

**Natural Disaster
Photographic and GPS Documentation
United States Environmental Protection Agency (USEPA)
Region 6, United States Coast Guard (USCG), National
Oceanic and Atmospheric Administration (NOAA), Texas
General Land Office (TGLO), Texas Commission on
Environmental Quality (TCEQ) & Texas Parks and Wildlife
(TPWD), Disaster Response Procedures**

1.0 Purpose

1.1 Photographic and GPS Documentation Purpose: To visually document and locate impacted areas observed during a Rapid Needs Assessment, oil discharges or hazardous material releases from facilities and vessels or any other source, orphan containers identified during assessments and hazard evaluations, and any damage to water infrastructure caused by a natural disaster.

2.0 Objective

2.1 Photographic and GPS Documentation Objective: The main objective for taking GPS coordinates in the field is to return to the same location. The main objective for taking photos in the field is to tell a story about what happened. Each photo should illustrate critical information:

- Document orphan containers and debris fields;
- Document oil discharges or hazardous material releases from facilities and vessels or any other source; or
- Document damage to water infrastructure.

2.2 Photographic and GPS Documentation Methodology: This SOP will describe the procedures for photographic and GPS documentation using tablets, digital cameras, and GPS units. Note some GPS information is helpful to collect, but not required. This SOP identifies the GPS information that is optional to collect.

3.0 Core Resources Required

Before going in the field, each team should have a full photography kit appropriate for field work, including handheld GPS and digital camera, tablet with GPS enabled, or tablet and external GPS antenna.

3.1 GPS Resources for Documentation Activities: Operation of specific GPS devices are not covered in this document since operation can vary from brand to brand and year to year. See the device user manual for specific operations. All GPS (handhelds, external antennas, tablets, and smartphones) should be set up with the same datum (WGS84) and coordinate units (decimal degrees).

3.1.1 Handheld GPS and Setup

There are several key settings that need to be checked on the GPS, including: local time zone, datum, track (wrap, interval), WAAS (on), etc.

- Set time zone for the current field location.
- Set time format to 24-hour clock.
- Set datum to WGS84 (make default if possible). It is critical to make sure the datum is set correctly.
- Set the GPS to provide coordinates in Decimal Degrees (e.g. 48.408). This will make it easier for writing down coordinates on the NDOW Hazard Evaluation Field Data Sheets and will make it easier to map these points later.
- Check battery levels before use; carry extra batteries.
- Adjust screen visibility if operating in bright sunlight or overcast skies (typically under Setup).
- Optional: if GPS has capability, clear the tracklog and waypoints at the start of the day and set the tracklog options:
 - Choose an appropriate sampling rate (5 seconds is good for driving or flying, 15 is more appropriate for walking). If there are no time options, choose more often or most often.
 - Set tracklog to wrap when full (keep the newest data).

3.1.2 Handheld GPS Accessories

- Data cable for downloading the unit (including adapters if needed).
- If the unit is not waterproof, a waterproof bag or dry bag to protect the unit
- Mechanism to clip the unit to a pack for easy access and consistent reception.
- External antenna if flying. The antenna may need to be repositioned around the platform to get good reception.

3.1.3 GPS for Tablets and Smartphones

- If the tablet does not have GPS capability the team will need to use an external GPS antenna. It is the team leader's responsibility to ensure that the external GPS and tablet are syncing properly.
- It is recommended, but optional, for each team to have a handheld GPS unit running a tracklog, even if the team is using the tablet to collect GPS data points. The handheld GPS can be used to correct GPS point if the smartphone/tablet points are inaccurate.

3.1.4 GPS Accuracy

- If possible check that the unit is receiving from at least three satellites and check unit accuracy.
- Most built-in GPS units in cameras, phones, and tablets do not provide the same accuracy as hand-held units and they can use up the battery fast.
- When using a tablet or smartphone, the data entry person should start each new target by first ensuring the team's location is correct in the map app on the tablet or smartphone.

