



**Lower Cook Inlet  
3D Seismic Survey  
Mike Dunn, Project Manager**

**Integrity • Urgency • Ownership • Alignment • Innovation**



# Hilcorp Alaska – Our Goals

## OUR GOALS

- Operate safely and environmentally responsibly
- Invest to develop additional oil and gas production and reserves
- Create efficiencies and innovations that extend field life
- Increase asset values over the long term

## BENEFITS

- Provide affordable energy for Alaskans
- Increased royalty payments
- Increase property values and taxes
- Extend the life of existing fields
- More Jobs





# Safety lives in our Values

## INTEGRITY

*Operating safely and maintaining environmental stewardship are the right things to do.*

## URGENCY

*Do the **right thing**, the **right way**, as quickly and **safely** as possible.*

## OWNERSHIP

*We encourage and expect all **employees** and **contractors** to take personal **accountability** and have **ownership** of their own safety and the safety of those around them.*

## ALIGNMENT

*We **all** win when we maintain and encourage safe and environmentally responsible operations.*

## INNOVATION

*We work to **get better every day** in operational safety and environmental monitoring and mitigation*



# Integrity: Do the Right Thing

*Hilcorp recognizes the importance and sensitivities of the Cook Inlet region and our obligation to execute our work in a responsible manner.*

