All persons engaged to Hydrogen Generation shall complete and maintain currency in the following corporate training or for contract personnel equivalent training.

<b>TRAINING</b>		
<b>Course Code</b>	<b>Course Title</b>	<b>Interval</b>
PRS150R or equiv.	PRESSURE SAFETY ORIENTATION REFRESHER	3 years
PRS150 or equiv.	PRESSURE SAFETY ORIENTATION	0 years

### 3. HAZARDS & CONTROLS

<b>Hazard Source</b>	<b>Hazard</b>	<b>Control</b>
Hydrogen	Explosive Hypoxia	Ventilation System Design; System Design; H2 Detectors
Pressure	Whiplash from broken high-pressure pipe or hose	Pressure Training
Walking Working Surfaces	Slips, trips, falls	Weather-appropriate footwear

### 4. OPERATIONS

Perform the checklist in attachment A Daily.

## TURNING ON THE HOGEN

Verify the cabinet doors are closed and secured.

Switch the Main Power Disconnect Switch from the **horizontal OFF "O"** position to the **vertical ON "I"** position.

The display will show **"0183"** (the Application Software Version) and then **"A00"** (the revision)

Next a dashed line moves across the center of the display.

After approximately 10 seconds, the **green START "I" (D)** keypad light will begin to flash.

Press the **green START "I" (D)** keypad

A dashed line moves in a "racetrack" pattern around the perimeter of the display for approximately 120 seconds.

The display will next begin to show **"System Pressure" (B)** and the **yellow H2 (E)** indicator light illuminates, signaling that hydrogen is being generated.

**NOTE:** Press the **"Product Pressure" (A)** keypad at this time to display the tank pressure. The tank pressure will display a value and will stop at 200 +/- 5 psi (the configured set value). The **yellow H2 (E)** indicator light will go out signaling that the HOGEN is no longer generating hydrogen.

## TURNING OFF THE HOGEN

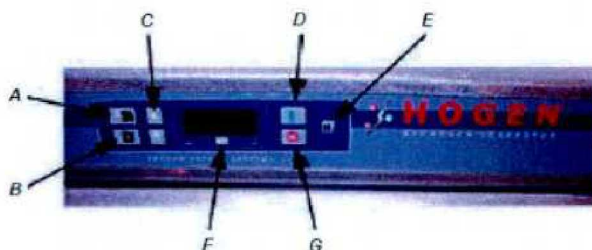
Press the **red STOP/RESET "O" (G)** keypad.

After approximately 60 seconds, the **red STOP/RESET "O" (G)** keypad light will begin to flash.

Switch the Main Power Disconnect Switch from the **vertical ON "I"** position to the **horizontal OFF "O"** position

**NOTE:** Do not use the E-Stop (RED Knob on Front Panel) or main power disconnect switch to stop gas generation EXCEPT in the event of an emergency from the above instructions.

### HOGEN FRONT Panel Display (Figure 1)



### HOGEN Rear Panel (Arrow pointing to the Main Power Disconnect Switch in the **horizontal OFF (O)** position) (Figure 2)