3.2 Digital Camera and Tablet Resources for Photographic Documentation Activities: Operation of specific camera and tablet devices are not covered in this document since operation can vary from brand to brand or year to year. See the device user manual for specific operations. If using a tablet to take photos, make sure the tablet has enough memory for photos and data collection.

3.2.1 Learn basic camera functions

It is critical that team photographers know how to use their camera before going in the field. Attachment 2 provides information on basic camera functions, information on camera settings, and memory card tips. Note that many digital cameras require “P” (program) mode, not “A” (auto), to use special functions and settings.

3.2.2 Digital Camera Gear

The team leader must ensure the team has assembled a full photography kit appropriate for NDOW field work. Refer to the Field Gear Checklist (Attachment 1).

Preparing gear

- Charge batteries.
- Format memory cards.
- Check lens for dirt.
- Adjust camera settings (See Attachment 2).

It is highly recommended that each team has a digital camera, in addition to the tablet available for backup purposes.

3.2.3 Smartphones

It is faster and more efficient to download photographs from a digital camera than a smartphone. Therefore, teams should only use smartphones for taking photographs with paper field forms when no other option is available.

4.0 Photographic and GPS Documentation Procedures

See the SOPs for RNA, vessels and facilities, orphan containers, and water infrastructure for procedures specific to achieving those tasks.

4.1 Daily Task Overview:

- Check that all tablets for field use have been synched appropriately (Example: 0100 hours, 0600 hours) and charged. If using an external GPS antenna, ensure that it is syncing properly with the tablet.
- Check batteries and settings in the GPS unit, camera, and other necessary equipment.
- Photograph impacted areas observed during a Rapid Needs Assessment, oil discharges or hazardous material releases from facilities and vessels or any other source, all orphan containers identified during assessments and hazard evaluations, and any damage to water infrastructure. See Attachment 3 for example photos.
- Create a photo log, if using the NDOW Hazard Evaluation Field Data Sheets (See Attachment 4 for an example photo log form). At a minimum, the photo log should include:
 - team name,
 - photograph number (file name),
 - time,
 - date,
 - direction,
 - photographer, and
 - target ID and description.
- Turn in the tablet, field forms, photos, photo log, and GPS data to the Data Manager for uploading into Response Manager.

4.2 Basic Methodology

- When using a tablet, the data entry person should start each new target by first ensuring the team's location is correct in the map app on the tablet.
- If using NDOW Hazard Evaluation Field Data Sheets, take a photo of the completed data sheet, prior to starting the next target. This helps to identify which photos are associated with which field data sheet. Photos must be documented in the photo log.
- Keep the number of photos taken at a minimum, but take as many as needed to convey all critical information.
- Check the size of the images being saved by the camera. Make sure the images are smaller than 5 MB. Try not to shoot photos on the large file setting, usually medium or small size is appropriate

4.2.1 Vessels and Facilities

Document the discharge or release with photos. Take photos of observed discharges or releases at facilities, vessels, or other sources. It may be helpful to take close-up and wide-angle shots. Photograph any details that may be helpful for responders, such as:

- How the spill happened, including the source;
- Cleanup/remedial efforts;
- Direct observations of wildlife injuries;
- Access issues; and
- Marsh, sensitive habitat concerns.

Enter data into the tablet or NDOW Hazard Evaluation Field Data Sheet. For teams utilizing the field data sheet, a photo log is necessary. If the tablet becomes inoperable or damaged during the field day, the team may continue to document discharges and releases throughout the day using the field data sheets, handheld GPS, and camera.

4.2.2 Orphan Containers

The term "target" refers to a GPS location, while the term "item" refers to an individual container. A target may have only one item or may have many items. A target should not contain more than 10 items at one location. A single drum is a target with only one item. A debris field with 10 items located in one general area is also a target.