*Our team will be doing all it can to minimize any potential disturbances.*



# Permitting



**BOEM**  
BUREAU OF OCEAN ENERGY MANAGEMENT



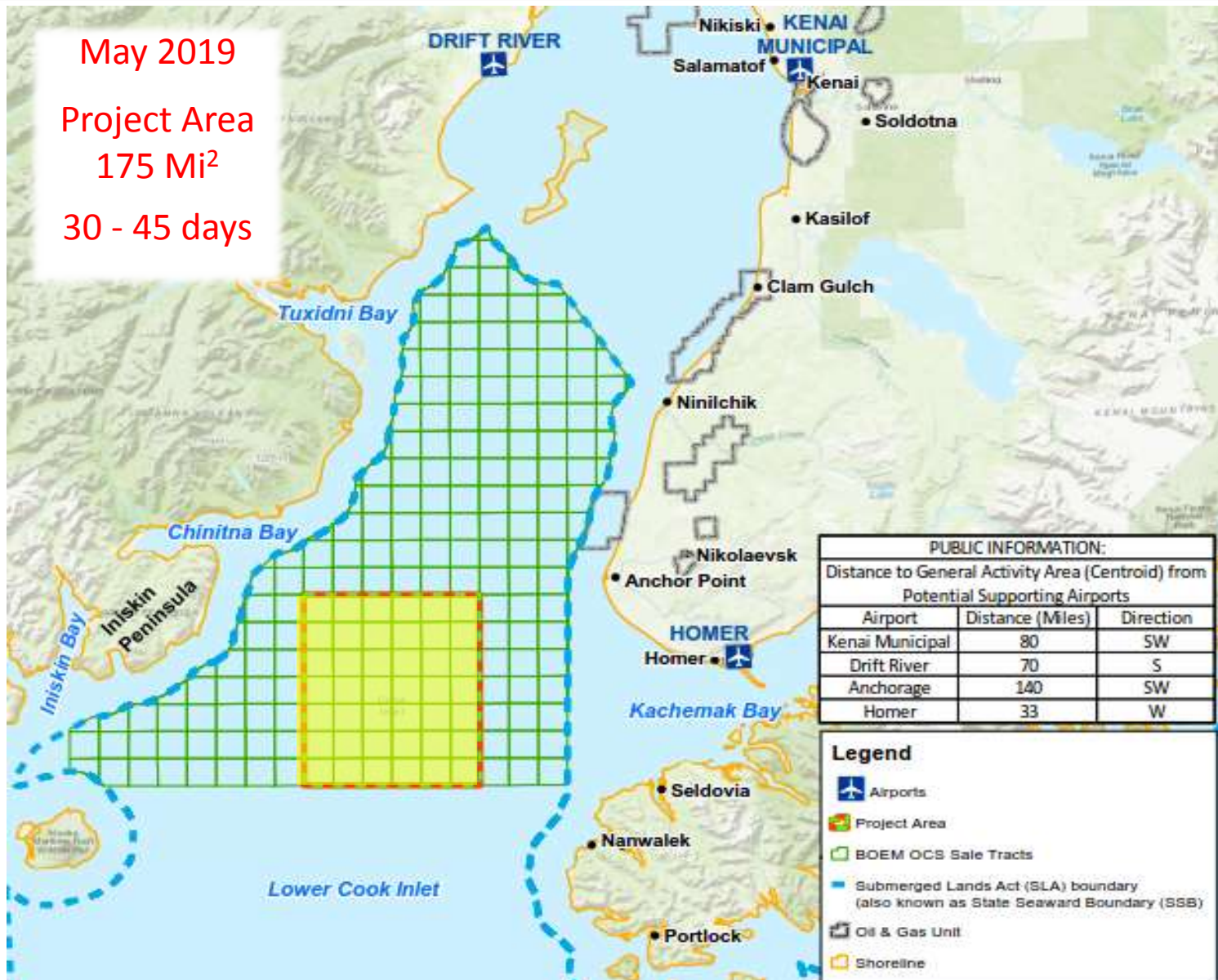


# Survey Area: Lower Cook Inlet

May 2019

Project Area  
175 Mi<sup>2</sup>

30 - 45 days





# Sound Safety

**JASCO**  
APPLIED SCIENCES

Founded in 1981  
JASCO Applied Sciences provides consulting and research services for assessing and mitigating underwater noise.



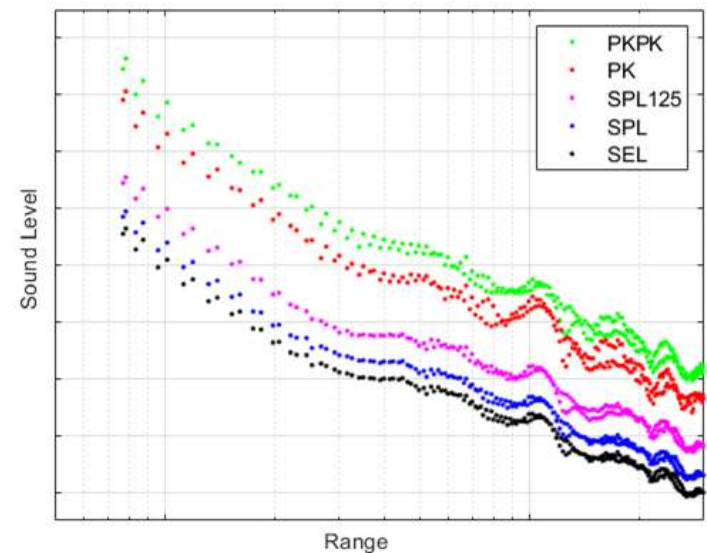
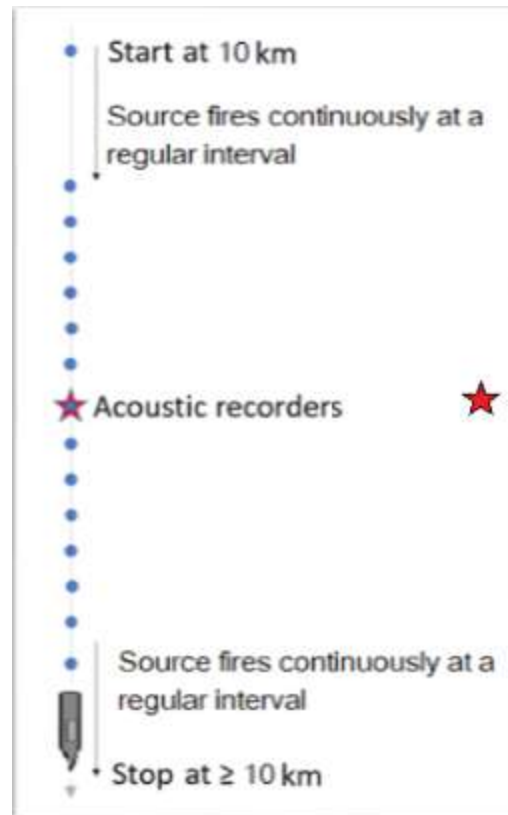
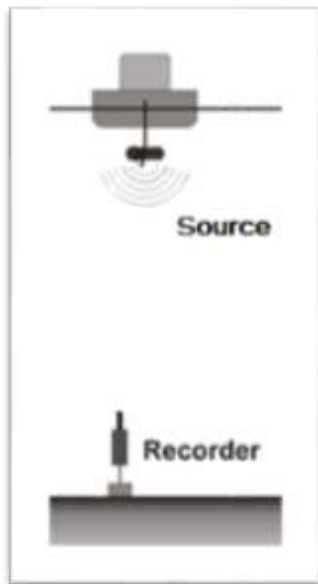
## SOUND SOURCE VERIFICATION

Measurements and  
Safety Zones Established  
BEFORE Activity Begins



# Sound Source Verification

- Two acoustic recorders will be placed on the seafloor to record underwater sound levels while the survey vessel passes by.
- Sound levels will be measured at multiple distances from the seismic source.
- These data will be used to determine the distance from the source to the sound threshold that defines the marine mammal safety zone.





