# Presentation from 2016 World Water Week in Stockholm

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### WATER AND MINING

A View From the Mining Industry

**Hubert Fleming, Ph.D. August 2016** 



### Marginal cost of water management is rising



- •Water infrastructure = 10% industry CAPEX
- •US\$3.4b (2009) US\$11.9b (2013), a 350% increase.



### Investors / Insurers: Stranded assets – drying and drowning







### RISK-BASED WATER MANAGEMENT

**Strategic Risks** 



### Reputational risks

Creating competitive advantage for current, future growth opportunities by maintaining investment attractiveness through strong operating performance (<u>Water is a triple bottom line metric with investors</u>)



### **Growth potential**

Ability to mine new reserves is increasingly <u>linked to responsible</u> stewardship of water resources



### Social license to operate

Water related social issues are complex and highly variable;, and, **Number 1 issue in social license to operate**. Mismanagement results in lack of license, significant financial impact

### RISK-BASED WATER MANAGEMENT

### **Operational Risks**



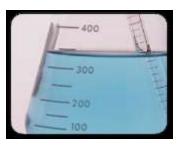
### **Security of supply**

•Water deficiencies result in <u>lost production</u> and the <u>inability to</u> <u>adequately support expansions</u>



### **Excess water**

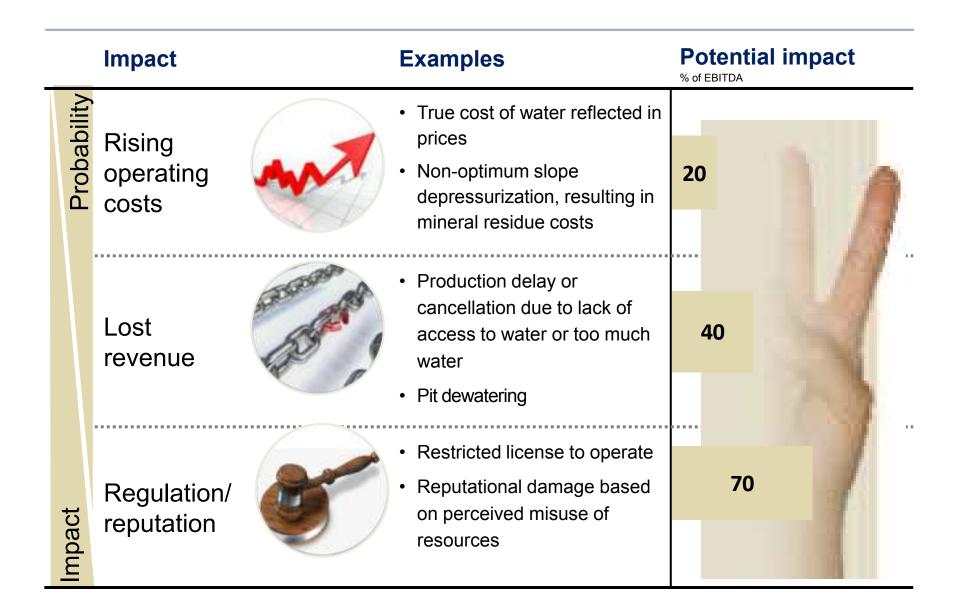
•Leads to operational inefficiencies, <u>loss of mining days</u>, uncontrolled discharges and increased operating costs



### Water quality

•Inadequate management leads to <u>increased operating and closure</u> <u>costs</u>; water re-use opportunities may be compromised

### THREE TYPES OF WATER - RELATED RISKS FOR ANGLO



### **EFFECTIVE WATER MANAGEMENT:**

STRATEGIC AND OPERATIONAL RISK MANAGEMENT



## **Strategic**Risk Management

### Water Management Framework

- Strategy
- Plans
- Programs
- Systems

### Performance Metrics

- Operational
- Environmental
- Social
- Legal
- Financial

### Stakeholder Relations

- Employees
- Community
- Government
- Investors
- Analysis



**Operational**Risk Management

# **Operational**Water Plan



### Water Sourcing

- Basin wide
- Climatology
- Communities
- WaterResources



### Hydrogeology

- Subsurface Water
- Dewatering
- Depressuriza tion



### **Hydroprocessing**

- Mine Water
- Processing Plant
- Energy
- Dust Supression



#### **Environmental**

- Tailings discharge
- Waste Rock discharge
- Processing plant
- Storm water
- Surface water



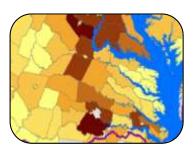
#### Closure

- Mine Water
- Tailings
- Waste rock discharge

# LIFE OF MINE CYCLE: WATER-RISKS / OPERATIONAL PRIORITIES CHANGE

#### **Feasibility Operation** Closure Construction Water supply Construction water Water supply/inventory Post-mining drainage identification/ supply management design quantification Surface water Erosion control Water treatment management Impacts on local Water quantity/quality Water resources users Sediment control predictions recovery/storage/ Water supply treatment/ reuse Permit compliance Water treatment/ storage discharge strategy Cyanide management Waste water disposal Dewatering rates/ Dust control Facility specific closure Discharge management strategies management Site-wide water Storm water Post-closure catchment management management Waste management Performance characterization monitoring/ reporting

