ITRC has developed a series of fact sheets that summarizes the latest science, engineering, and technologies regarding environmental data management (EDM) best practices. The purpose of the Field Data Collection fact sheets is to establish best practices for field environmental data collection that will result in efficient and effective management of the resulting data and information. The scope of these fact sheets covers the collection and data workflow of field-derived environmental data, including:

- planning field data collection events
- field data collections
- data ownership
- data encoding
- data reporting
- field data handling
- sensor data handling
- data quality control (QC)
- preparation of field data for aggregation into a database or other data repository

Study design is beyond the scope of this document.

1 INTRODUCTION AND OVERVIEW

Overlooking the complexity and importance of field data collection can lead to a variety of issues, often not discovered until long after the field event is complete. The solution is not specific hardware or software, it is deliberate planning, decision-making, and follow through. Planning and careful forethought is an important investment toward the success of your field event, regardless of the project size or data types. Understanding the project and its data quality objectives, data types, final work product, and environmental data management system requirements are critical, as many issues can be avoided by beginning with the end in mind. Having and following a well thought out field data collection plan can save project time, increase efficiency, improve data quality, and make for an easier data collection and management process for both project field staff and data manager.

Field data is collected for a variety of reasons, from regulatory compliance to baseline or long-term monitoring. Field team members make environmental observations and measurements (directly or using sensors), collect samples for laboratory analysis, and capture metadata, which are additional information about the field observation, measurements, and sample collection event. Metadata are information that describe data to help you understand or use it. Metadata provide context on the time, date, quality, and environment in which data are collected in the field and are critical to data quality. Field data collected may include collecting samples for a variety of matrixes (air, water, soil, tissue, etc.), and some sample types are field quality control samples versus direct measurements of the sample media. Data collected can also be in various formats (hard copy, structured digital, and unstructured digital) and over a spectrum of space and time scales. The best practices for field data collection in this fact sheet are related to designing sample collection processes for new data. If you have legacy historical field data that need to be migrated from prior systems, refer to the Data Migration Best Practices Fact Sheet for integrating historical environmental data in an EDMS.

Electronic or Digital?

*As a convention throughout the EDMBP work products, the term **electronic** is used in reference to hardware devices, whereas **digital** is used to describe software products or platforms. Documents produced for other purposes may use these terms differently.*

After the reason for field data collection and the data types are identified, organizations have an opportunity to provide cost-effective, intuitive solutions to assist in the field data collection process. These solutions can range from traditional analog solutions, such as pen and paper, to innovative digital solutions using mobile electronic data collection devices. Careful thought and consideration should be given to field conditions and desired outcomes of the field data collection activities so

an effective solution may be selected.

Field data are often collected in less than ideal conditions and optimized workflows are usually not available. ***However, this does not mean that field data should not be treated with the same rigor that data collected in controlled laboratory settings demand.*** In fact, field data often deserve extra scrutiny due to increased likelihood of errors, such as transcription or in situ instrument drift. Well-planned field data collection workflows are a key component to accuracy and consistency of data collected, and an optimized system that limits the amount of repetitive paperwork and data entry for field staff can boost morale. Organizations have a responsibility to provide adequate training, not only for field team members but for individuals at all levels within the organization on the system(s) implemented. The field data collection procedures should be included in sample analysis plans, quality assurance project plans, field sampling plans, and the organization's overall data management plan to ensure continuity. These planning documents must be reviewed by field staff and the project team members responsible for the collection and management of field data.

The Field Data Collection fact sheets present suggested techniques for developing field data collection programs focused on data quality objectives, data types collected (see Defining Data Categories and Collection Methods Fact Sheet), quality control of these data (see Field Data Collection Quality Assurance and Quality Control [QA/QC] Fact Sheet), training of field staff (see Field Data Collection Training Best Practices Fact Sheet), and other considerations (see Other Considerations for Field Data Collection Fact Sheet) to best implement a field data collection program (see Field Data Collection Process Development Considerations Fact Sheet) that conforms to your overall data management goals. These best practices do not provide specific guidance on how to collect samples and make specific study observations. For guidance on developing sampling programs, see the ITRC Sampling, Characterization, and Monitoring guidance document.

2 REFERENCES AND ACRONYMS

The references cited in this fact sheet, and the other ITRC EDM Best Practices fact sheets, are included in one combined list that is available on the ITRC web site. The combined acronyms list is also available on the ITRC web site.