

An Environmental Liability Management and Risk Control Tool

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Concerns



Why Manage Legacy Oil & Gas Properties?

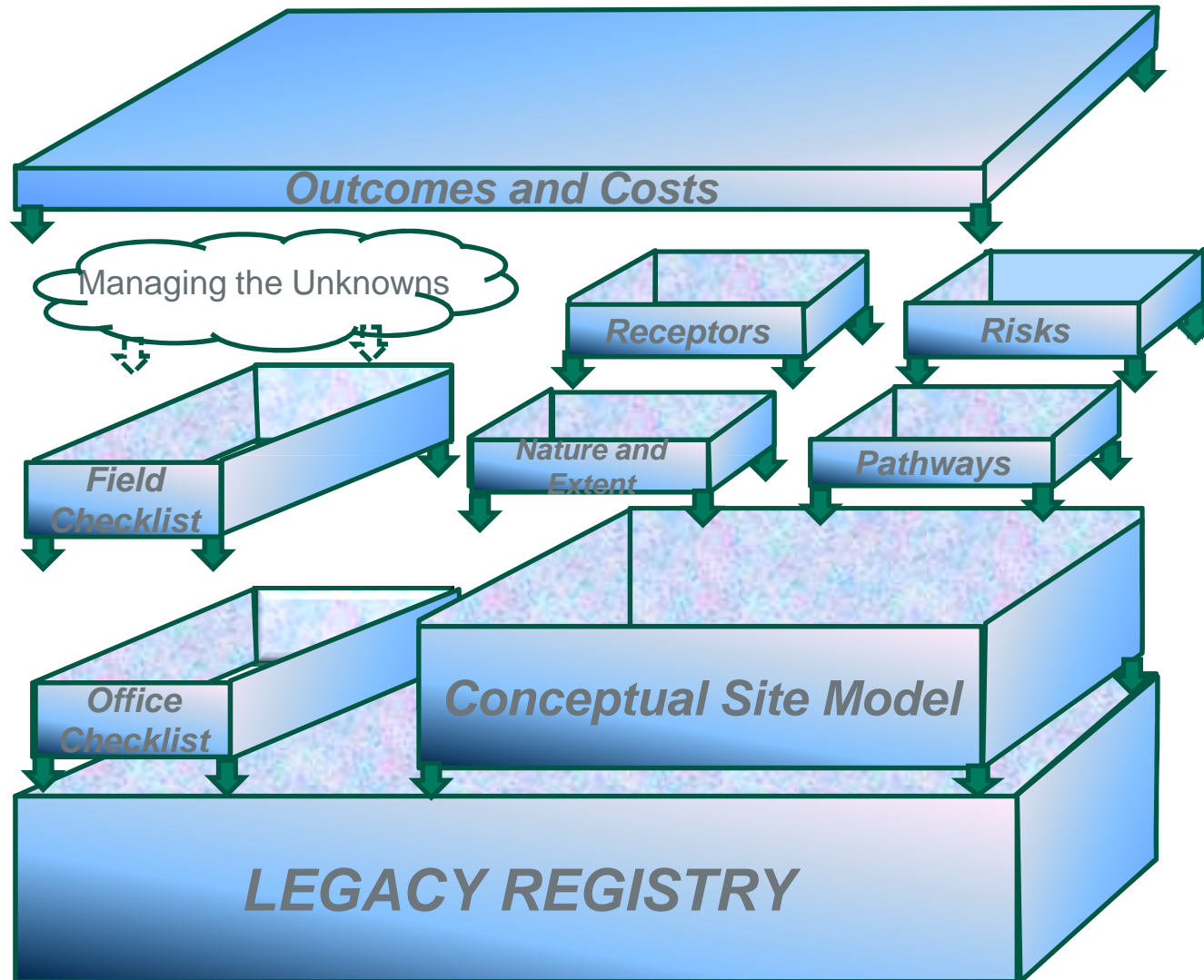
- Risk Management
- Regulatory Requirements
- Reserve Allocation
- Best Practices
- Risk Management Continuity
- Reputation and Societal Considerations



How Do You Manage Historic Properties?

- Collect and access facts
- Develop exposure pathways for the elements that you want to consider in the risk assessment
- Understand what facts you know, what facts you don't know, and what facts you should know
- Develop Decision Quality Objectives (DQOs) to focus the inquiry and get the answers you need
- Actively manage the repository - update and review
- Develop a process for identifying unknown risks
- Create a repository or registry where data and decisions can be housed and managed

Conceptualized Registry – By Site



What is the Registry and what is the Goal?