Take a photo indicating an area which contains items requiring recovery. Wide angle shots may be helpful to show issues that responders may need to take under consideration. At a minimum, take a photo of the items in which the item target number is visible and show the condition of the item. The photo of the item must clearly identify the item number on the target or by using a photo placard (Attachment 5). For teams utilizing the NDOW Hazard Evaluation Field Data Sheet, a photo log is necessary.

Enter data into the tablet or field data sheet. If the tablet becomes inoperable or damaged during the field day, the team may continue to document orphan containers throughout the day using the field data sheets, handheld GPS, and camera.

4.2.3 Water Infrastructure

Take photos of damage to drinking water systems, wastewater systems, and outfalls. Document damage to a system on the Drinking Water or Wastewater Evaluation Data Sheet, as appropriate, and take photos. In addition to noting critical damage on the data sheet, take photos of any damage to facilities associated with a system. This can be done by utilizing the Water Infrastructure Photo Placard Form (Attachment 6). Water Infrastructure Evaluation Teams will use the placard as the photo log.

Enter data into the tablet or Drinking Water or Wastewater Evaluation Data Sheet, as appropriate. If the tablet becomes inoperable or damaged during the field day, the team may continue to document infrastructure damage throughout the day using the NDOW Hazard Evaluation Field Data Sheets, handheld GPS, and camera.

4.2.4 Notes

- Note key photos and important details in notes.
- Record basic information - locations, times, photographer, team members.
- Descriptions of GPS locations or waypoints

4.2.5 GPS Check

- When using a tablet or smartphone, the data entry person should start each new target by first ensuring the team's location is correct in the map app on the tablet or smartphone.
- Take waypoints for photos occasionally (good check later for GPS-photo synchronization)
- To document GPS accuracy, take photos at (not of) landmark locations shown on commercial maps. Note photo number and location.
- Examples of landmarks: road intersections, coastal promontories, stream outlets, shore access locations, lighthouses, etc.

4.3 Basic photo techniques: Photo techniques should be the same regardless of the field team and the equipment that is being used.

4.3.1 Put every photo in perspective

Every close-up should be followed by one or more wider-angle shots that will show the close-up in the context of the rest of the environment. The closer the initial shot the more perspective shots may be needed. For example, at a facility oil spill take photos of:

- Habitats and spatial patterns of oiling.
- Sources of oil.
- Context shots. (Maybe not every time but always when the broader picture has changed or when it's important to make specific close-ups more valuable.)
- To document GPS accuracy, take photos of landmarks: road intersections, coastal promontories, stream outlets, shore access locations, lighthouses, etc.

4.3.2 Consistent, repetitive photo process

Taking photos in the same order will help to ensure that important photos are not missed and will help keep things organized so it's easier to review photos later. For example:

- Start each new location with panorama shots, where appropriate.
- Always capture the subjects the most zoomed out to the most close-up.

4.3.3 Provide scale in the photos

- 15 cm scales are standard (6 inches). Be sure the scale is labeled.
- For oily conditions, use disposable scales of standard length, such as 15 cm long wooden sticks. (Use a photograph to document its length in relation to a printed scale).
- If a scale is not available, provide another object (pen, etc.) that can provide perspective in the photo.
- Scales (and quadrat frames) should have intermediate reflectance, not bright white. A bright scale object can cause the camera to underexpose the rest of the photo.

4.3.4 Avoid harsh shadows and over exposure

When conditions allow, try to change the perspective of the photo to avoid shadows or over exposure. If possible shoot photos with the sun behind the photographer or at the side, try to avoid shooting into the sun.

4.3.5 Review critical photos

- Use the review feature and zoom function to ensure that the photos capture all the necessary details.
- Are key images (critical information) missing?

4.3.6 Adjust camera if needed

It may be necessary to adjust camera settings in the field when photos are not coming out well.

4.4 GPS Data Collection: GPS data collection should be the same regardless of the field team and the equipment that is being used.

