

Environmental Risk Management



Human Energy®

AICHe/SACHE 2013 Faculty Workshop
August 21, 2013, Richmond CA

Areas of Discussion



Diversity of
Environments
and Risks

Strategy to
Understand &
Manage Risk

Challenges
and
Opportunities



Diversity of Receptors and Receiving Environments



Diversity of Hazards



Chemicals

- Products
- Emissions
- Discharges
- Wastes
- Inadvertent or undetected releases



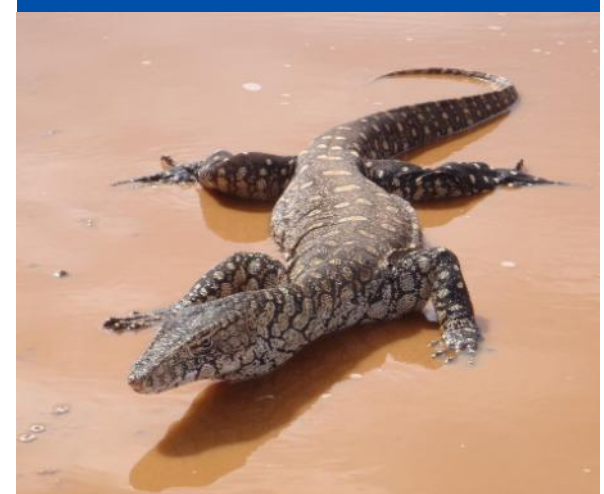
Environmental Condition

- Noise
- Light