- *What* – A process whereby a property owner can systematically document and update site information, develop a conceptual site model, and pathways to closure in an electronic repository/database (the Registry is a living document)
 - Registries allow for the decision pathway to be mapped so that it can be replicated.
 - The Registry allows for prioritization
 - The Registry allows for easy access to past decisions
- *Goal* – To be fairly certain that liabilities are captured and understood for each property. Those liabilities reflect issues associated with 6 sets of considerations:
 - Physical
 - Environmental/Chemical
 - Receptors
 - Safety
 - Social
 - Reputational

Registry Site Model - Risk Considerations

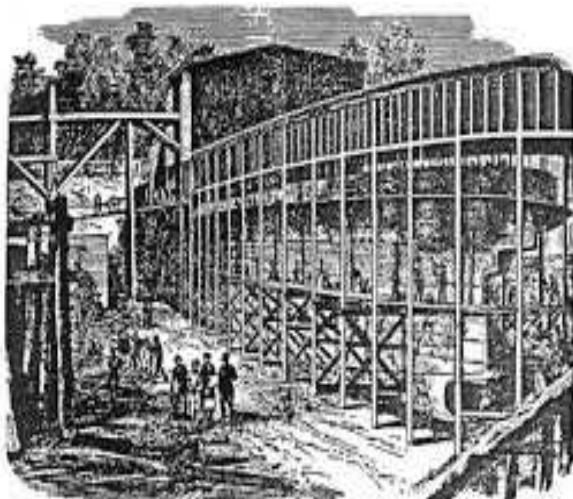
The site model will capture the physical, chemical, biological conditions, safety, reputational, and the social status of each property (there is detail on the Registry Checklist).

- Physical
 - Property dimensions, physical characteristics, and man-made structures
 - Setting and climate
 - Geology and groundwater regime
 - Topography and surface water regime
- Environmental/Chemical Conditions/Status
 - Groundwater and surface regimes
 - Sediment
 - Contaminants of concern
 - Nature and extent of contamination
 - Exposure pathways
- Receptors
 - Humans
 - Ecological (terrestrial and aquatic)
 - T&E species
- Other receptors/NRD
- Safety
 - Adits, shafts, tailing piles, waste rock (parameters and issues)
 - Access
 - Stability
- Reputational
 - Corporate citizen assessment
 - Aesthetics
 - Area use enhancement assessment
 - Community benefits assessment
- Social
 - Current uses by others
 - Closure impacts (+ and -)
 - Historic/cultural uses

Registry Development

Add to the database information related to:

- Environmental/Chemical – Safety-property – receptors data are fact-based.
- Societal and Reputational – fact-based data and suppositions (using a qualitative scale)
 - Media outlets
 - Community activism



The Registry – Layout

The registry collates issues and assists in managing legacy sites by focusing on:

- Understanding, developing, and registering information on a property (capturing the facts)
- Accessing data relative to liability considerations
- Aiding in developing solutions, remedies, or pathways forward to reduce or eliminate risk and recording
- Providing a methodology to identify unknown liabilities
- Ability for a person to enter the facts with as little bias as possible.

Registry Basis

Registry format is based on the CERCLA process and methodologies

Why? - Because it is recognized by regulators, bankers, lenders, state and local governments.