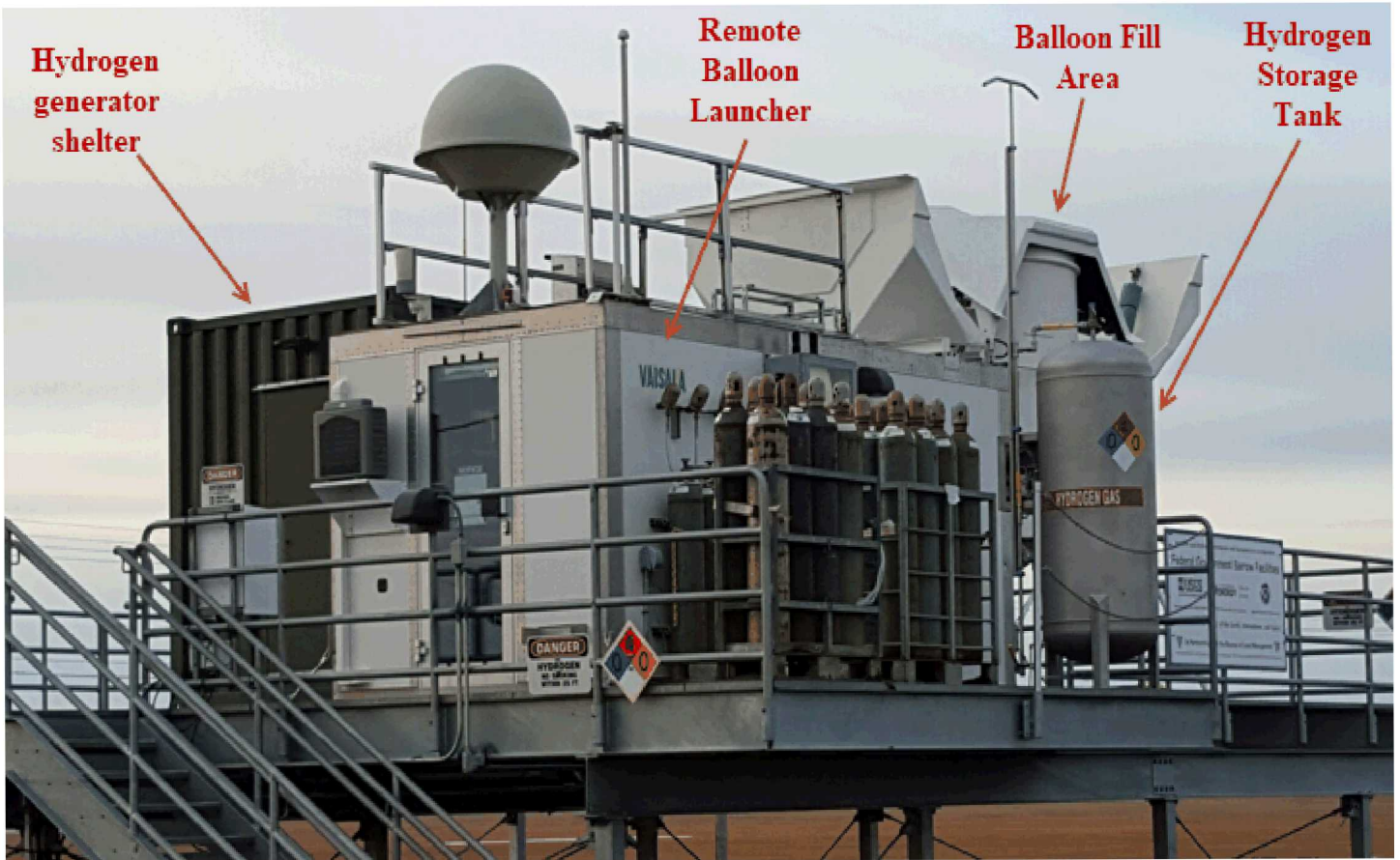
## 5. Balloon Launcher Operations (Autosonde)

Include special requirements for H2 balloon launches here (wind etc.)

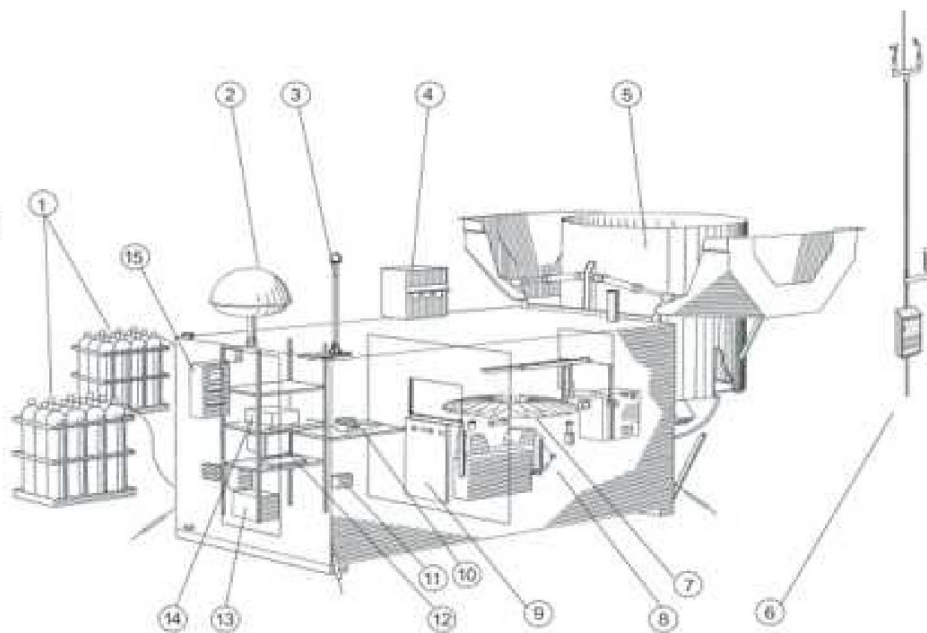
The Autosonde is set to operate in wind speeds under 25 m/s with a 10 min average and temperatures above -40C

