Open Water Oil Identification

Abbreviated Training

for sUAS Pilots and Visual Observers

Image Credit: NOAA

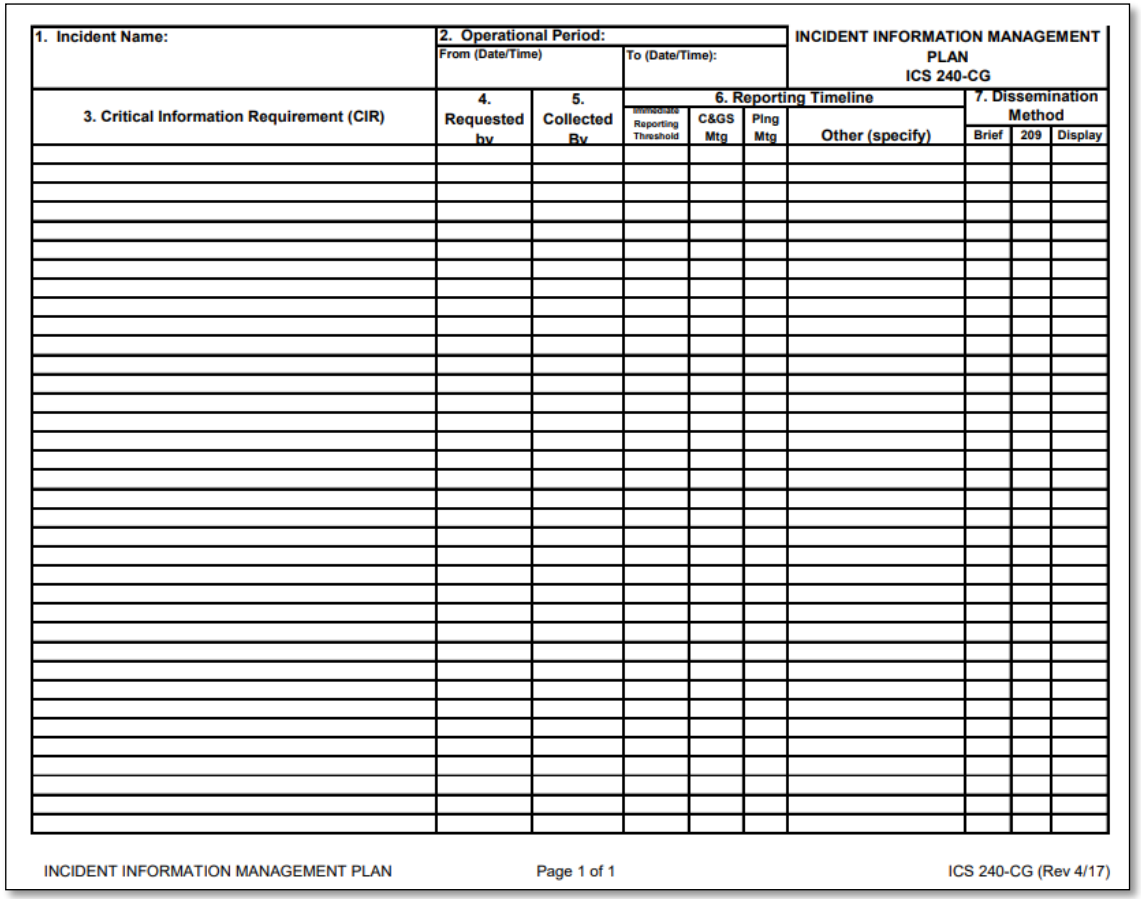
Purpose and Resources

This presentation is designed for untrained aerial observers.

- Does not replace the online training offered by NOAA (1-hour course): *Introduction to Observing Oil from Helicopters and Planes* - https://www.meted.ucar.edu/education_training/lesson/1044
- Other training opportunities and materials include:
  - Science of Oil Spills (SOS) Class
  - 1-day training courses offered by NOAA (contact your NOAA SSC)
  - Job Aids

Proper Reporting is Important

- Aerial observations of oil slicks are important to a response effort and constitute a Critical Information Report (CIR).
- Observations can help NOAA oceanographers refine trajectory models.
- Proper response terminology helps others interpret and understand observations.



