

Multi-Agency Radiological Analytical Protocols Manual (MARLAP)



Module 1. Introduction

Bob Litman — drbob20@centurylink.net

Contents

MODULES


1. Introduction and Overview – **Litman**
2. Directed Planning Process – **McCroan**
3. DQOs and the Development of MQOs (**Exercise**) – **McCroan**
- 4. Key Analytical Planning Issues: MQOs and APSs (**Exercise**) – Litman**
5. Obtaining Laboratory Services – **Shannon**
6. Measurement Uncertainty – **McCroan**
7. Evaluating Measurement Uncertainty (**Exercise**) – **McCroan**
8. Method Validation: Performance-Based Approach (**Exercise**) – **Shannon**
9. Evaluating Methods and Laboratories – **Litman**
10. Data Verification and Validation (**Exercise**) – **Shannon**



HANDOUTS

- a. Extract from MARLAP Appendix B (Development of the Gray Region)
- b. MARLAP Appendix C (*MQOs for Method Uncertainty and Detection and Quantification Capability*)
- c. MARLAP Attachments 3A (*Measurement Uncertainty*) and 3B (*Analyte Detection*)
- d. Exercise: Analytical Protocol Specifications for ^{90}Sr in Milk
- e. Exercise: QC Charts for ^{90}Sr in Milk
- f. Exercise: Data Report for ^{90}Sr in Milk
- g. Table E.6: Example of a Proposal Evaluation Plan
- h. Consolidated MARLAP Recommendations from Part I

After this course, you will be able to —

1. Navigate through *MARLAP* and understand its organization
2. Recognize that the **required method uncertainty** is the key to the MARLAP process 
3. Describe, using specific equations, how the **required method uncertainty** is used in the MARLAP process.
4. Apply the MARLAP process during the project planning, implementation, and assessment phases

What is MARLAP?

- A multi-agency guidance manual for project planners and managers and radioanalytical laboratories
- Participants include: EPA, DOD, DOE, DHS, NRC, NIST, USGS, FDA, Kentucky, and California
- Companion to MARSSIM
- Websites:
 - <https://www.epa.gov/radiation/multi-agency-radiation-survey-and-site-investigation-manual-marssim>
 - https://cfpub.epa.gov/si/si_public_record_report.cfm?Lab=ORIA&count=10000&dirEntryId=73954&searchall=&showcriteria=2&simplesearch=0&timstype=



Ultimate Goal of MARLAP



Provide guidance and a framework to assure that laboratory radioanalytical data meet a program's or project's specific needs and requirements

MARLAP Objectives

- Providing a framework and an information resource for using a performance-based approach for radioanalytical work
- Promoting a directed planning process involving radioanalytical laboratory expertise
- Providing guidance on how to link project planning, implementation and assessment from an analytical perspective
- Making collective knowledge and experience in radioanalytical laboratory work widely available
- Providing guidance on obtaining and evaluating laboratory services



Examples of MARLAP's applicability —

- Cleanup of contaminated sites
- Environmental monitoring
- Waste management
- Effluent monitoring of licensed facilities
- Site characterization
- Emergency response
- Background studies
- Decommissioning of nuclear facilities



MARLAP Part I (Volume 1)



- Chapter 1 — Introduction
- Chapter 2 — Project Planning Process
- Chapter 3 — Key Analytical Planning Issues and Developing APSs
- Chapter 4 — Project Plan Documents
- Chapter 5 — Obtaining Laboratory Services
- Chapter 6 — Selection and Application of an Analytical method
- Chapter 7 — Evaluating Methods and Laboratories
- Chapter 8 — Radiochemical Data Verification and Validation
- Chapter 9 — Data Quality Assessment
- Five Appendices

Manual Outline (Continued)

MARLAP Part II (Volume 2)

- Chapter 10 — Field and Sampling Issues
- Chapter 11 — Sample Receipt, Inspection, and Tracking
- Chapter 12 — Laboratory Sample Preparation
- Chapter 13 — Sample Dissolution
- Chapter 14 — Separation Techniques
- Chapter 15 — Quantification of Radionuclides
- Chapter 16 — Data Acquisition, Reduction, and Reporting
- Chapter 17 — Waste Management
- Appendix F — Laboratory Subsampling



Manual Outline (Continued)

MARLAP Part II (Volume 3)

- Chapter 18 — Laboratory Quality Control
- Chapter 19 — Measurement Uncertainty
- Chapter 20 — Detection and Quantification Capabilities
- Appendix G — Statistical Tables



