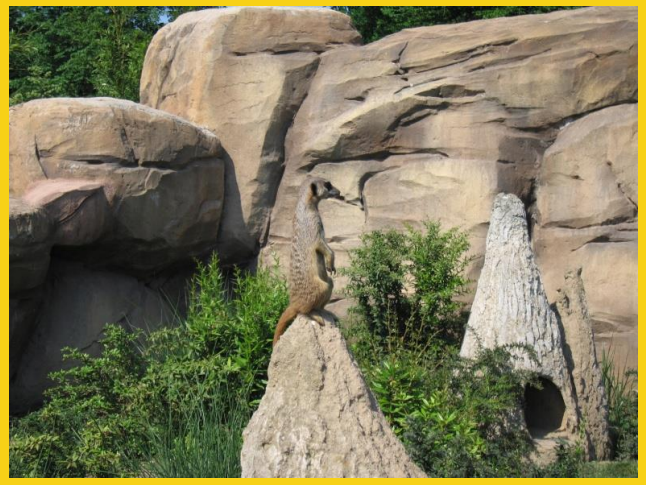
RESEARCH COLLABORATION MODELS

WRC What Indaba,
3 June 2013
The Waterfront,
Cape Town



Philippa Scott

Shell Research Ltd

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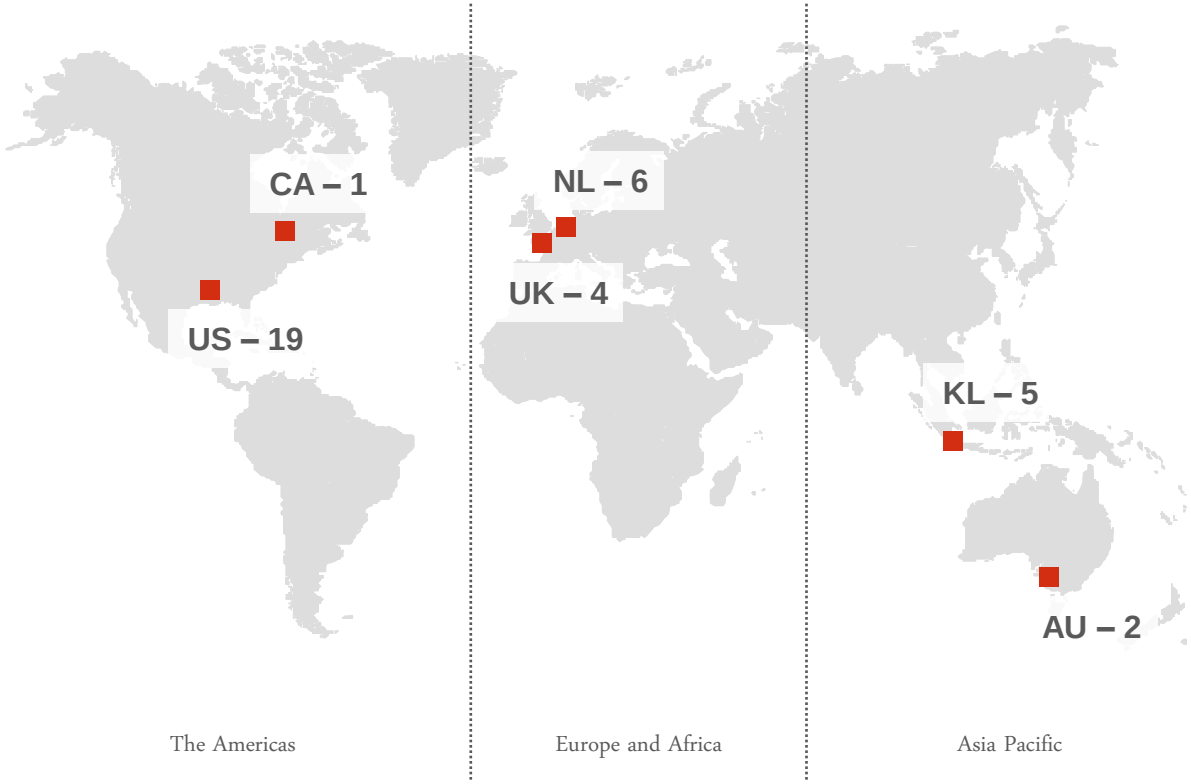
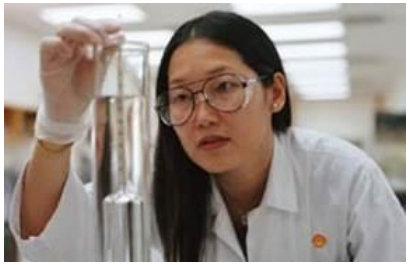
THE SOIL AND GROUNDWATER TEAM