1. Incident Name:	2. Operational Period: From (Date/Time)		To (Date/Time):			INCIDENT INFORMATION MANAGEMENT PLAN ICS 240-CG			
3. Critical Information Requirement (CIR)	4. Requested by	5. Collected By	6. Reporting Timeline				7. Dissemination Method		
			Immediate Reporting Threshold	C&GS Mtg	Ping Mtg	Other (specify)	Brief	209	Display

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Reporting Observations

- When reporting oil slick observations:
  - Attempt to identify the source;
  - Main location and estimated size of the slick;
  - The leading edge (farthest edge downwind/downcurrent of the sour and
  - The trailing edge, if applicable.

  These observations may be difficult with a sUAS, but any information is helpful when reported correctly.
- Report observations using both:
  - A latitude/longitude (with enough precision to plot the location),
  - A compass direction, and distance from a prominent landmark such as an island, etc.
- sUAS images will have latitude and longitude in their exif metadata. Ensure that nadir images are taken directly above the oil slick observations.

Four Main Observations to Report

- There are four observations of an oil slick that should be reported:
  1. Dimensions (length x width).
  2. Orientation of the long axis (parallel to shoreline, along a convergence, etc.).
  3. Color (e.g., sheen, dark oil; refer to the Open Water Oil ID Job Aid)
  4. Distribution/Structure (streamer, windrows, etc.).

Image Credit: NOAA

Reporting Dimensions

- Oil slicks can be miles long in which a sUAS will not have sufficient battery life or will not be able to remain within line of sight.
  - In this case, other methods of aerial observation should be considered.
- It is not uncommon to use miles to report the length and yards or feet to describe width.
- Use the same measurement system when reporting dimensions (imperial or metric).
- Some structures will be small, such as patches or tarballs.

Reporting Orientation

- Report the orientation of the slick using the long axis.
- If near a shoreline, you can report that it is parallel to the shoreline.
- If offshore, saying the slick goes from the SW to NE is appropriate, or it is going southeast from the source.

Color

- Oil slicks can have many colors associated with it, each denoting the thickness of the oil.
- As an untrained observer, simply reporting sheen vs. dark or emulsified oil is appropriate.