# Noise readings: Air vs Underwater



Human Perception	Noise in Air (dBA re 20µPa)	Examples	Underwater Noise (dB re 1µPa)	Examples Most at 3 feet reference distance
Intolerable	140	Firearms, jet engine	230	Unmitigated impact piling
Very loud	120	Thunder clap	210	Military sonar
Loud	100	Car horn at 10 feet	190	Large vessels
Noisy	80	Shouting at 3 feet	170	Small boats / ships
Moderate	60	Conversation	150	Oil drilling and production
Quiet	40	Computer or fridge	130	Background shipping noise harbors or busy vessel routes
Almost silent	20	Remote wilderness on calm night	110	Foggy Island Bay typical range of ambient underwater noise
	0	Threshold of "perfect" hearing	80	

219 dB underwater impulsive peak noise "injury" threshold for bowhead whales (permanent hearing damage)

120 dB underwater noise marine mammal behavioral disturbance threshold



# Protected Species Observers (PSO)

## PSOs WILL BE IN PLACE ON ALL WORK VESSELS

- Wildlife and Protected Species Monitoring
- Data Collection



## PSOs HAVE DIRECT COMMUNICATION WITH VESSEL CREWS

Vessel crews will SHUTDOWN activity if marine mammals are observed within specified distances of work vessels



The Fairweather Science team is composed of experienced environmental professionals with a proven history of successful operations in Alaska and a strong commitment to safety, professionalism and environmental responsibility.

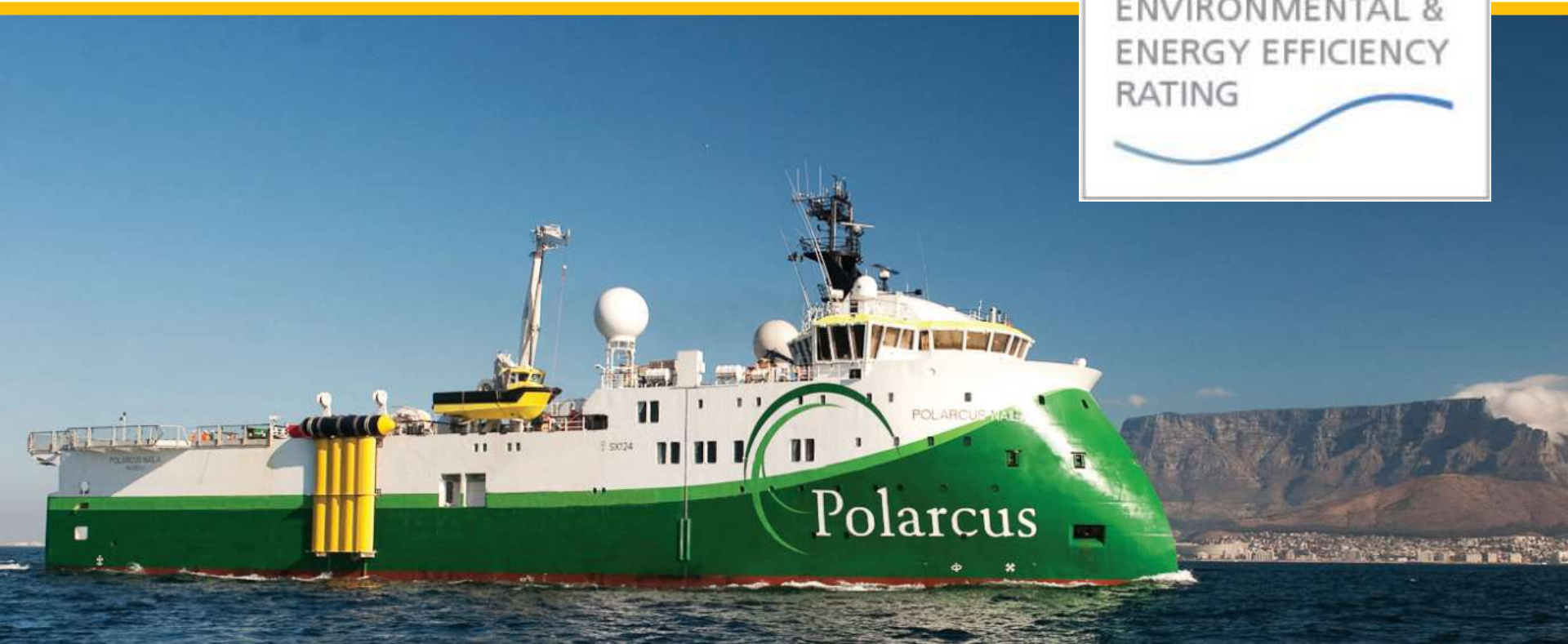
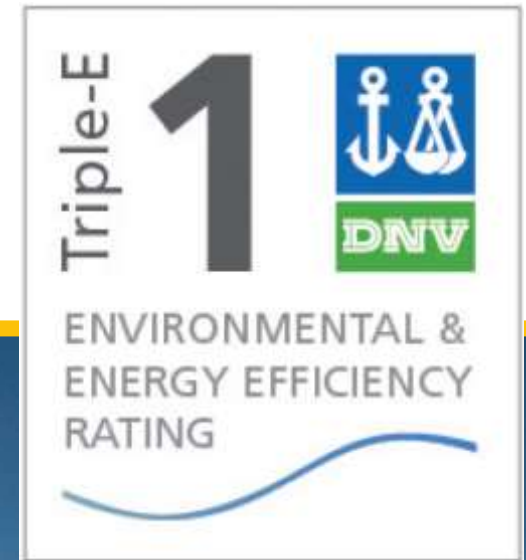