4.4.1 GPS Data Collection (*Check device manual for specific instructions*)

- Unit should have at least 3 satellites.
- Waypoints – Click the MARK option or hold down Enter to capture a point location. Select OK to save the waypoint. Use the appropriate NDOW Hazard Evaluation Field Data Sheet or notebook to write down waypoint ID and notes. It may be helpful to take a photo of the GPS screen with the waypoint ID and lat/long. When using field data sheets, it is helpful to MARK waypoints for each lat/long documented.
- Optional: when available, ensure the GPS is recording a tracklog.

4.4.2 Field Use

- Check GPS batteries every evening. Charge or replace them as needed. It's important to carry spare GPS and camera batteries when in the field.
- Optional: Leave GPS on while in the field for the day. This will ensure that it is recording a tracklog for all of the team's photos. Most GPS units will have plenty of memory and power to handle a full day.
- Optional: Take a photo of GPS showing its date and time stamp with seconds designation each day. Make sure the photo is clear and easily legible.

4.5 Data Download

At the completion of the field activities each day, photographs must be turned in to the Data Management /Documentation Unit. All documentation, including photos, must be uploaded and synched into Response Manager daily. It is critical that the photographs captured can be associated with a target in Response Manager. The following steps should be completed for photos that are captured using a digital camera:

- Upon arrival at the command post, ensure that the photo-log (Attachment 4) is completed and is consistent with the NDOW Hazard Evaluation Field Data Sheets.
- Turn in digital photos on a memory card and photo log to the Data Management/Documentation Unit, along with any paper field data sheets that have been completed
- The Data Management/Documentation Unit will copy photographs from the cameras memory card and organize them for streamlined uploading to Response Manager.
- Ensure that you retrieve your memory card after the photos have been copied.
- Optional: download waypoints and tracks each day after field work and process accordingly.

4.6 Information Sharing

Information Sharing – NDOW Agencies will staff agency specific positions within the Incident Command Post before and during a disaster. All information, data, maps, reports, photographs or any other information shall be shared with the responding agencies. All Rapid Needs Assessment, oil discharges or hazardous material releases from facilities and vessels or any other source, all orphan container identified during assessments and hazard evaluations, and any damage to water infrastructure will be documented in accordance with these procedures and maintained in the EPA Response Manager Data Management system and shared by all agencies while responding to a disaster.

5.0 Aerial Photographic Documentation and Procedures

Taking photos from a plane or helicopter requires distinct methodology and special resources. The procedures below must be followed to accurately assess geographical areas. Point and shoot cameras can take good photos from the air but SLR's typically perform much better.

- Use manual focus to set cameras to infinity (∞). This avoids accidentally focusing on the window.
- Image stabilized cameras or lenses will help.
- To prevent transmitting aircraft vibration to the camera, do not rest the camera on an aircraft window frame or other part of the aircraft structure. Instead, hold the camera with your arms braced against your legs or torso, or the camera held against your face.
- Avoid shooting through a bubble window.
- Smaller aircraft often have sliding windows, or easily removable windows or doors. Make arrangements with the pilot before take-off.
- Consider using one zoom level. Survey flights often are directed to maintain a specific altitude. By maintaining a constant zoom level, items in successive photos will be comparable. Remember there are no scales in aerial photos. However, if an object of known or estimated size is near the target, it can provide a size reference or perspective.
- Notes to record: Capture the basic flight plan including altitude and distance from shore. Aircraft type. Pilot and passenger names. Port or starboard.

5.1 Use of Software

Tablets or laptops are essential in this mission for documentation. Tablets or laptops will be used to document container GPS coordinates and data. Delorme Maps and Microsoft Streets and Trips are also useful for navigation in the air. The software can be used with a transmitter connected to a computer to navigate through the grids and the mapping system will record the flight path. Once on the ground, the entire flight path can be printed for documentation purposes.

5.2 GPS Coordinates

Accurate GPS coordinates are critical to allow future or recovery teams to locate items efficiently. The pilot should hover vertically over each recorded target so that an accurate coordinate is recorded and that appropriate information can be collected for the target. The helicopter's GPS system can be used as a backup system should it be necessary to collect the coordinates for the target.

