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Chesapeake ENERGY

ENVIRONMENTAL DATA MANAGEMENT & SHALE GAS PROGRAMS

INTERNATIONAL PETROLEUM ENVIRONMENTAL CONFERENCE

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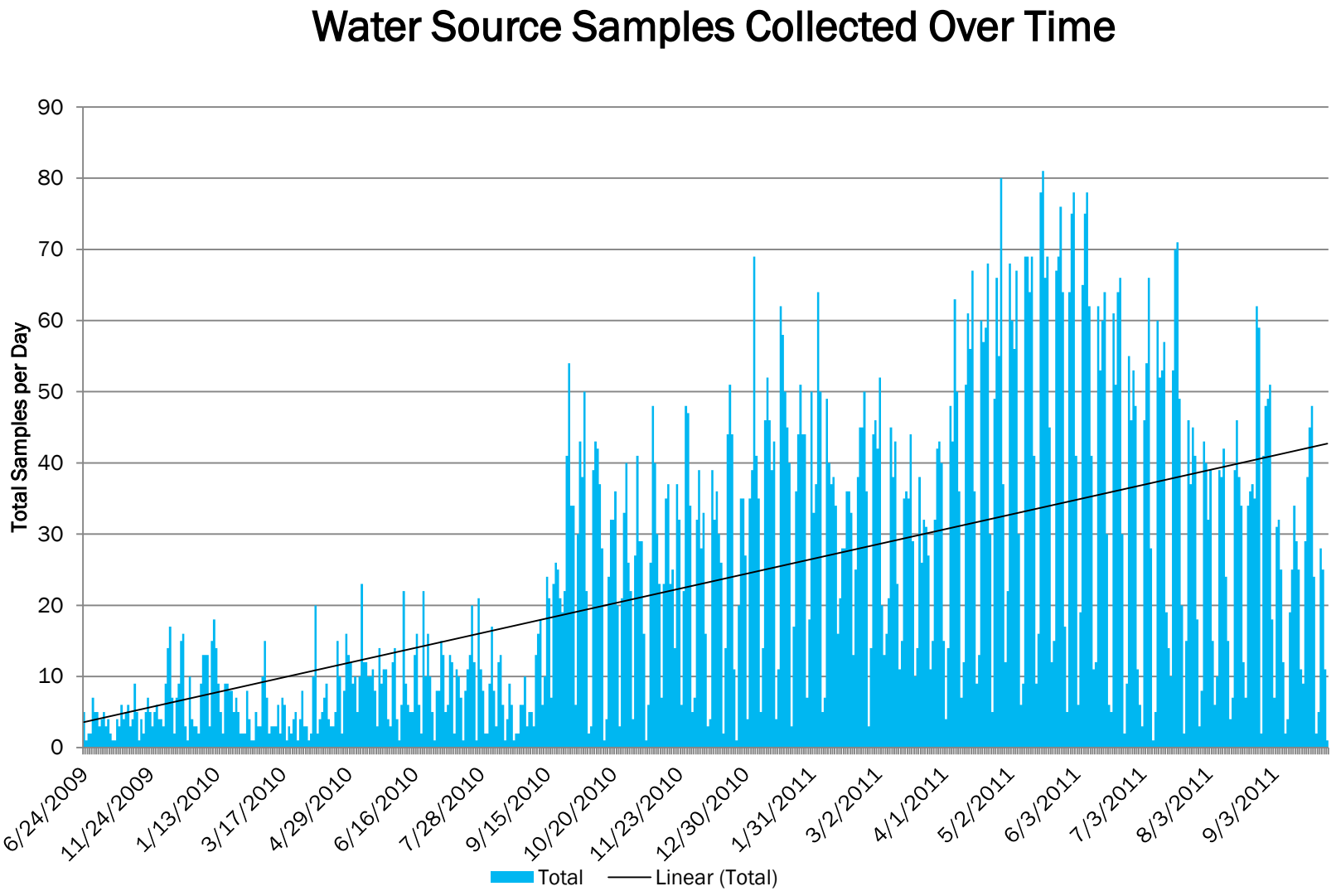
AGENDA

- Problem Statement
- Stakeholder Issues
- EQuIS Project Design
- Implementation of EQuIS
- Lessons Learned
- Key Benefits

