



Infrasound and Low-Frequency Acoustics MINOS Briefing

September 2021

Changing the World's Energy Future

Edna S Cardenas



DISCLAIMER

This information was prepared as an account of work sponsored by an agency of the U.S. Government. Neither the U.S. Government nor any agency thereof, nor any of their employees, makes any warranty, expressed or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness, of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. References herein to any specific commercial product, process, or service by trade name, trade mark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the U.S. Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the U.S. Government or any agency thereof.

Infrasound and Low-Frequency Acoustics MINOS Briefing

Edna S Cardenas

September 2021

**Idaho National Laboratory
Idaho Falls, Idaho 83415**

<http://www.inl.gov>

**Prepared for the
U.S. Department of Energy
Under DOE Idaho Operations Office
Contract DE-AC07-05ID14517**

Infrasound and Low-Frequency Acoustics MINOS Monthly Briefing

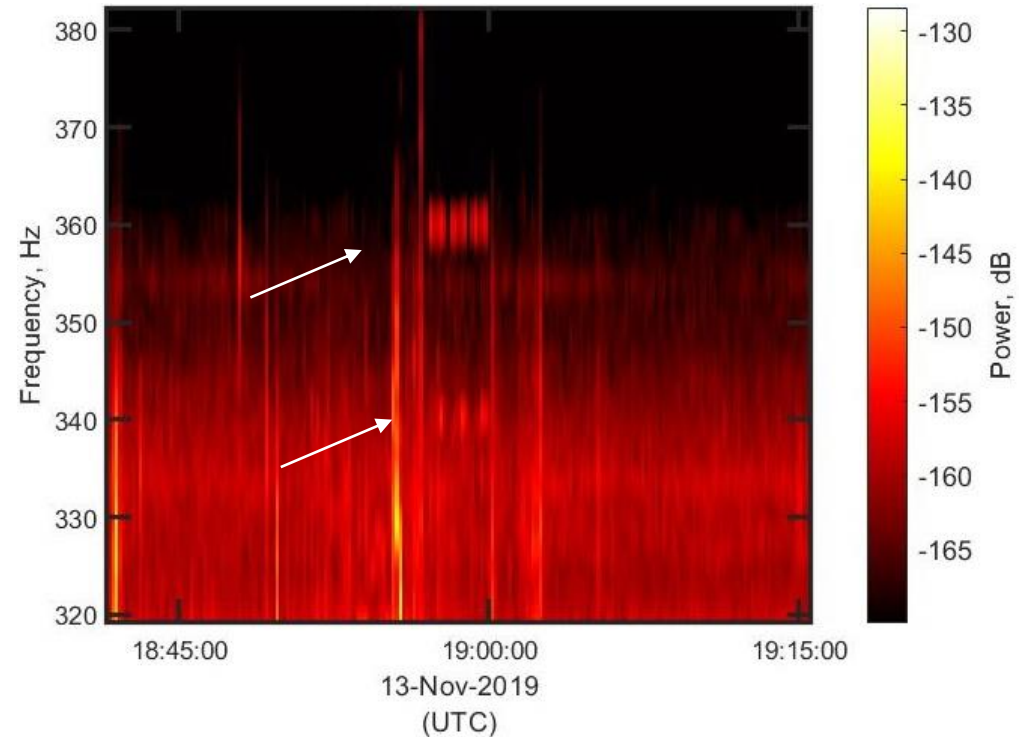
Edna Cárdenas

September 9, 2021

Transfer Materials from HFIR and/or REDC



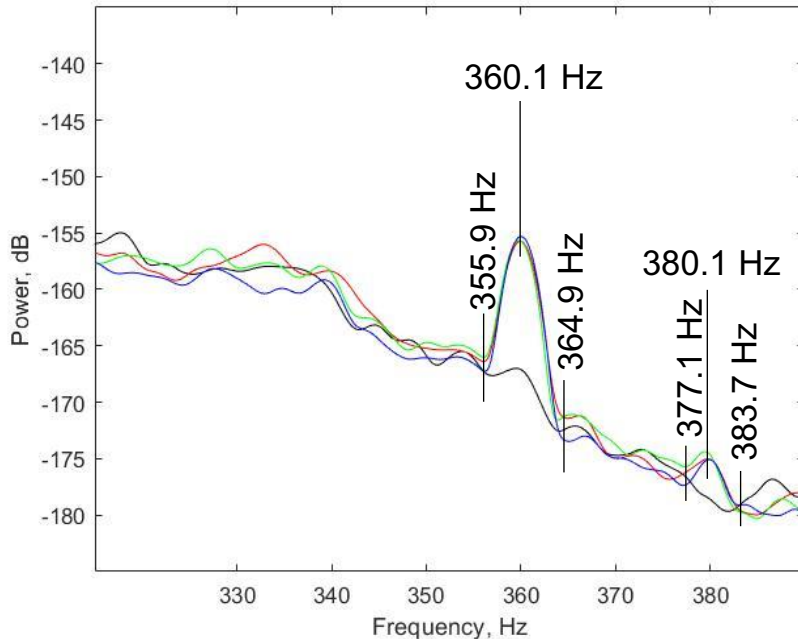
HFIR exterior airlock truck door. Smartphone 35 around the corner from airlock.



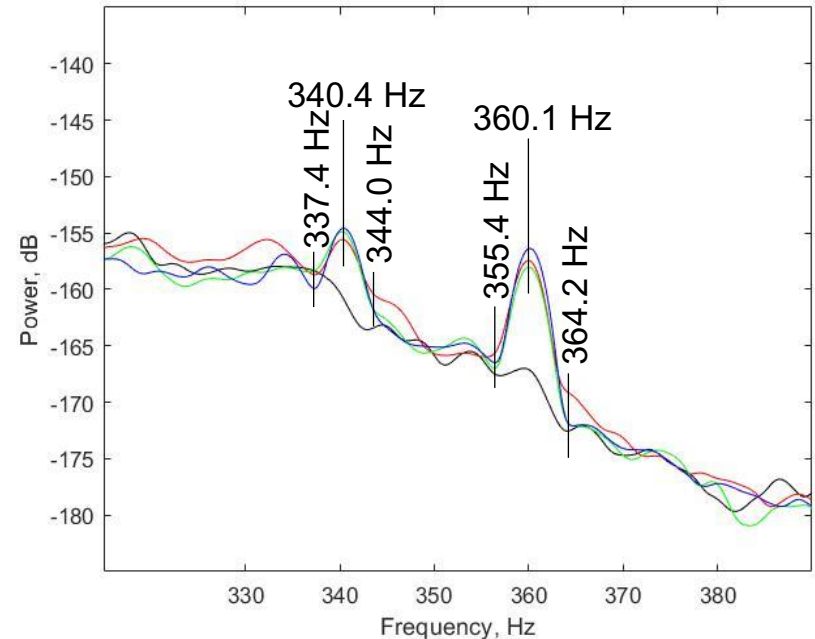
Power increases observed at 360 & 340 Hz during known times when the exterior airlock truck door opened/closed.