6.0 Safety in the Field

All ICPs, Branches/Divisions will have a Health & Safety Officer (HSO). All health and safety is managed by this officer. The HSO will be able to provide overall field health and safety. The HSO will also have job aids/job safety analysis/hazard analyses available for the teams. The HSO may have on site H&S officers from other agencies or contractors that will work together as a team. The

HSO reports directly to the Unified Command. The HSO can stop operations at any time they deem necessary due to safety concerns.

LIST OF ATTACHMENTS

1. FIELD GEAR CHECKLIST
2. CAMERA SETTINGS AND BASIC CAMERA FUNCTIONS
3. EXAMPLE PHOTOS
4. PHOTO LOG
5. ORPHAN CONTAINER ASSESSMENT PHOTO PLACARD FORM
6. WATER INFRASTRUCTURE PHOTO PLACARD FORM

Attachment 1

Field Gear Checklist

<input type="checkbox"/> Camera	With neck strap
<input type="checkbox"/> Case – small	Sized to hold and protect the camera and gear in the field
<input type="checkbox"/> Memory cards	1-2 extra depending on size – 200-300 full resolution photos on each is good
<input type="checkbox"/> Rechargeable batteries	1-2 extras
<input type="checkbox"/> Photo scale	15cm waterproof, 15cm disposable. Not white or light colored. Grey is best
<input type="checkbox"/> Waterproof bag	Dry sack or heavy duty ziplocks
<input type="checkbox"/> Polarizing lens	Optional – reduces glare and reflections
<input type="checkbox"/> GPS	
<input type="checkbox"/> Field notebook	

Attachment 2

Camera Settings

Resolution	Make sure the images are smaller than 5 MB
Mode	Program (P) if you have any doubt
Time	Local time
Continuous picture numbering	Set to use a running count for file names even after changing or formatting memory cards. You don't want the camera to start from 1 each time.
ISO (light sensitivity setting)	Auto if you have any doubt (avoid higher than 400 unless you know your camera performs well at higher ISOs)
Camera reset	Most cameras have a way to return all settings to the factory default values. This is useful if you have been experimenting with camera settings, but your images are consistently poor.

Basic Camera Functions

Light metering - Spot	At this setting the camera meters the exposure at a designated spot in the photo frame. For most cameras the spot is shown as a box or circle in the center of the viewfinder. Spot metering is helpful if your priority subject is much darker or lighter than the rest of the frame.
Light metering - Exposure compensation (+/-) adjustment	This lets you manually tell the camera to make the photo lighter or darker. It works like the lighter-darker adjustment on most copy machines.
White balance adjustments	White balance settings help the camera adjust the colors in the photos based on the type of light (fluorescent, incandescent, sunny, cloudy, etc.). Most of the time Auto White Balance (AWB) works fine, but sometimes the camera does not adjust correctly. Manually choosing the type of light can fix the problem.
Review photos	Know how to use your camera display to review a photo. Know how to zoom in on the photo in the display screen to check focus, exposure, and other key details.
Forced flash	In dim light or harsh shadows, you may need to force the camera to use the flash to avoid losing details.
Continuous shooting	Most cameras will shoot consecutive photos while you hold down the shutter. This is sometimes helpful when trying to capture moving people or objects.