# Seismic Vessel: Polarcus Naila

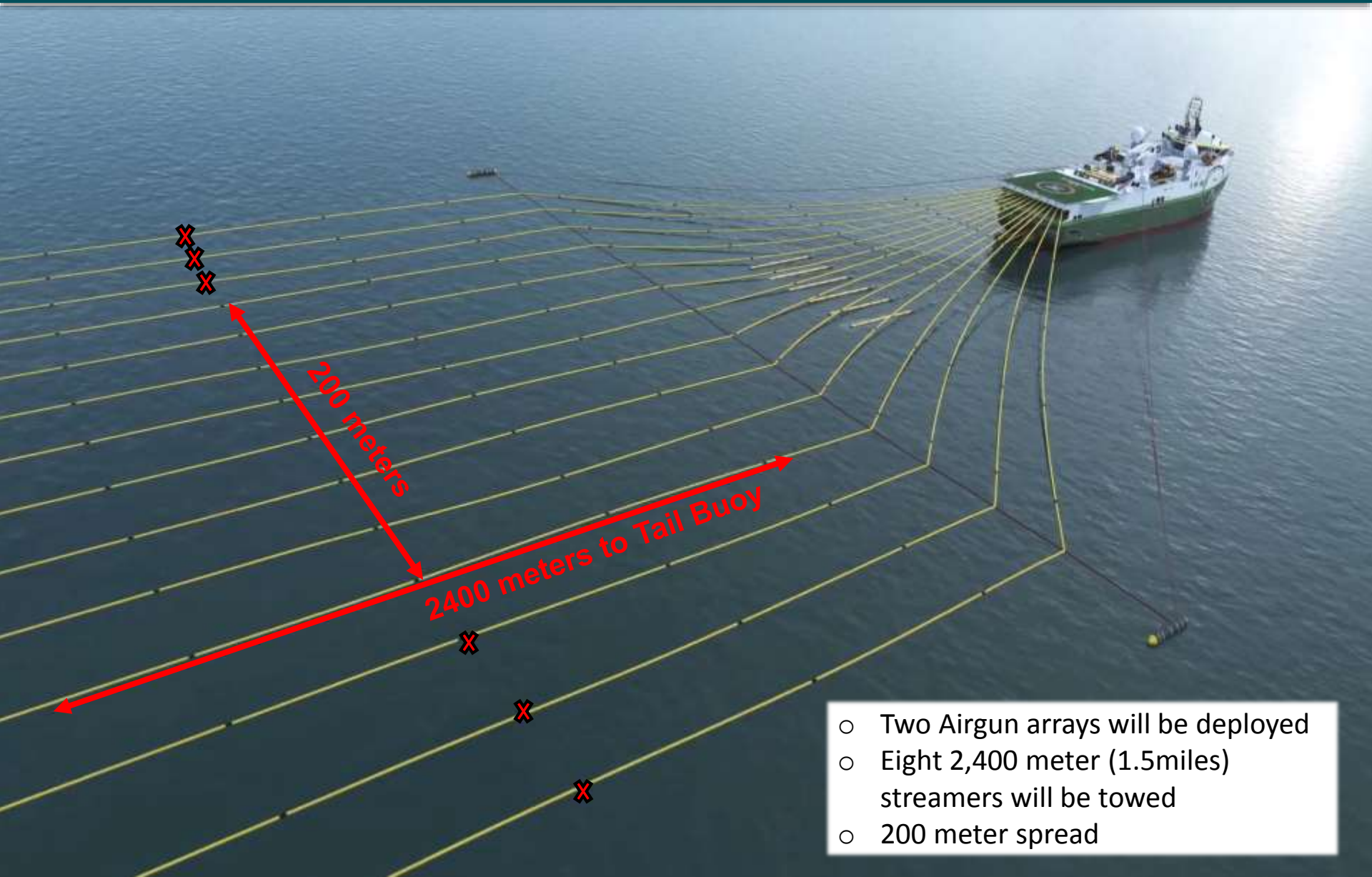
## 2010 ULSTEIN SX124

- 91 Meter Double Hull Vessel with Helideck
- Diesel-Electric Propulsion
- DNV Clean Design Compliant
- Most advanced commercial seismic technology available





# Towed Seismic Array



- Two Airgun arrays will be deployed
- Eight 2,400 meter (1.5miles) streamers will be towed
- 200 meter spread