37 Staff in 3 regions

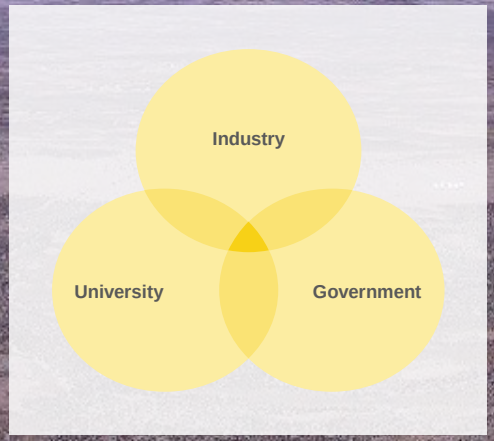
Our focus is on conducting research and implementing results

To manage soil and water resources risks for the businesses

(A multi disciplinary team of Hydrogeologists, Geochemists, Forensic chemists, Engineers)

AGENDA

- History of Contaminant Hydrogeology
- Value of collaboration and focused research
- Some project examples
- Other organisations (API, ASTM, Claire,WRC)



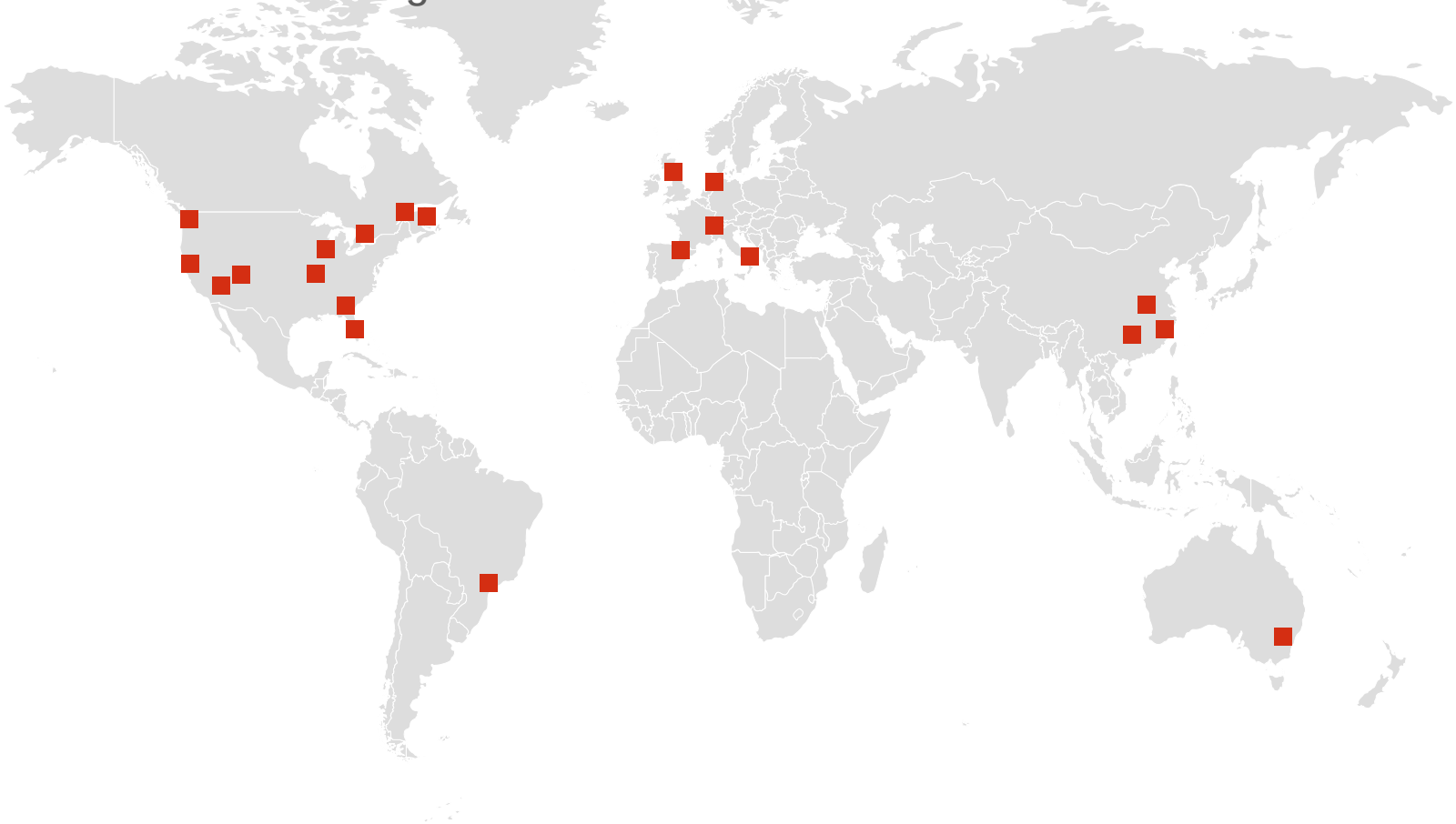
HISTORY - THE UNIVERSITY OF WATERLO

- Pioneering work from the late 1970s based on measuring and removal had ltd success
- US turned to Canada for collaborative research to drive understanding processes
- Solvents in Groundwater Consortium was developed, lead by Prof. John Cherry
- US Air Force Base at Borden
  - An internationally renown study area for contaminant hydrogeology
  - Borden provided significant draw for top professors, students and industry sponsors interested in studying contaminant hydrogeology
  - Leveraged funding from US, international industry and the Canadian government
  - Significant learning with >200 research projects since the early 80's
  - Pioneered monitoring tools, drilling techniques, and effective remedial methods
  - Taught courses and field courses open to regulators, consultants, industry etc
- Finally resolved significant issues and evolved into the **University Consortium**