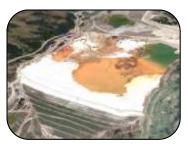
### IMPLEMENTATION IS ENABLED BY WATER TOOLBOX



Watershed Vulnerability Mapping (NOAA)



Water Risk Assessment Framework



Asset Management/ Reliability



Waste Management



Water
Efficiency Program
(WETT, Reuse,
recycle,
treatment)



Water
Accounting/
SiteWide + BasinWide
Water Balance

### ANGLO AMERICAN WATER GOALS

- Water is an asset, not liability
- •Recognize that access to water is a human right
- •Committed to achieving water security for our operations and communities where we operate.

### *Water* strategy key components:

- a comprehensive risk management approach
- a regional water management approach
- a focus on reducing, reusing and recycling the water our operations need
- investment in innovation to support our long-term ambition

#### **Key Metrics:**

- 20% reduction in abstraction by 2020
- Reuse at 75% by 2020

Our aim by 2025 our sites will recycle all available water, work effectively with our partners to become net water contributors to our communities, and work on innovative technology with the long-term aspiration that one day we may mine without water.

We have developed a water management plan for each of our sites, and our basins. There is a site water management coordinator for each site, as well as a regional water management coordinator. In addition, each site develops specific projects to meet the agreed water management KPIs, which are reviewed every year.

### **EXAMPLE: ANGLO WATER RISK ASSESSMENT**

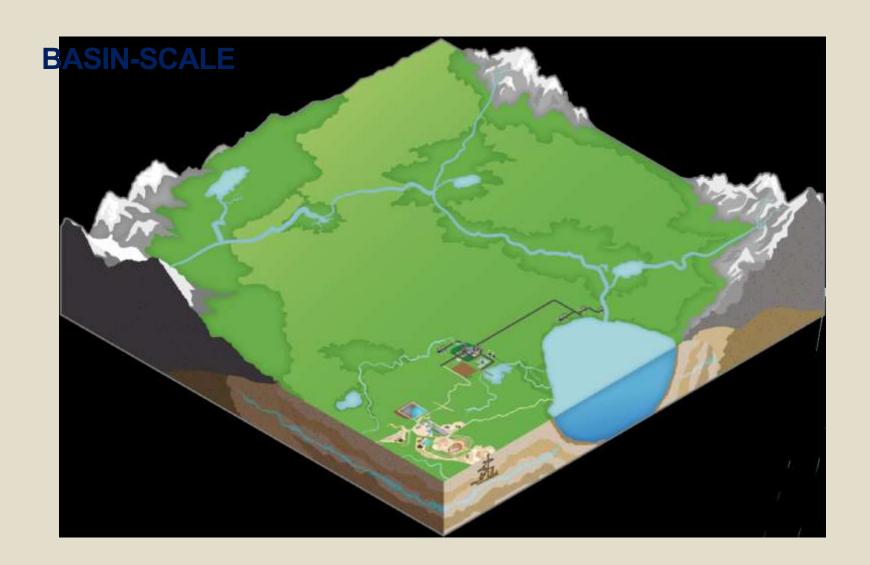
Operation / Project	SiteWide Water Balance	Mine dewatering	Depressurizat ion, Water Ingress Management	Water Quality	Water Resources (Security*, Social, Env)
Site A- Canada	Understanding	Understanding	Understanding	Understanding	Understanding
Site B- Canada	Competence	Competence	Understanding	Understanding	Understanding
Site C- Peru	Understanding	Understanding	Awareness	Awareness	Awareness
Site D- Chile	Understanding	Awareness	Awareness	Innocence	Understanding
Site E- South Africa	Awareness	Awareness	Innocence	Awareness	Awareness
Site F- South Africa	Innocence	Awareness	Innocence	Innocence	Awareness
Site G- Botswana	Awareness	Innocence	Innocence	Awareness	Awareness
Site H- Australia	Understanding	Competence	Understanding	Awareness	Awareness
Site I - Brazil	Awareness	Awareness	Awareness	Awareness	Awareness
Site J- Finland	Understanding	Understanding	Awareness	Awareness	Awareness



### **OPERATIONAL SCALE**



# MANAGEMENT STRATEGY REFLECTS OPERATING ENVIRONMENT AT MULTIPLE SCALES



# Anglo American: ECONOMICS OF WATER MANAGEMENT

- > Site Level
  - > 2016 Budget: USD 500 million+
  - Multiple sites: Reduced hauling with water management: USD 100 million/yr+
  - ➤ Site B- Slope Increase USD 1 billion+ over Life of Mine
- Business Unit Level
  - ➤ 2015 Impact: Revenue Loss: > USD 2 billion+
    - ➤ 10+ sites with revenue/ profit impact
    - Fines: USD 5 million +
- Corporate Level
  - Social License to operate / reputational
    - Multiple permits- expansions, new sites