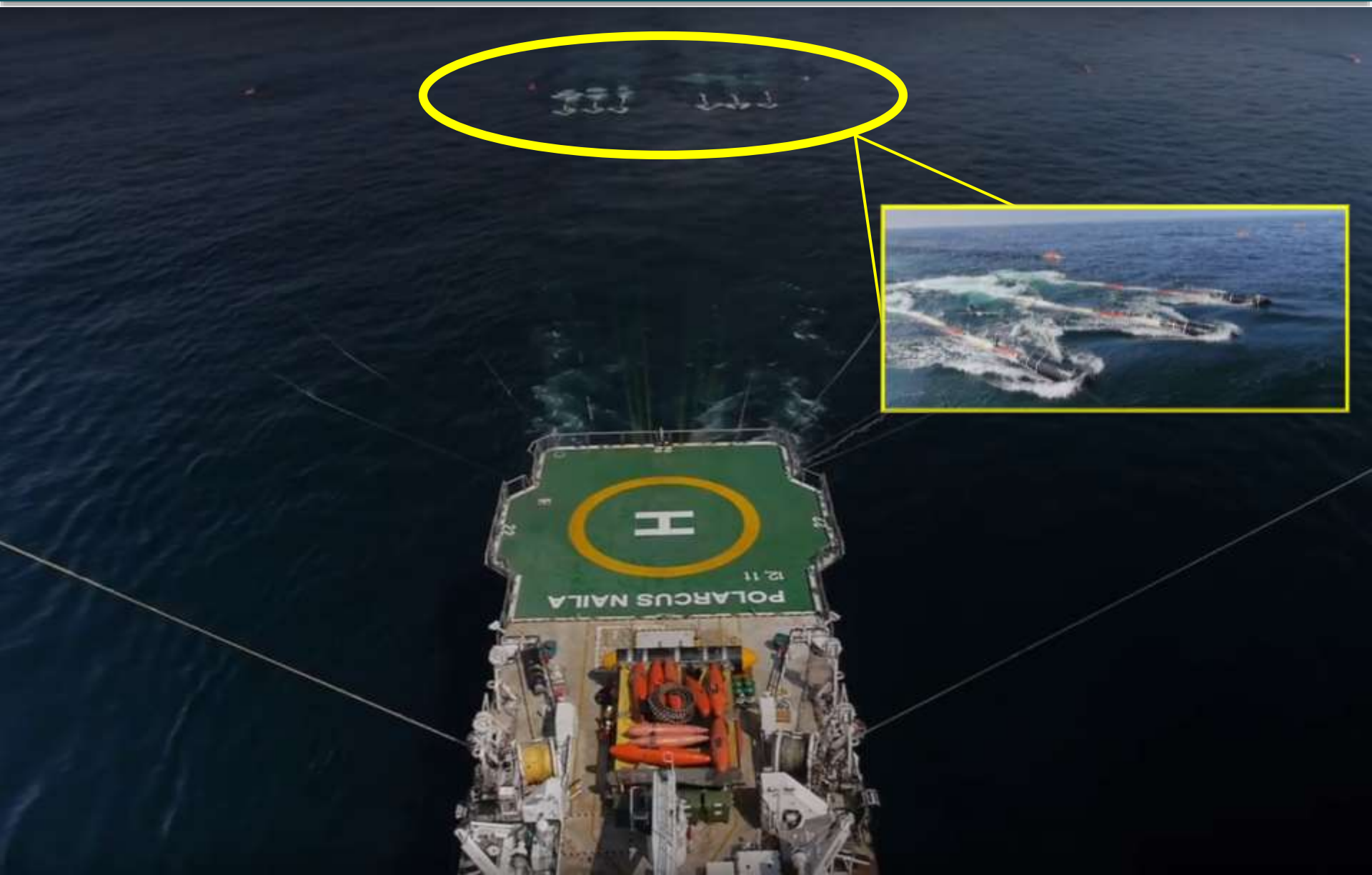
# Towed Seismic Array



- 4 to 10 hours per 16 mile line length dependent on tidal currents
- Vessel speed ~ 4.5 knots