PROBLEM STATEMENT

- **Spreadsheets, Spreadsheets, and more Spreadsheets**
  - Consultant provided tabulated lab data, property information on multiple spreadsheets, transmitted via email and web portal
  - CHK GIS mapped after internally processing spreadsheets
  - Data was Not database ready (unique identifiers had to be established in format)
- **Drilling Program was growing to be the most active driller in the US**
  - Concurrently baseline program moved to get farther ahead of the rigs
- **Need to manage water quality complaints and associated data**
  - Need data to make internal decisions and better understand water quality in generalized area
    - Better management of data increases company benefits based on informed decisions
- **Need to store additional water source data internally**
  - Ability to manage additional field sampling notes and field measurements
  - Ability to centrally store site specific documentation

MANAGING LARGE AMOUNTS OF DATA



STAKEHOLDER ISSUES

- **Effective Data Management**
  - Ability to manage large amounts of data
    - Understanding the uses of the data
  - Building efficiency through reporting
    - Real time GIS Mapping capabilities
- **Data Migration**
  - Migrating data from previous formats to singular format
    - Understanding the changes and limitations of data migration
- **New Data Storage**
  - Adjusting Process Work Flow
  - Change of Management process (Running dual systems for verification)
- **Quality Control Mechanisms/ Assurances**
  - Ability to monitor and track progress/data completeness
- **Costs**
  - How to remain on task and budget