- Temperature
- Global environmental change



Resource Use / Footprint

- Introduced species
- Clearing
- Dredging
- Erosion
- Water use



Managing Environmental Risk



Environmental Risk is managed by 3 key processes at Chevron

Environmental Stewardship

Environmental Aspects

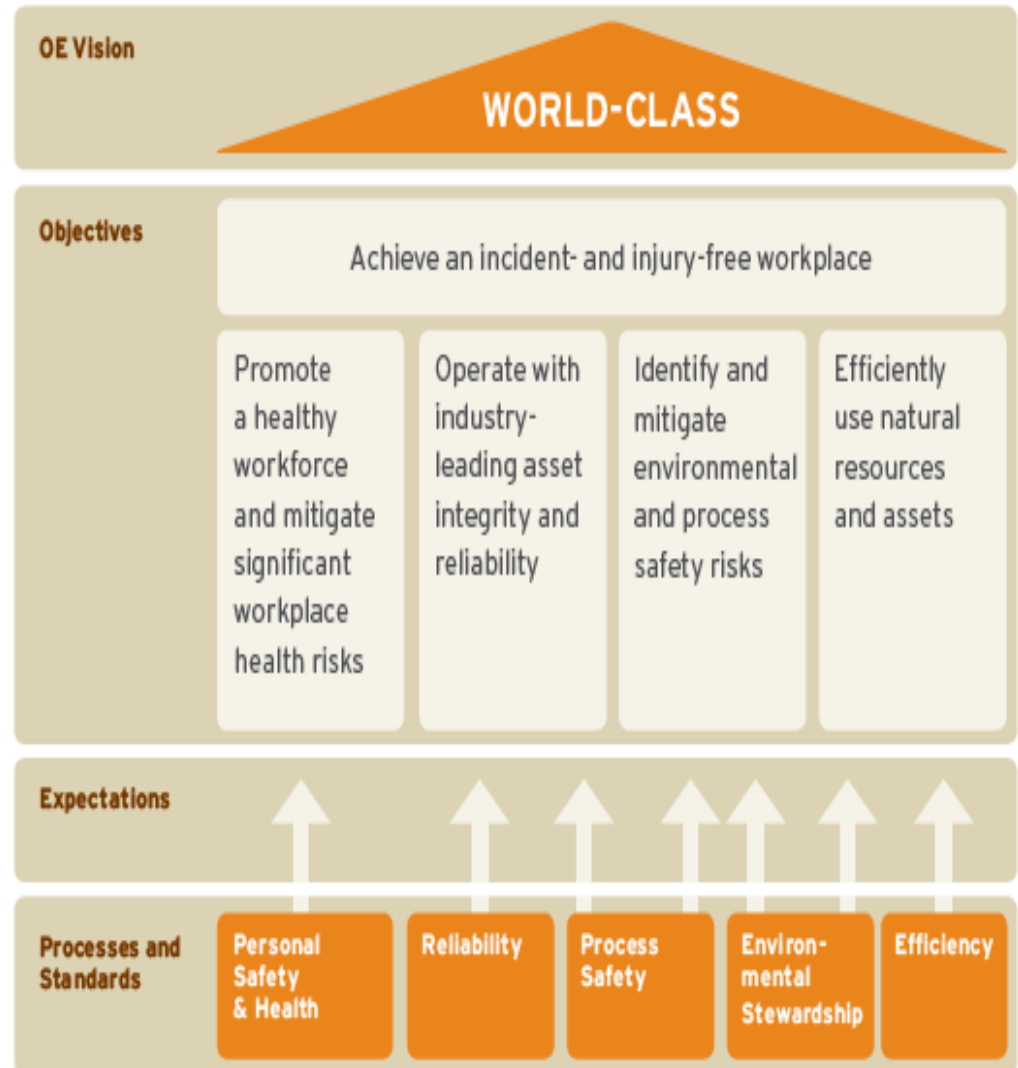
Third Party Waste Stewardship

Retirement of Assets

Environmental Performance Standards

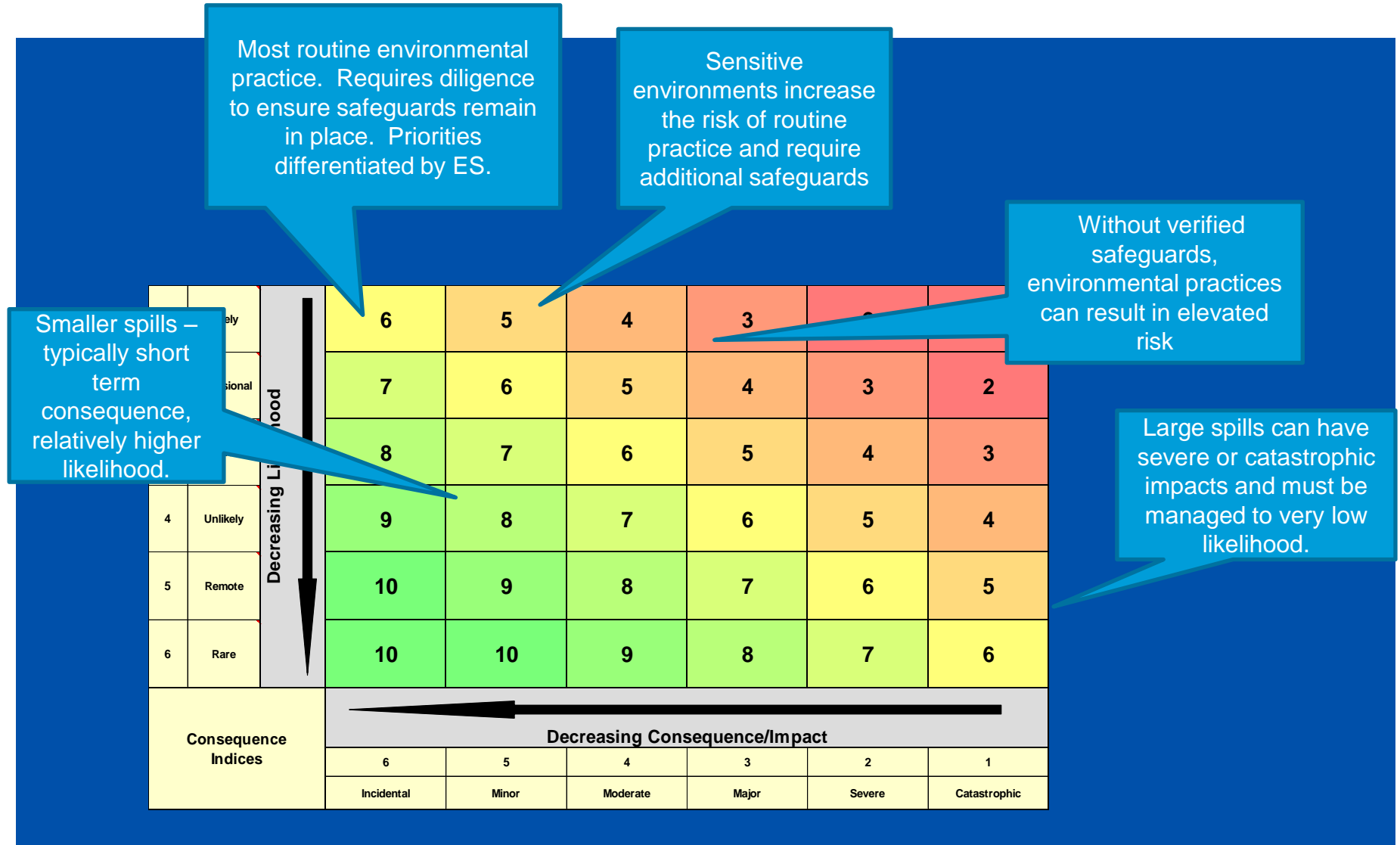
Environmental Health Social Impact Assessment