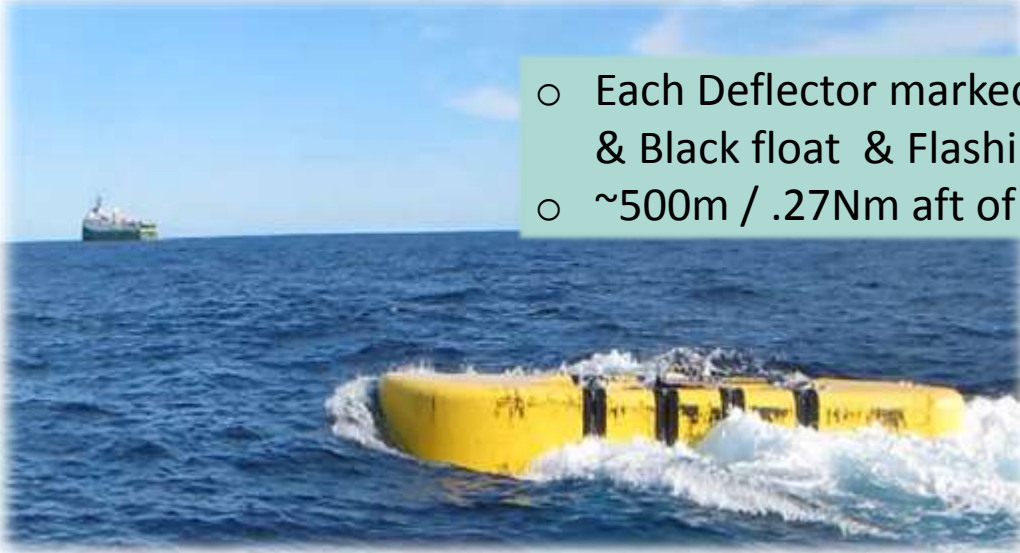


# Towed Seismic Array





# Towed Seismic Array



- Each Deflector marked with Yellow & Black float & Flashing light
- ~500m / .27Nm aft of the vessel

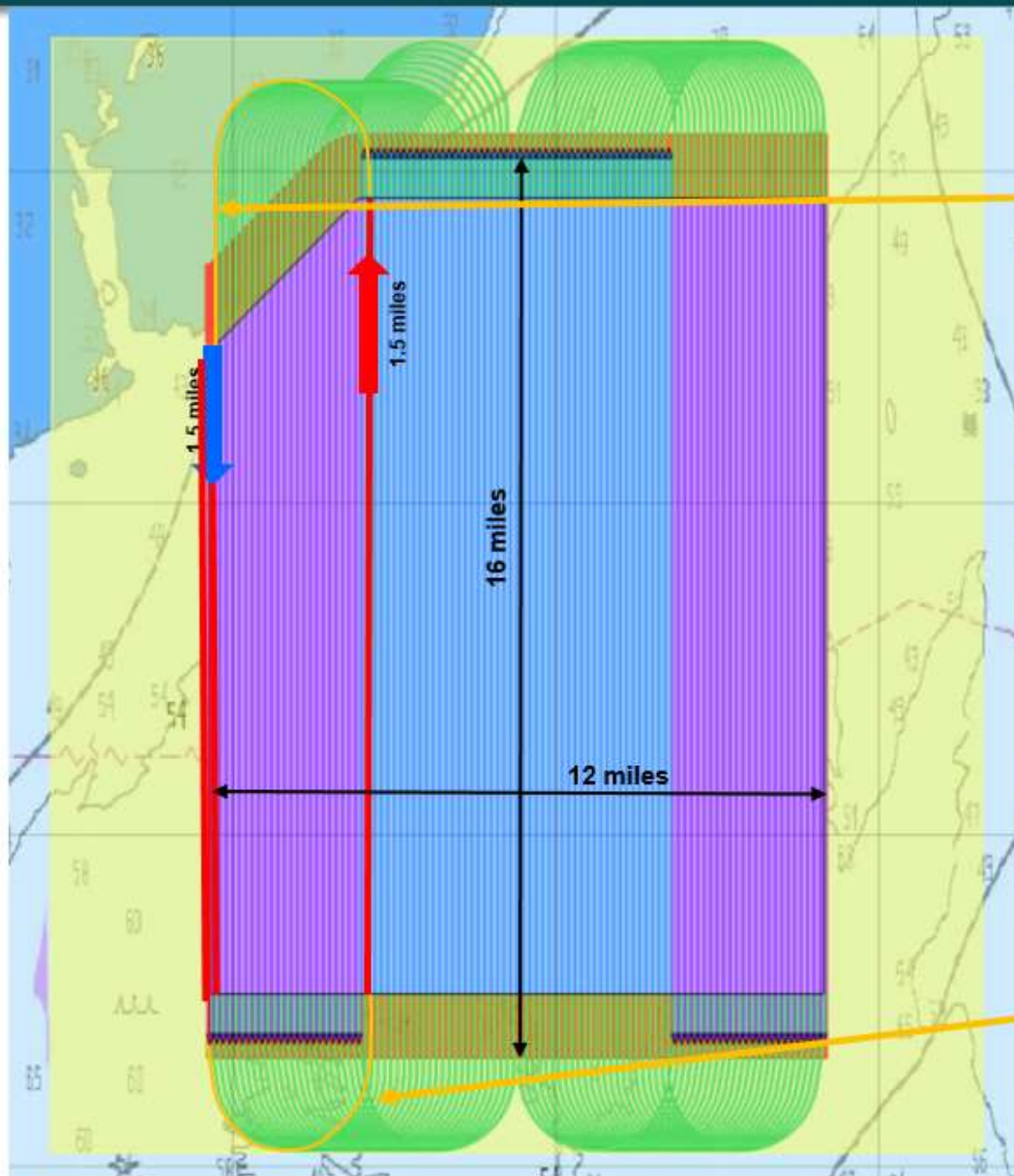
- Each streamer head marked with yellow float
- ~500m / .27Nm aft of vessel