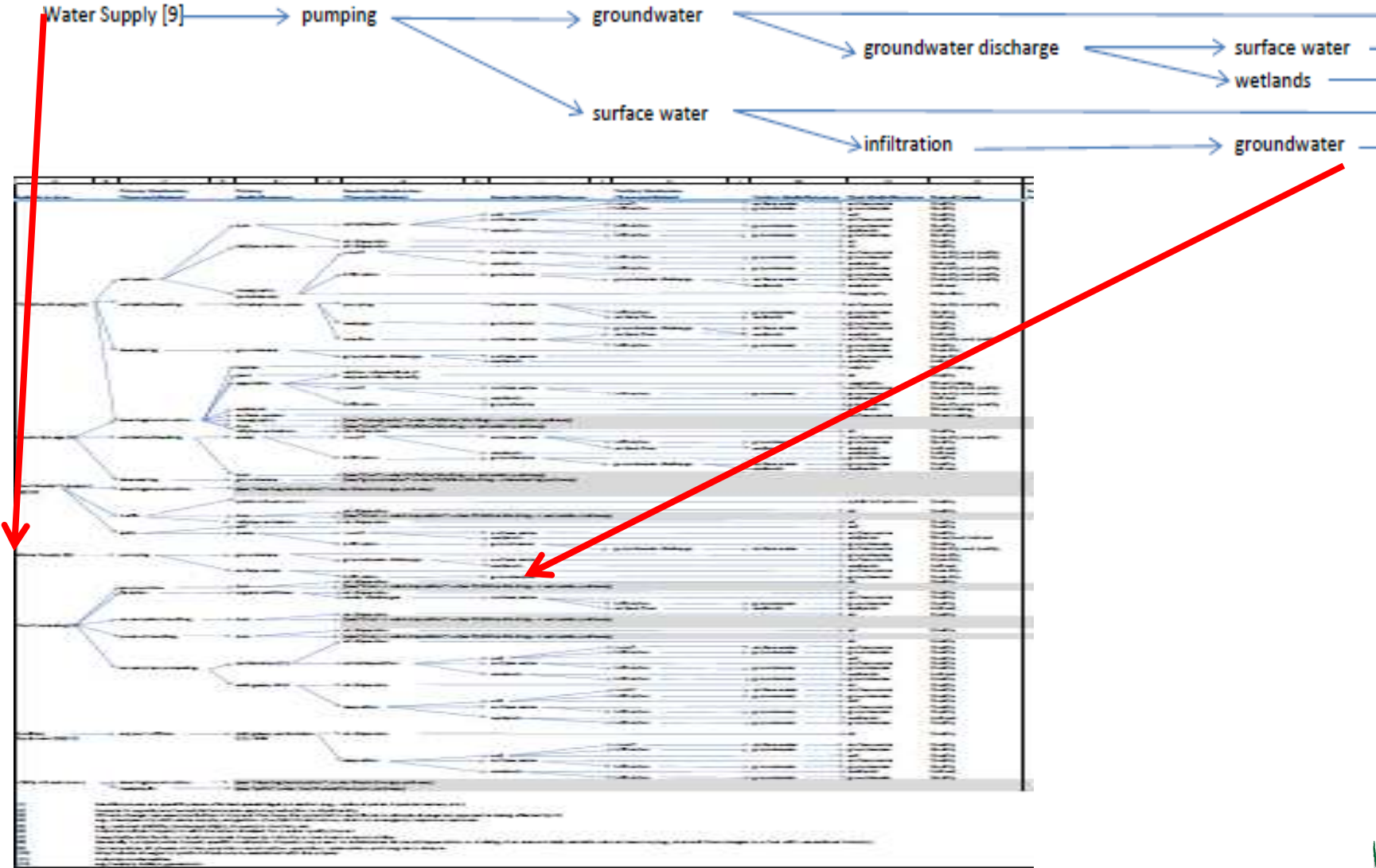
- Establish information based on a **Conceptual Site Models (CSMs)** developed for each considerations.
- The CSM is then used to develop desired **outcomes**
- **Pathways** to closure are based on the outcomes
- The Outcomes and Pathways are recorded
- Progress will be monitored
- The registry can house tools to monitor conditions that might uncover **unexpected, unforeseen, or unknown** events or regulatory changes

Registry Content – Environmental example

Nature and Extent

- Inventory of the Media present on site (GIS)
 - Groundwater
 - Soil
 - Mud pits
 - Sediment
 - Pipelines
 - Production Chemicals
 - Waste Management and Disposal
- Constituents
 - Develop a list of constituents present at each site (Priority Pollutant List)
 - Record where, when, what was sampled and how (GIS Database?)
- Location and aerial distribution (GIS)
- Exposure Pathways

CSM Architecture - Environmental Considerations



Registry – Tracking for Unknowns

- Develop a list of possible unknowns for each risk consideration i.e.:
 - Property ownership is expanded based on new historic information
 - A new chemical becomes a risk driver
 - A new plant or animal is declared a T&E
 - Shallow workings open to the surface
 - Medical evidence in a population suggest long-term health impacts to receptors
 - Middens or other Native American features discovered

- Develop a way of discerning if risks are increasing for a consideration
 - Develop a rating system for site knowledge
 - Track papers present at conferences on chemicals that are present on a property
 - Follow the movement of species through the T&E species listing, know what species are on site that could impact risks
 - Review workings maps and track any surface changes
 - Follow medical surveys in surrounding communities
 - Monitor site activities that might disturb the land surface

Conclusion - The Registry Benefits

- The Registry factors can be prioritized based on assignment of scores.
- Many companies have a committee-based decision-making process when it comes to assessing liabilities and determining addressing risks.
- The registry can record and track the liabilities and the paths to closure in as much or little detail as an owner desires (add in tax history or production data).
- Ticklers will notify designated personnel to periodically update the conceptual site model, liabilities and paths to closure.
- The real and possible risk liability relies on the facts contained within the registry. The registry records the assessment but does not make decisions. It is also used to record the path forward decisions
- When someone retires or leaves the company their rationale for actions is captured and institutionalized in the Registry.

Questions?



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