HES Risk Management



Application of the Risk Matrix

Environmental risks are evaluated at a high level during the IHAZID



Managing Environmental Risk in Operations



HES Risk Management frames risks at an asset group and/or business unit level and provides governance on risk criteria and mitigation. Environmental Stewardship is the detailed process that identifies and prioritizes environmental risks (aspects) and mitigation actions.

Environmental Stewardship (routine operations focused)

- Identifies potential spill scenarios as environmental aspects and further refines understanding of the risk
- Defines certain standard practice via Environmental Performance Standards (EPSs)
- Prioritizes environmental aspects based on a variety of criteria, including reputation
- Stewards long term mitigation of environmental risks
- Drives sustainable risk reduction through ES plan

HES Risk Management (event focused)

- Identifies potential scenarios that could result in loss of containment and qualitatively estimates the risk
- Requires verification that routine practices (level 6 risks) are aligned with established standards
- Highlights reputation risks using signposting
- Provides governance on closure of environmental risk mitigations
- Focuses attention on near term closure of elevated risks

Managing Environmental Risk in Projects



Stakeholder Engagement is a critical component of the ESHIA process. ESHIA allows for consultation with internal and external stakeholders on a range of project issues, including health, safety and environment risks. ESHIA is also the mechanism to fully characterize environmental and health impacts and identify mitigation measures

Integration is the key strength of HES RM. The IHAZID study enables a big picture look at health, environment, safety and reputation. This is particularly important for projects with significant process hazard risks such as LNG, sour gas development and deepwater drilling.

Environmental, Health, Social Impact Assessment (ESHIA)