- Each streamer tail marked with yellow navigation buoy- radar reflector, GPS & flashing light
- 2400m / 1.3Nm aft of vessel





# Details of racetrack acquisition & 24 hr look ahead



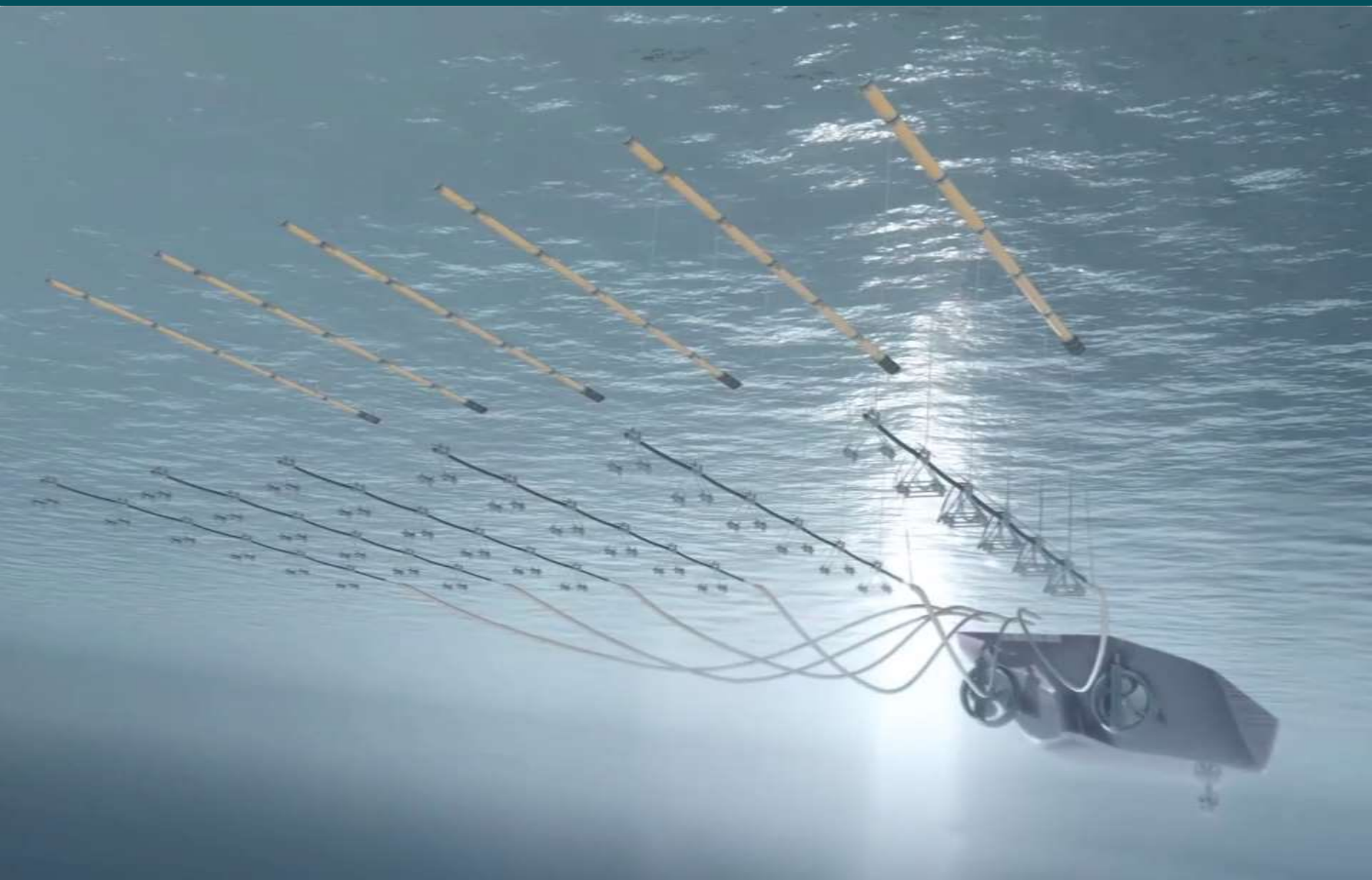
- Typical 24 hour operation area notice
- 4 to 10 hours per 16 mile line length, dependent on tidal currents
- 1:35 minutes per line change on about a 3 mile diameter
- Vessel through water speed of 4.5 knots
- 24 hour production estimated at:
  - 3 lines
  - 2 line changes