Programmed Notification Algorithm

Exterior Airlock Door Opened



Exterior Airlock Door Closed

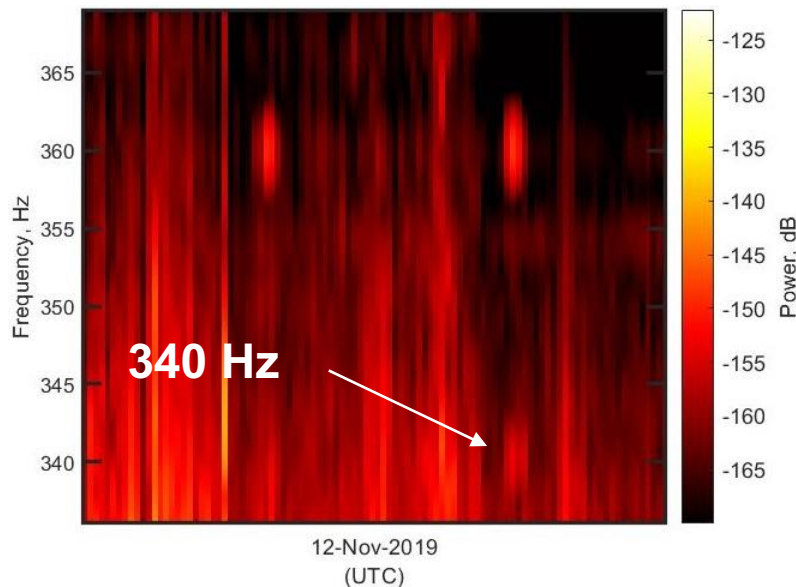


Background (—) and exterior airlock door operation signals (—), (—), and (—).

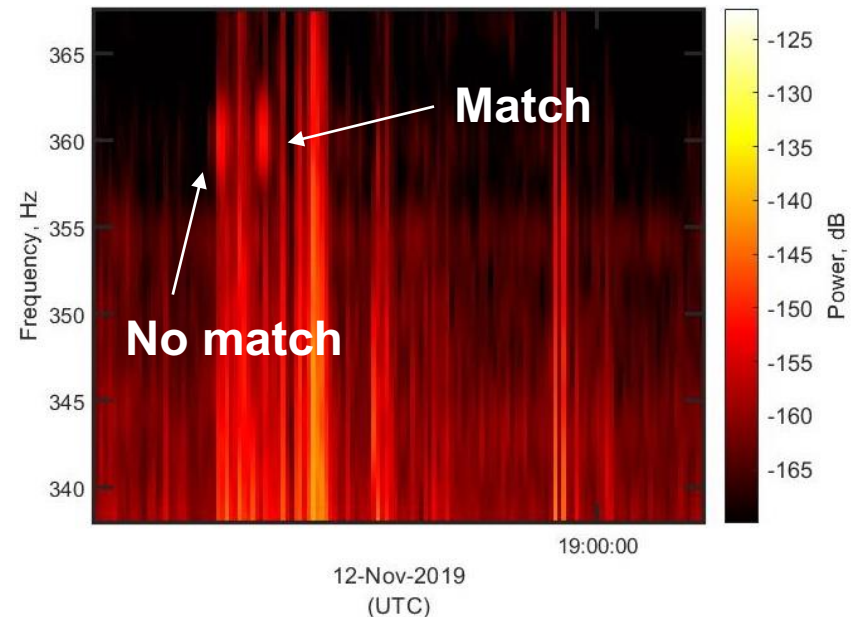
- Peak and background channels input into two-sample t-test.
- Power increase continuing for 24 s at 360 Hz.
- Algorithm found 6 instances of 360 Hz peak during time of targeted door operations.

Results – Spent Fuel Transfer Observed

- Three signals found at 360 Hz; one matching time when the exterior airlock truck door was closed.
- Two signals found prior to recorded times.
- Algorithm failed due to noise around 360 Hz peak.



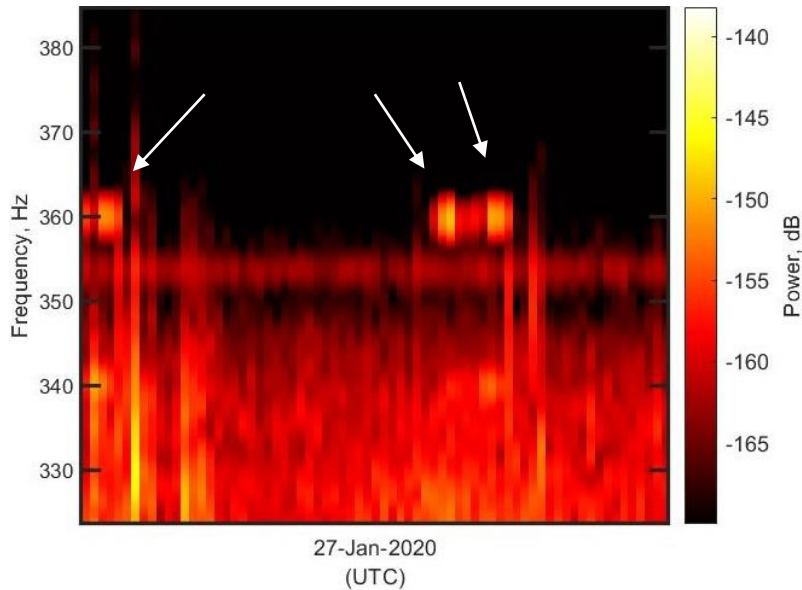
Events not observed by team.
Signals discovered from 17:42:33
to 17:42:54 & 17:46:02 to 17:46:21.