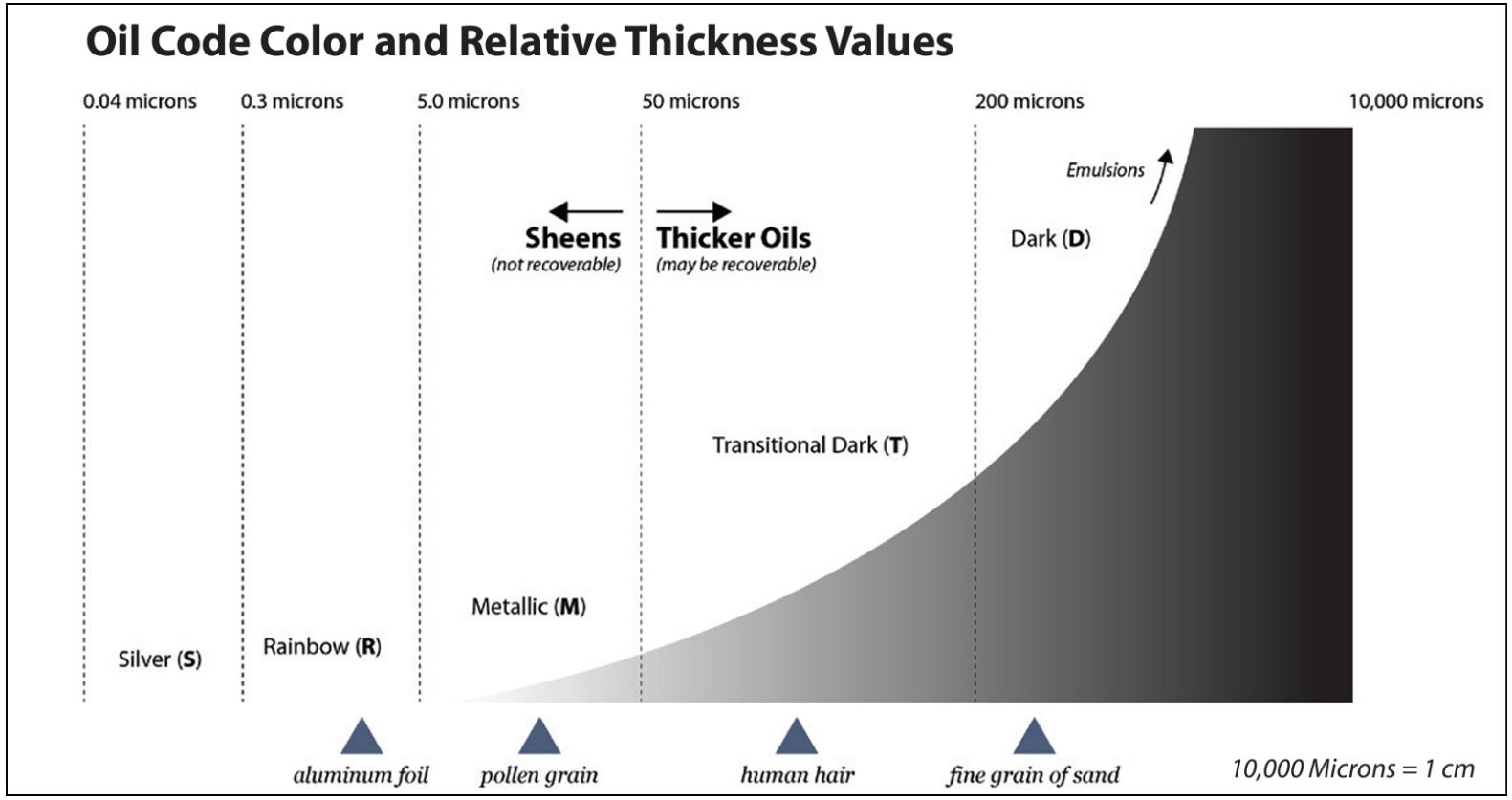


Image Source: Open Water Oil Identification Job Aid for Aerial Observation; NOAA

Credit: NOAA

Sheen

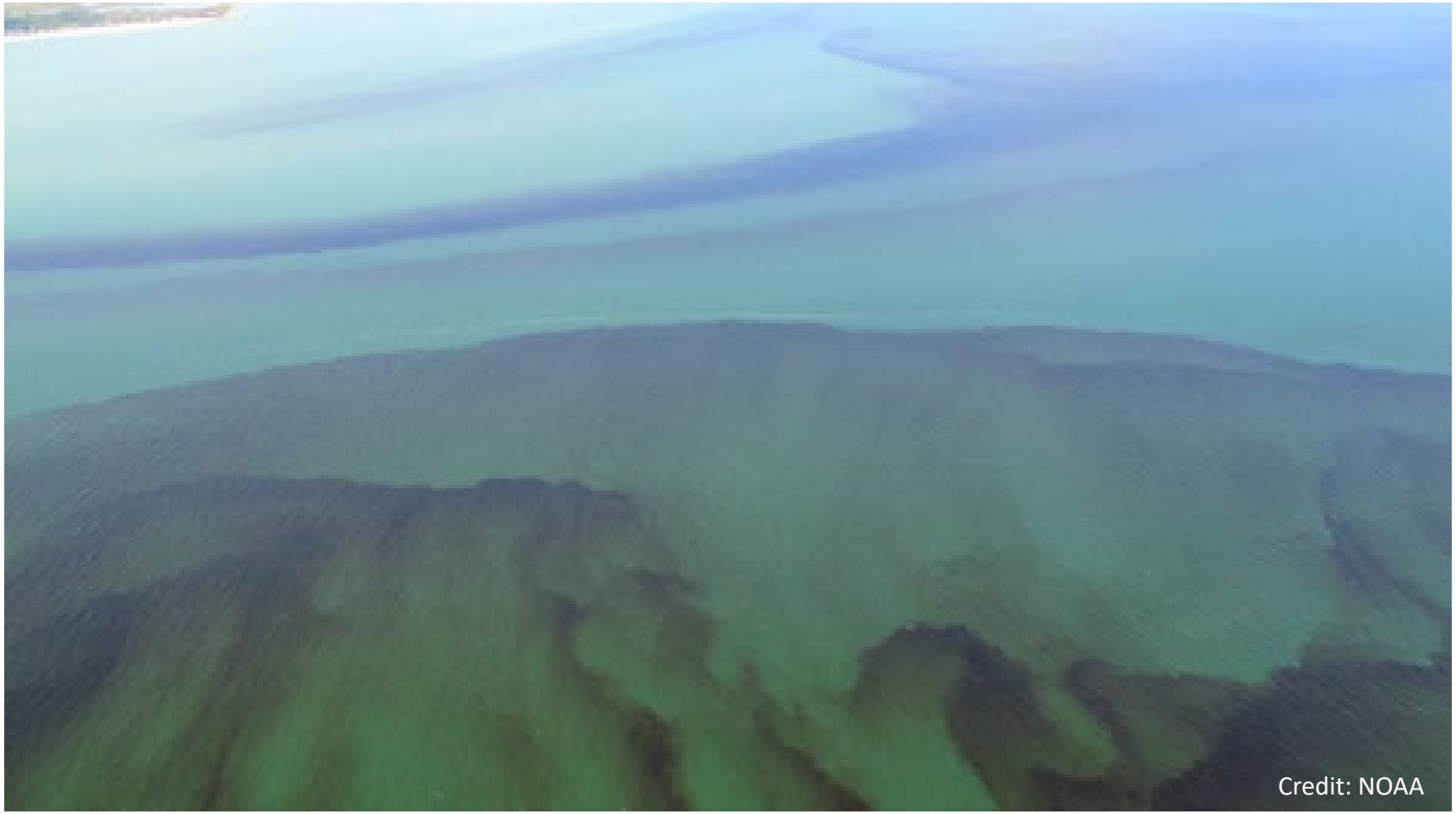
- Sheens are a very thin layer of oil and are generally not recoverable.
- The colors range from transparent, silver, rainbow, or metallic based on thickness.
- A slick can have multiple sheens and dark or emulsified oil.
- Note if multiple thicknesses if observed