Plan Step	Preplot Name	Preplot Start	Preplot End	Azimuth	Duration	Local Time SOI	Local Time EOL
1	1700	015°11'34.609"N, 093°52'6.283"E	014°55'4.413"N, 093°42'59.754"E	208.0°	1:10	Jan 14 04:55	Jan 14 06:10
2	2375	014°54'17.831"N, 093°52'53.600"E	015°16'8.209"N, 094°04'58.478"E	28.0°	5:30	Jan 14 09:25	Jan 14 14:55
3	2365	015°14'11.946"N, 094°01'24.179"E	014°37'55.773"N, 093°41'22.981"E	208.0°	9:05	Jan 14 19:45	Jan 15 04:50
4	2425	014°39'52.248"N, 093°43'9.733"E	015°16'8.234"N, 094°03'11.418"E	28.0°	9:05	Jan 15 10:10	Jan 15 19:15





# Towed Seismic Array: Subsurface

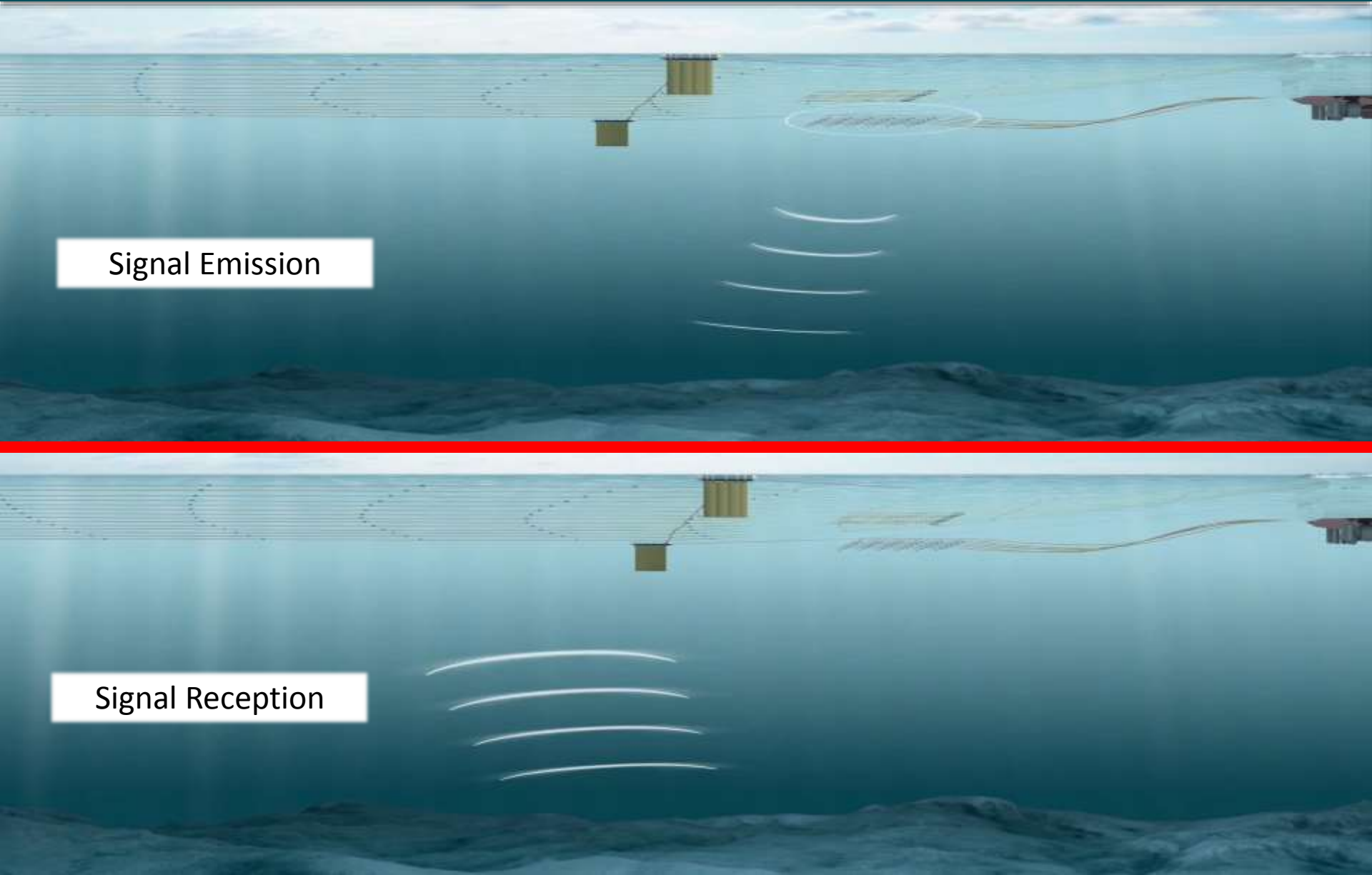




# Seismic Reflection

Signal Emission

Signal Reception





# Thank You

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