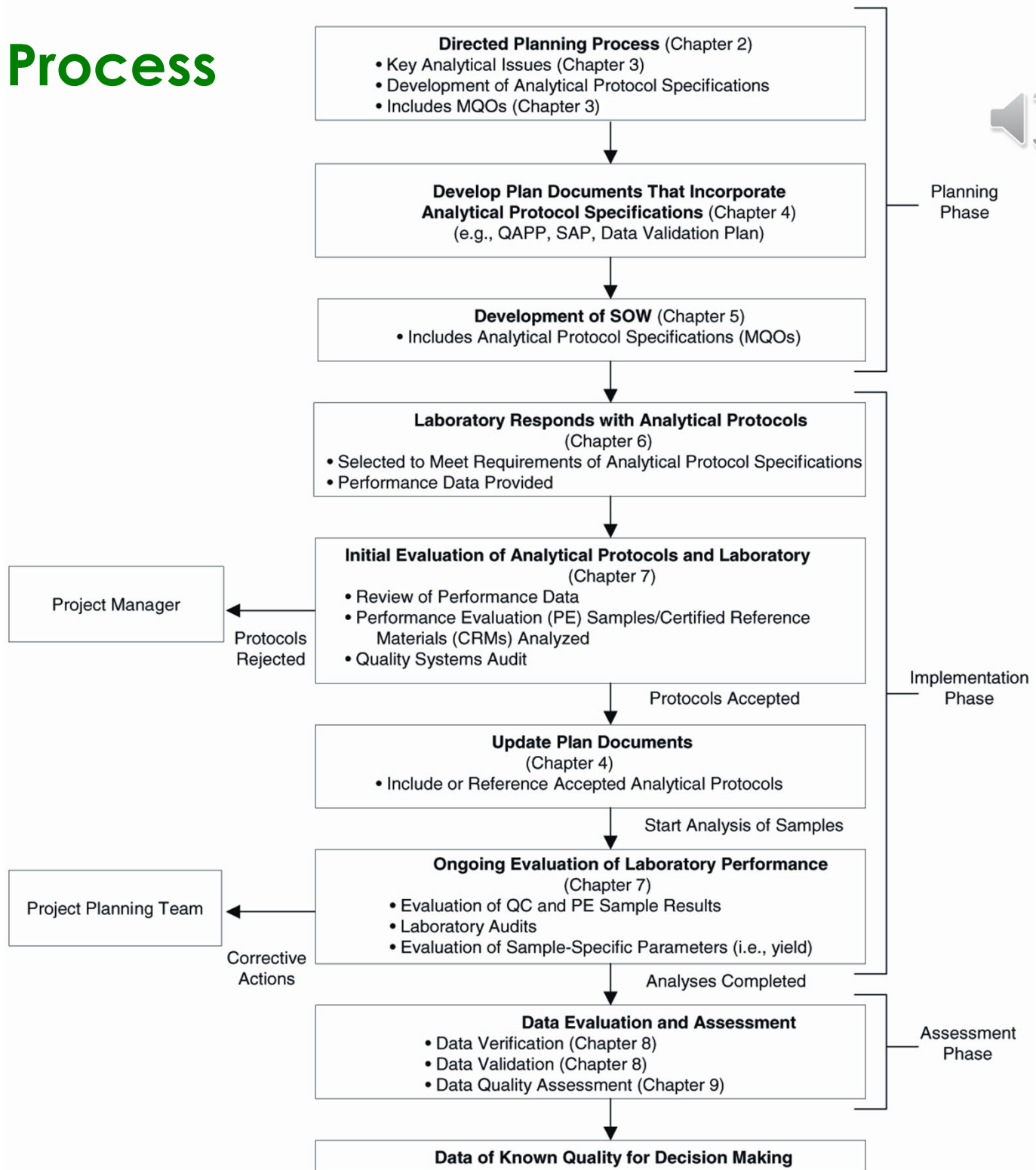
Data Life Cycle

- Planning phase
- Implementation phase
- Assessment phase
- Decision making



DATA LIFE CYCLE		
PROCESS		PROCESS OUTPUTS
Planning	Directed Planning Process	Development of Data Quality Objectives and Measurement Quality Objectives (Including Optimized Sampling and Analytical Design)
	Plan Documents	Project Plan Documents Including Quality Assurance Project Plan (QAPP); Work Plan or Sampling and Analysis Plan (SAP); Data Validation Plan; Data Quality Assessment Plan
	Contracting Services	Statement of Work (SOW) and Other Contractual Documents
Implementation	Sampling	Laboratory Samples
	Analysis	Laboratory Analysis (Including Quality Control [QC] Samples) Complete Data Package
Assessment	Verification	Verified Data Data Verification Report
	Validation	Validated Data Data Validation Report
	Data Quality Assessment	Assessment Report
Data of Known Quality Appropriate for the Intended Use		

The MARLAP Process



Class Exercises

- **Example: ^{90}Sr in milk** A MARLAP project example running through all the course modules
- **Example: Evaluating Measurement Uncertainty**
- **Example: Writing an Analytical Protocol Specification (APS)**
- **Exercise: ^{241}Am in ground water**



These exercises will demonstrate the MARLAP process and enhance your ability to use it on your own projects

Summary

- The MARLAP process is designed to ensure that project planning incorporates input from stakeholders
- The process is iterative so that changes can be made during each phase
- The process ensure data generated will be of appropriate quality for decision making
- It emphasizes a team approach to the project.

