
***Technology Options for Collecting Compliance Monitoring Information
Under 20.2.50 NMAC***

New Mexico Environment Department, Air Quality Bureau

The purpose of this guidance is to document a list of available digital tools and commercial off-the-shelf software options and smartphone applications for collecting compliance monitoring information required under 20.2.50 NMAC, Part 50, *Oil and Gas Sector – Ozone Precursor Pollutants*. All technologies listed herein may be considered pre-approved, although other technology options may exist that will work equally as well. This list is not to be considered the only options.

NMED rule provisions under Part 50 require the spatial/temporal verification of inspections and certain monitoring events, including a date and time stamp and latitude/longitude coordinates of the location. A review of existing technologies and applications to assess how best to meet this need was conducted and the results are grouped into categories below.

1. Infrared Cameras

Latitude and longitude coordinates are typically obtained when using infrared cameras, which are used in a variety of applications in the oil and gas exploration and production industry. For example, optical gas imaging (OGI) infrared cameras are used to detect leaking components to assist in maintenance and repair activities. In addition, they are commonly used in emissions testing and monitoring activities and typically already record the data elements required under Part 50. Infrared camera manufacturers include, but are not limited to, the following:

- Teledyne Forward Looking Infrared (FLIR) cameras
- Infrared Cameras Inc. Gas DetectIR
- Konica Minolta Gas Camera System
- Opgal EyeCGas camera
- Ventus OGI-Camera MWIR

Infrared cameras currently in use as a component of existing maintenance or monitoring programs are a viable option to meet the Part 50 data collection requirements as they would impose no additional effort or devices on behalf of the owner or operator.

2. Global Positioning System (GPS) Units

For inspection activities that do not require emissions monitoring, more cost-effective options are available to collect the required date/time and coordinates. While military GPS units have long been considered the most accurate due to their use of dual-frequency equipment, GPS

augmentation methods and developments in the field have led to comparable, if not better, results using commercial equipment.

Commercial GPS units typically store high quality coordinate and date/time information internally and can then connect via wi-fi, Bluetooth, USB, and/or an associated PC or phone application to retrieve the recorded data. The primary commercial providers for accurate and reliable handheld GPS units include the following:

- Garmin
- Trimble
- Magellan

These and others each have a range of models at different price points with varying features, such as duration at a location and elevation, but all models should be able to comply with the Part 50 requirements. These units support multiple export formats including comma separated values (CSV), which is easily imported into many data management systems, including common spreadsheet programs.

3. Smartphones, Tablets, and Portable Smart Devices

Most smart devices such as cell phones and tablets include their own GPS tracking systems which has revolutionized the collection and use of spatial and temporal data. However, accuracy varies based on the age of the phone, the software obtaining the data, and local factors such as nearby structures and weather.¹ Newer smart devices rely on Global Navigation Satellite System (GNSS) which provides high-quality positional and temporal accuracy even in the absence of cellular service or access to the internet.

Date/time and location can be retrieved from the device if the settings are appropriately configured. This may include enabling location history, activating location reporting, disabling automatic deletion of tracking history, and potentially requiring a log-in to an active phone, work, or personal account. The data can be stored locally and/or on a cloud service such as Google Cloud or iCloud. Both options provide download options that can be easily incorporated into other data management systems.

4. Smart Device Applications

An application that works across multiple platforms and smart devices would streamline data collection and later processing, particularly in cases where data from multiple users will be consolidated into one database. With hundreds of applications available, there are many reliable and efficient options to choose from. Specific applications and options which tag location and date/time to meet the requirements of Part 50 include the following:

- ArcGIS Field Maps

¹ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8604560/>

One of the most popular data collectors in the field, ArcGIS Field Maps² focuses on spatial and temporal accuracy that seamlessly integrates with Geographic Information Systems (GIS). They have customizable data entry forms, ample base reference maps, and smooth integration between multiple users and the central database and/or cloud. As leaders in the geospatial industry, their suite of tools within the app as well as within the associated software include additional tools to check coordinate accuracy, visualize changes over time, etc.

For companies that already have Esri (a leading provider of geographic information system software products), this would be an easy-to-implement solution that would build upon their prior investment. Cost varies based on the size of the organization and particular data needs, but those new to Esri products would have to purchase a base subscription before investing in this additional extension. For that reason, the cost and learning curve associated with these products may be obstacles for adoption for companies not currently using Esri.

- **CompanyCam**
CompanyCam³ is a photo-based application “created for contractors, by contractors” for site-based projects with multiple tasks that require tracking, quality checks, and frequent communication. It allows a team of workers to view, collect, and share images and notes with other workmates, project managers, and clients. It integrates with other common contracting applications such as Salesforce, customer relationship and field service management systems, and estimating/proposal software. Photos are stored on a dedicated company site and can then be transferred to desktop and other systems.

The wealth of features available in this application commands a higher per-user price such that it may not be the most economical choice for many potential users.

- **GPS Map Camera**
GPS Map Camera⁴ allows the user to design a “stamp” that can contain coordinates, notes, and other information to be stored visibly within the image. Reviews are mixed on this product, with users noting significant lag times, inaccurate locations, and excessive ads causing the application to freeze. The premium (paid) version removes the ads but does not appear to have better performance.
- **Solocator**
Solocator⁵ is a simple, straightforward application that marks photos with coordinates, date/time, and other features as selected. For a nominal one-time cost, there is an additional Industry Pack that provides additional fields for notes, project/equipment

² <https://www.esri.com/en-us/arcgis/products/arcgis-field-maps/overview>

³ <https://companycam.com/>

⁴ <https://apps.apple.com/il/app/gps-map-camera-geotag-photos/id1503116917>

⁵ <https://solocator.com/>

information, and street address. It is an inexpensive, easy-to-use application with 10 years of successful deployment and positive reviews from government agencies and professionals in the field. Data can be exported as keyhole markup language (KML) or CSV file formats, among others. They also offer an enterprise⁶ option which facilitates organizational license management, custom application development, and other changes to ensure consistency throughout the organization.

- **Mergin Maps**
Mergin Maps⁷ is a free application created as an extension of QGIS, the most popular open-source GIS application in use today. It can capture location and date/time online or offline and can intelligently synchronize data from multiple users to a cloud-based dataset. Photos and associated data can be shared and exported to a number of different file formats including CSV, Microsoft Excel, KML, and many others. Reviews indicate it is a reliable application with solid performance and quality results. While many users may not need them, the application includes additional capabilities that ensure smooth incorporation within other GIS software.

Summary

Hardware and software options are currently available that provide a wide range of potential solutions to meet the monitoring data collection requirements of Part 50. Smart devices currently used in maintenance activities could be modified to provide the additional information required for monitoring activities. Alternatively, there are several smart device applications at various price points that provide a variety of additional features in addition to the capture of location and date/time and the ability to export data for inclusion in other data management systems. Prices vary depending on many factors, including the numbers of users/applications, functionality, and integration capabilities with existing licenses and data platforms.

Of note is that all these technologies use exchangeable image file format (EXIF) data specifications for image files. EXIF is a standard set of metadata that includes date/time and coordinates as well as information about the smart device used to take the photo. While not all smart devices use all EXIF fields, sharing a similar format facilitates merging of data from different devices. Also, since most smart devices use global navigation satellite systems (GNSS), the reference datum of World Geodetic System (WGS84) is consistent as well.

⁶ <https://solocator.com/enterprise-app-for-mdms/>

⁷ <https://play.google.com/store/apps/details?id=uk.co.lutraconsulting&hl=en&gl=US>