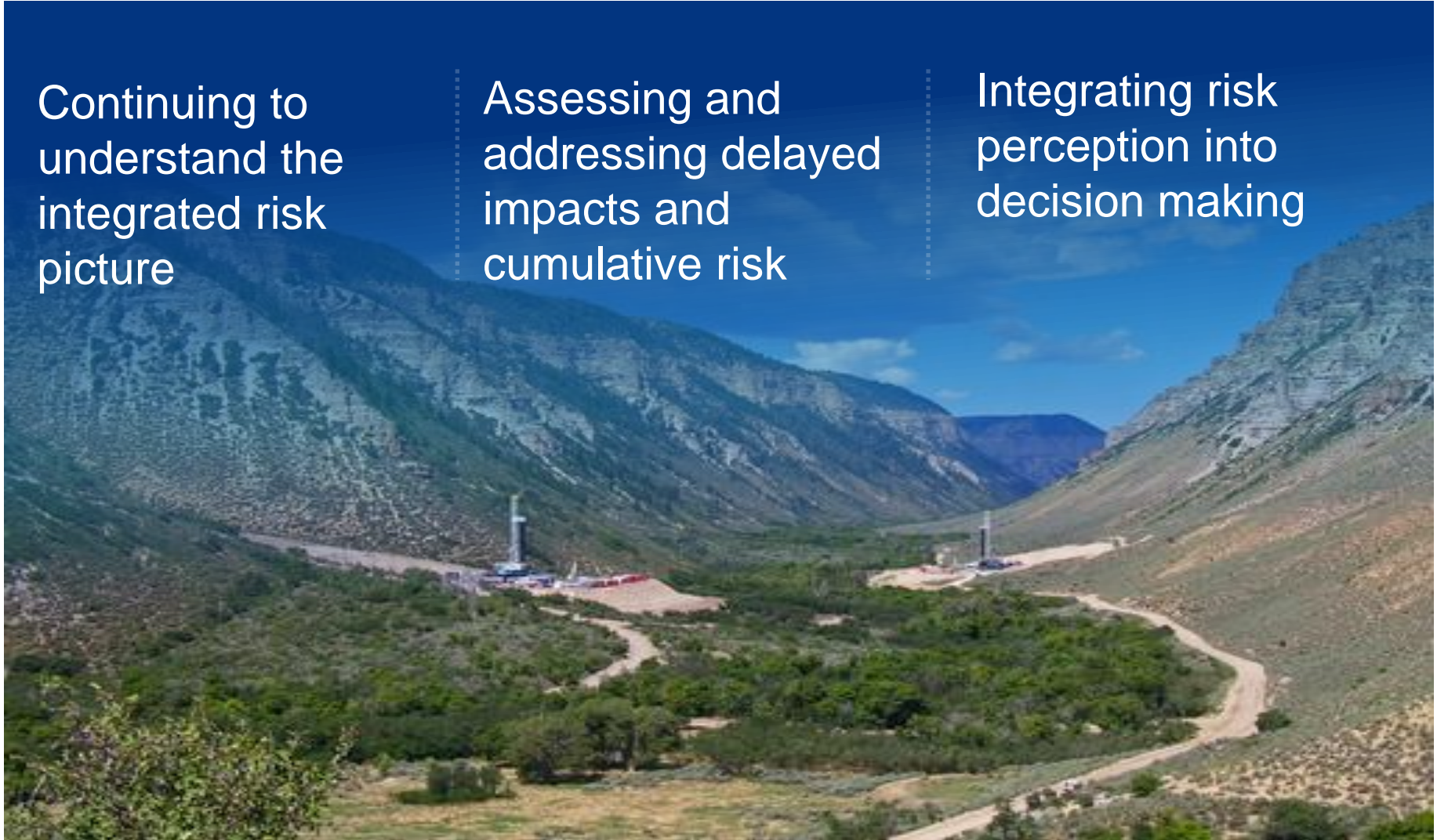
Key Challenges



Continuing to understand the integrated risk picture

Assessing and addressing delayed impacts and cumulative risk

Integrating risk perception into decision making



Unique Tool Set and Terminology



Decision making on risk priorities occurs using inputs from many sources – each with unique tools and terminology

- EPA defines risk to be the chance of harmful effects to human health or to ecological systems resulting from an environmental stressor
- A stressor is any physical, chemical or biological entity that can induce an adverse response



Challenges to Understanding the Risk



- Multiple receptors
- Consequences often
 - Have effects that are delayed in time from the exposure
 - Are multi-causal or cumulative
 - Do not result in clear causation even with proven exposure
- Typically greater uncertainty and more difficult to characterize and bound the risk (relative to safety risk)



Risk Assessment Informs Risk Management