Dark and Emulsified Oil

- Areas with dark or emulsified oil are thicker than sheens and are often recoverable with skimmers and other collection methods.
- Dark oil will show the oil's true color, whereas emulsified oil has been mixed with water and can range in color from tan/brown to orange, yellow, or red.
- Emulsified oil is also referred to as mousse.

False Positives

- There are numerous features that may look like oil, including algal blooms, cloud patches, fish schools, ice, mussel beds, marsh peat, etc.
- These should still be reported if seen



Example: False Positive of an algal bloom

Distribution/Structure

- Distribution/Structure defines the shape of the oil slick. There are six descriptors:
  1. Streamers
  2. Windrows
  3. Convergence Line
  4. Patches
  5. Tarballs
  6. No Structure

Streamers

- Long, relatively narrow bands of oil coming off in a straight line, often seen from the source.
- Also seen where an obstruction splits the flow of oil, or off larger oil slicks.

Credit: NOAA

Windrows

- Windrows look like many narrow streamers at once and are formed by strong winds.
- They run parallel to the wind.

Convergence Line

- A convergence line forms where different water masses meet due to a variation in temperature, salinity, or abrupt changes in bathymetry.
- They form long, narrow lines at the meeting of the water masses.

Credit: NOAA

Patches

- Patches are isolated areas of oil apart from the main slick.
- They are formed when there is an absence or very weak wind and current.
- They can vary in size (small to large).

Tarballs

- Tarballs are small, discrete globules of weathered oil.
- Rarely visible from the air; however, an observer may be able to detect a sheen coming from them.

Credit: NOAA

No Structure

- Random swirls of dark oil with no discernable pattern.
- Caused by slow, random currents.

Sun Angle and Observations

- Be aware of obstacles to attaining good images of an oil slick:
  - During the early morning and later afternoon, the low sun angle can lead to glare on the water
  - During the middle of the day, the high sun angle can lead to glint.
- Consider using a polarized filter over the camera lens.
  - Easier to see light sheens and to see darker oil within a large area of sheen by cutting the glare.
  - Negative: they can alter the observed color; however, if reporting sheen vs darker oil this should not be a problem.

Resources

NOAA Open Water Oil Identification Job Aid for Aerial Observation:

https://response.restoration.noaa.gov/jobaid/aerialobs

Training Resources:

https://response.restoration.noaa.gov/training-and-education/training/workshops/aerial-observation-training.html

Various NOAA Assessment and UAS Job Aids:

https://response.restoration.noaa.gov/jobaid/UAS-oilspill

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