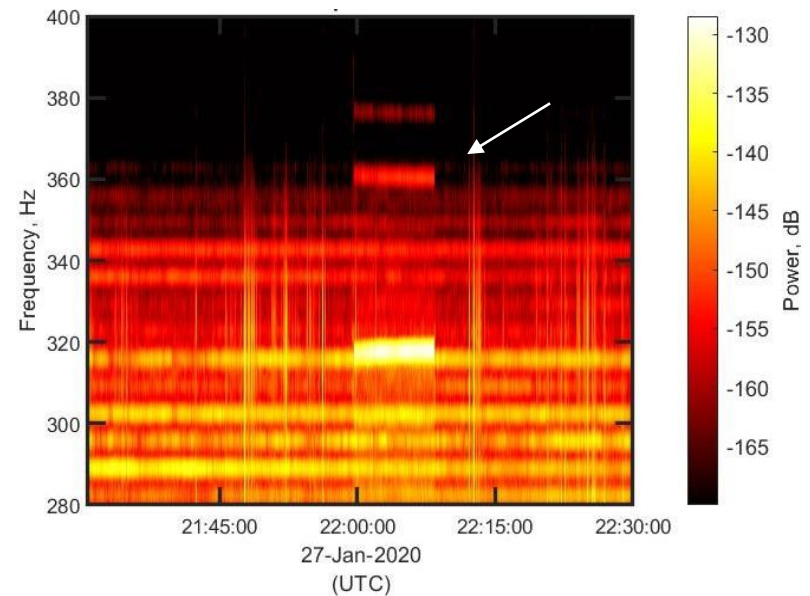
Signal matched times recorded by team
from 18:53:26 to 18:53:46.

Results – Spent Fuel Shipment (Dates Provided)

- Times discovered between 1100 and 1115 UTC on January 27, 2020.
- Algorithm reported false positives.



360 Hz peaks found beginning at 11:00:31, 11:04:00, and 11:04:20 UTC.



Twenty-six 360 Hz peaks found after 22:00 UTC.

ATR Ground Truth

- Two entries uploaded to data portal.
 - Memo describing ground truth.
 - 10 files in consecutive date order from February 1 to May 6, 2021.
 - One text file with reactor power values.

TAG	SHORT DESCRIPTION	BLG	LONG DESCRIPTION
TE-1-6-1.OUT.Sample	HX 2 PRI OUT TEMP	670	Temperature of water exiting primary heat exchanger
TE-1-6-1B.OUT.Sample	HX 2 PRI OUT TEMP BKUP	670	Temperature of water exiting primary heat exchanger
TE-1-6-2.OUT.Sample	HX 3 PRI OUT TEMP	670	Temperature of water exiting primary heat exchanger
TE-1-6-2B.OUT.Sample	HX 3 PRI OUT BKUP TEMP	670	Temperature of water exiting primary heat exchanger
TE-2-1-1.OUT.Sample	HX SEC HEATER INLET TEMP	670	Temperature of water entering secondary heat exchanger
TE-2-1-1B.OUT.Sample	HX SEC HDR INLET TEMP BKUP	670	Temperature of water entering secondary heat exchanger