Additional Pointers

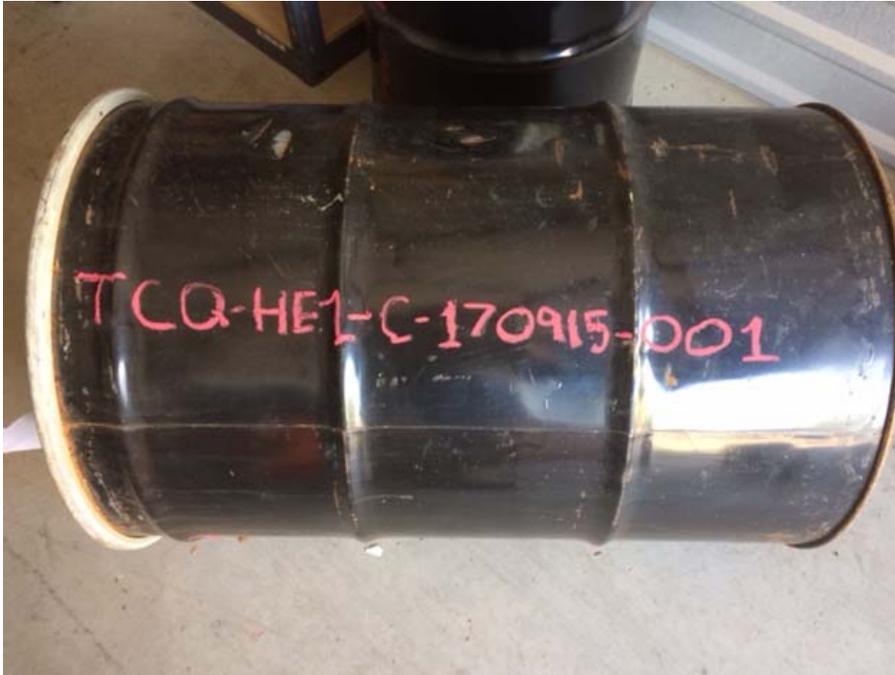
<p>Panoramic photos are often unnecessary, and can distort the viewers perspective, but can be useful for a 360-degree view of a landscape. To take a panoramic photo, do the following:</p>	<ul style="list-style-type: none"> ▪ Keep photo edges parallel. ▪ Do not change “zoom” factor. ▪ Overlap photos by about 30%. ▪ Place a scale or natural distinctive feature in each overlap area for accurate alignment. ▪ Do not move your photo scale. ▪ Use manual mode to set shutter and aperture if you are comfortable with this. ▪ Note which photos are part of the panorama. ▪ Lock your elbows against your sides for stability and pan as close to horizontally as you can. Use a tripod or monopod if you have one.
<p>Using video</p>	<ul style="list-style-type: none"> ▪ A short video synopsis of a location can be very helpful later for relaying or reviewing the general layout of a location. ▪ Take 30-45 seconds to slowly pan through a site while narrating key features

Memory Card Tips

- **Use large memory cards.** Get enough capacity for a whole day’s shooting. Changing cards in the field risks getting moisture, salt, and dirt on the memory card contacts and inside the camera.
- **Most bad memory cards fail early.** Always test your card by formatting it. If it doesn’t format, exchange it for a new one.
- **Never buy a card just before you go into the field.** Be sure your cards are working properly.
- **Buy high-quality memory cards.**
- **Format your card regularly.** It’s better to format than to delete all photos.
- **Make sure camera and cards are compatible.** Older camera may have issues with new cards. Updating firmware may fix the problem.
- **Cards are fragile.** Protect the electrical contacts from dirt and mechanical deformation.
- **Never use batteries until they die.** Change batteries before they lose power just as you are taking a critical photo.
- **Never take out a memory card when the camera is still writing to it.** Most cameras show this as a flashing light. To prevent this, turn off the camera before changing memory cards.
- **Use a quality memory card reader.**
- **Use your camera as card reader.** If you have a problem downloading, try a different card reader or downloading through the camera. Be sure your batteries are fully powered. If all fails, you usually can make the card work fine by reformatting it, but you’ll lose the photos.
- **Image rescue software.** If your card fails and there are photos on it, try using image rescue software from companies such as Lexar, SanDisk and Symantec. These programs come on new cards or can be downloaded from the manufacturers’ websites.

Attachment 3
Example Photos

55-Gallon Drum



Gas Cylinders



Poly Tote



Spherical Tank



Debris Lines



Oil spills



Attachment 5

Orphan Container Assessment Photo Placard Form

Attachment 6

Water Infrastructure Photo Placard Form