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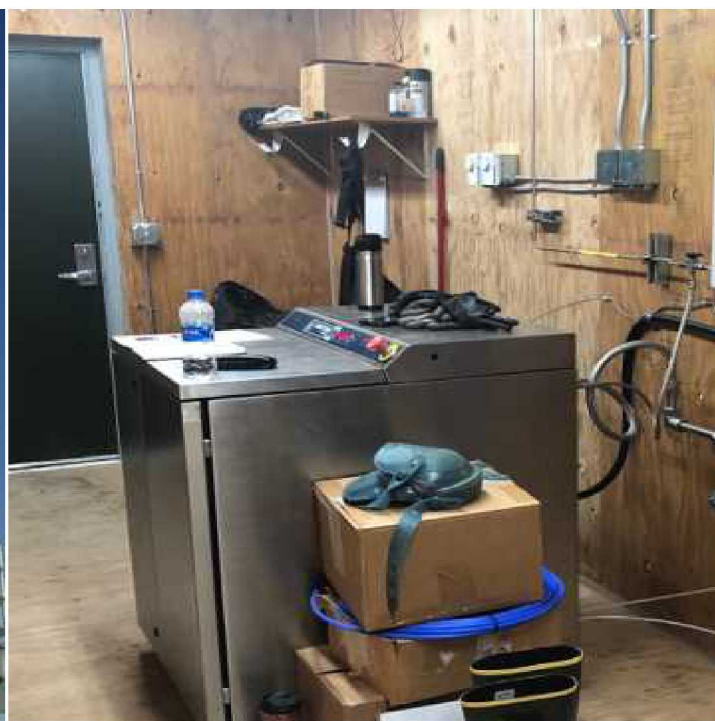
## 6. Site Photos



- 1 = Gas Banks
- 2 = UHF Antenna
- 3 = GPS Antenna
- 4 = Gas Measurement Unit
- 5 = Launcher Vessel
- 6 = Automatic Weather Station, MAWS
- 7 = Daisywheel
- 8 = Radiosonde Storage and Preparation Module
- 9 = Logic Controller
- 10 = Ground Check Set
- 11 = HMT Series Humidity/ Temperature Transmitter
- 12 = Sounding Workstation
- 13 = UPS Power Supply
- 14 = Sounding Processing Subsystem
- 15 = Mains Distribution Box



Balloon being automatically being released



HOGEN - Hydrogen Generator



Distiller for HOGEN



Distiller Water Tank

## 7. EMERGENCY ACTIONS AND RESPONSE

- a. **If fire evacuate to safe location and call 911 and site operations manager 1-505-259-0058**
- b. **loss of ventilation exit immediately, do not re-enter and call **Forecast Office in Fairbanks at 1-907-458-3708** and site operations manager 1-505-259-0058**
- c. **Balloon stuck in launcher Only trained maintenance personnel are allowed to clear Balloons contact **Forecast Office in Fairbanks at 1-907-458-3708** and site operations manager 1-505-259-0058 to schedule removal.**

## 8. FEEDBACK AND IMPROVEMENT

Document problems encountered and solutions implemented, opportunities for improvement, and lessons learned and enter this information into the Corporate Lessons Learned "Projects" application (<https://sandialessonslearned.sandia.gov/>).

## 9. RECORDS

N/A

## 10. REFERENCES

PRESSURE SAFETY DATA PACKAGE FOR REMOTE BALLOON LAUNCHER (RBL)



Attachment A

# Daily Check List

Date: \_\_\_\_\_ Time: \_\_\_\_\_

	Item to Check	Yes	No
1.	Is ventilation fan running? <b>If No exit and report to NWS 1-907-458-3708 and Fred Helsel 1-505-259-0058 do not attempt to re-enter.</b>		
	Shelter Temperature should be 50 – 75F  Shelter Temperature _____		
1	Any obvious water leaks, both HOGEN and Distiller.		
2	C Codes, Warning Codes C-00 thru C13, C30. As viewed on the front panel screen.  Code _____		
3	E Codes, Error Codes E-01 thru E-41, E-00 is a manual shutdown. As viewed on the front panel screen. If any E Codes occur the HOEGN will be shut down.  Code _____		
4	Verify the HOGEN front panel screen Indicates pressure (Product Pressure), if not making gas it should be 190psi or greater.  Product Pressure _____		
5	Verify the gauge on the storage tank reads what the Product Pressure is on the front panel (within a few psi.)  Product Pressure _____		
6	Distiller reservoir tank empty? As viewed on the sight glass.		
7	Distiller water supply tank have water? Fill as needed with tap water.		

**IF ANY QUESTIONS ARE ANSWERED NO.  
 NOTIFY THE WEATHER SERVICE FORECAST OFFICE IN FAIRBANKS AT 1.907.458.3708  
 PERSONNEL 24/7 AND SITE OPERATIONS MANAGER 1-505-259-0058**

