

I) INTRODUCTION, EXPERIMENTAL DESIGN, AND PROGRAM PLANNING

INTRODUCTION

Precision vs Accuracy

Uncertainty

Measurement vs Calculation vs Estimation

Significance and Significance Tests

Sampling Design (i/e/, Random/Stratified)

FUNDAMENTAL MEASUREMENTS

Position

Length

Voltage

Current

Resistance

II) SURFACE-WATER MEASUREMENTS AND METHODS

KINDS OF QUESTIONS

How much

How fast

How high

What direction

How distributed

How often

Trends/patterns

How to better measure?

OPEN-CHANNEL HYDRAULICS

Energy—Critical Flow

Momentum and uniform flow

Turbulence

Spatial Distribution

MEASUREMENT PRINCIPLES

Volumetric

Velocity-Area

Rating

Dilution

Electro-Magnetic

UNCERTAINTY

III) SEDIMENT MEASUREMENT AND METHODS

KINDS OF QUESTIONS

How much

When

Bedforms

Where

How distributed

Why

Trends/patterns

How to better measure

SEDIMENT HYDRAULICS

Spatial distribution

MEASUREMENT PRINCIPLES

Sample vs Measurement

Sampler types

Sample preparation/analysis

Quality Assurance/Uncertainty

WRAP UP SURFACE-WATER AND SEDIMENT

NEW DIRECTIONS& TECHNOLOGY
QA/QC
UNCERTAINTY
OTHER

IV) WATER-QUALITY MEASUREMENTS AND METHODS

KINDS OF QUESTIONS

How much
When
Where / How distributed
Why
Trends/patterns
How to better measure

WATER-QUALITY PRINCIPLES

Types of measurements/parameters
Measurements vs Samples (or Field vs Lab)

MEASUREMENT PRINCIPLES (FIELD)

Electrical
Optical
Count
quality assurance

SAMPLE COLLECTION

chemical compatibility
Sampler types
Flowing sites
non-flowing water sites
Sample preparation/preservation
quality assurance

V) GROUNDWATER MEASUREMENTS AND METHODS

KINDS OF QUESTIONS

Why
How much
When
Where / How distributed is water
Where / How distributed are chemical constituents
Aquifer properties
Trends/patterns
How to better measure

GROUNDWATER HYDRAULICS AND PRINCIPLES

WELL CONSTRUCTION

HYDRAULIC TESTS AND MEASUREMENTS

Water
Aquifer

GROUNDWATER-QUALITY SAMPLING

WRAP UP

I)