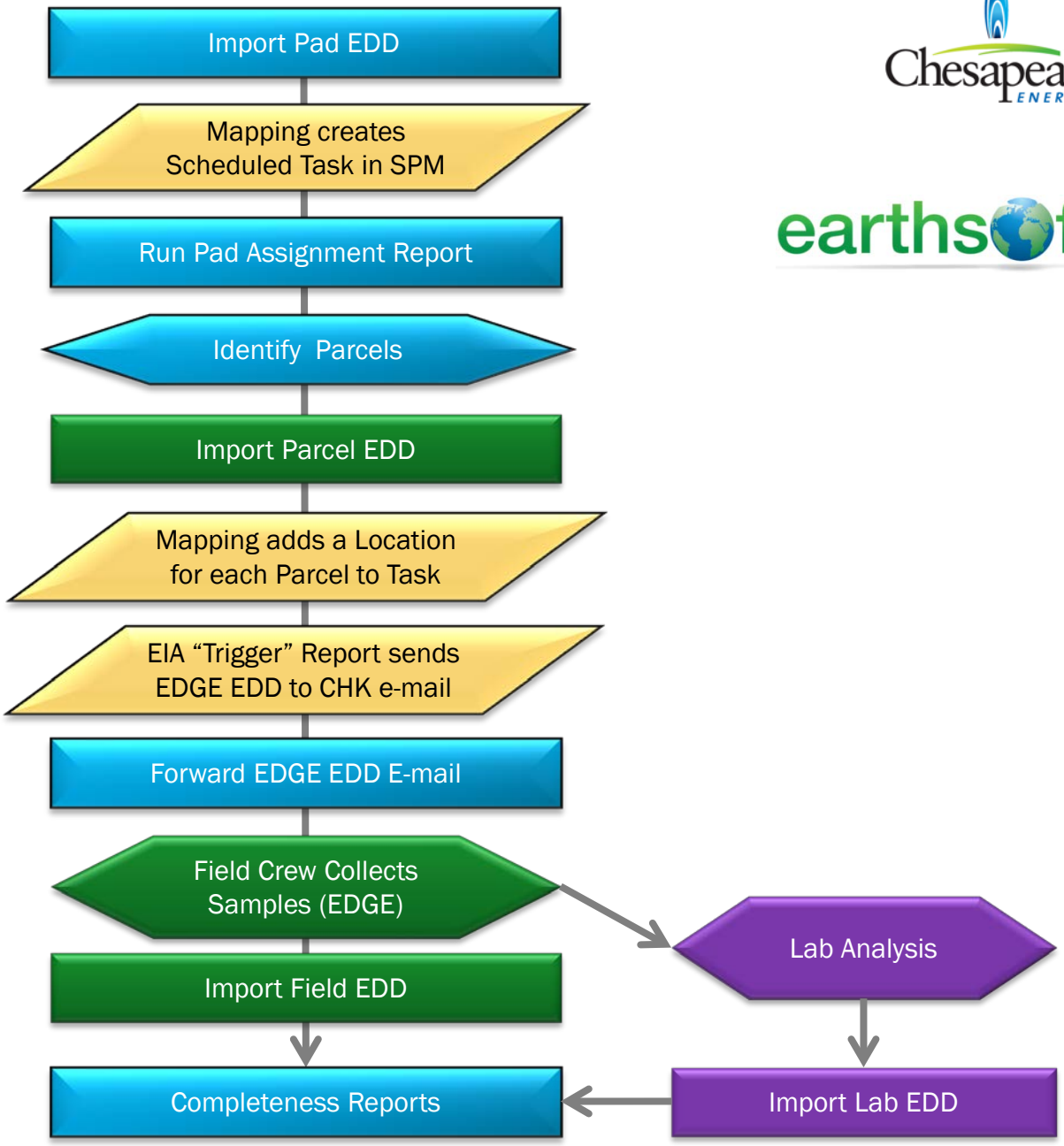
EQuIS PROJECT DESIGN

- **Historical View of Baseline Water Sampling**
  - Understanding different State Regulatory requirements and your data management needs
  - Data was collected and stored through Excel Spreadsheets – no central repository
- **Understanding proper data flow process**
  - How does the complex process get mapped for a database?
  - How will data be delivered to end user
    - Database formatted file (direct exported file) vs. PDF files or both?
- **EQuIS Database Configuration**
  - Building a new model for Baseline Water Sampling
  - Customized formats vs. Standardized formats
    - Sustainable use for years to come
- **Using the EQuIS Tools for process timeline events**
  - Using Sample Planning Module (SPM) for Pre-drill & Post-drill scheduling
    - Utilization of SPM Outlook-type calendar for scheduling
  - Using EQuIS Data Gathering Engine (EDGE) for field documentation

IMPLEMENTATION

- **Building the right Project Team**
  - Collaborative effort among consultants, Laboratories, EarthSoft and Chesapeake Energy
  - Weekly team meetings
    - Phased implementation (running test and production environments of data)
  - "All hands on deck" approach for timely implementation
    - Ability to make changes immediately to maintain data flow/input
  - Project Checklists with Action Items
- **Developing Data Reporting Requirements**
  - Internal Reporting needs
    - Quarterly matrices (KPIs)
  - External Reporting functionality
    - Exporting data to state databases (i.e. MSC)
- **Evaluating Costs with a long term perspective**
  - Changed data models over time to standardized (out of the box) format

Chesapeake SPM / EDGE Workflow



LESSONS LEARNED

- **Dedicate Active Project Management**
  - Time invested up front will save considerable time later
- **Take time to think through how data needs to be imported**
  - Will there be any delays on gap, historical and complaint data imports
  - What timeframe does data need to be imported (e.g. field EDD)
  - Initial steep learning curve for the consultants
- **Proper Management of Change Period**
  - Use of parallel databases (TEST & PRODUCTION environments) during testing period
- **Build in time for uncertainty and unknowns**
  - Allow 10-20% of project time (dependent with size and scope of data migrating)
- **Fully understand the project tasks/desired outcome**
  - Changed our Database structure from Customized to Standard (out of box) approach
- **Focus on changeable topics**
  - Don’t focus on the “what if’s”

CENTRALIZED DATA MANAGEMENT – KEY BENEFITS

By centrally managing all environmental data into a single storage facility, more sophisticated data analysis will be achievable, which leads to an improved technical/scientific understanding while enforcing comprehensive QA/QC procedures:

- Technical data quality objectives, including data validation and checking is standardized and managed centrally
- Electronic input and output of data improves data accuracy, efficiency and quality by reducing potential input errors during data transfer
- More efficient workflow and field monitoring procedures
- Data is timely (real time) and stored for multi matrices (e.g. Air, Soil, Ecology, etc.)
- Data is readily accessible to all stakeholders
- Proper data management system stores, processes, analyzes and reports project critical data necessary for both day-to-day project management and longer term strategic planning

Financial Value of Consistency

- Save time and money
- Ability to reevaluate existing sites easier
- Data sharing amongst offices

Increased Technical/Scientific understanding and time for advanced Data Analysis.

Auditable traceability of data – Open & Transparent system