THE UNIVERSITY CONSORTIUM

Global reach of collaborators developing leading edge credible research

Resulting in better methods and better science



COLLABORATION VS COMPETITION

University of British Columbia

University of New Brunswick

University of Waterloo

Colorado State University

Arizona State University

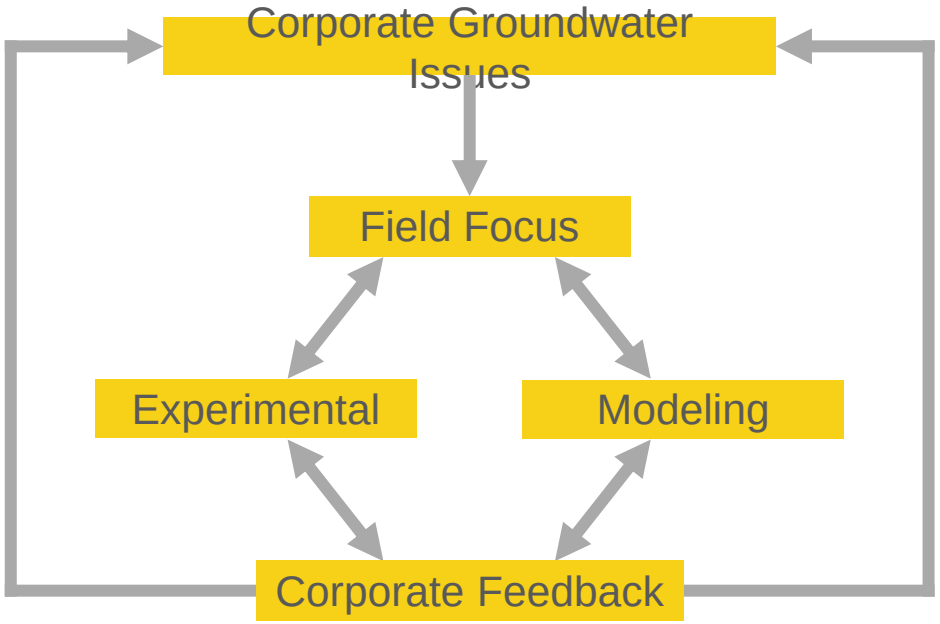
University of California

University of Florida

University of Guelph

THE FUNDING MODEL AND APPROACH

- Each corporation contributes $ US100K - Total group funding is ~$ 8-10 million/year
- Other sources of funding:
  - US Department of Defense
  - Canadian NSERC
  - University and other contributions in kind



CONSORTIUM PROJECTS GROUPED IN 10 THEMES 1998-PRESENT

1. Improved Methods to Determine Contaminant Nature and Extent
2. Natural Attenuation in Unconsolidated Environments
3. Natural Attenuation in Fractured Rock
4. Aquitard Integrity Assessment
5. Impact of Contaminant Plumes Discharging to Surface Water
6. Vapor Intrusion to Indoor Air
7. Source Zone Remediation
8. Plume Remediation
9. Performance Assessment of Remedial Actions
10. Technology Transfer and Communications

SABRE - SOURCE AREA INSITU BIOREMEDIATION

- Collaborative R&D project in UK between 2004 and 2008
- By an international, multidisciplinary team
- Funded by the UK DTI LINK program designed to include matched funding
- Over 40 papers published and Training courses developed
- The team
  - 8 research organisations
  - 14 Industrial partners
  - Links to Regulators (Env Agency technical centre, US EPA tech team)

Details on web link

SABRE Project LINK:
http://www.claire.co.uk/index.php?option=com_content&view=article&id=53&Itemid=47

WHAT IS SUSTAINABLE REMEDIATION - SURF?

- **Sustainable remediation** is broadly defined as a remedy or combination of remedies whose net benefit on human health and the environment is maximized through the judicious use of limited resources
- Aims to drive better decision making
- **SURF** is an ad-hoc organization developed in response increased understanding of the impacts of remediation
- Consists of multi-disciplinary specialists from:
  - Government departments and Regulatory agencies
  - Industry
  - Consulting, and
  - Academia

SuRF
SUSTAINABLE REMEDIATION FORUM

SURF AROUND THE WORLD

This is an example of a loosely linked collaboration with area specific focus

- US (Started as an EPA/Industry “indaba”)
- UK (started as a Government initiative)
- Italy
- Brazil (expanding throughout South America)
- Canada
- Australia/New Zealand
- China
- Japan
- South Africa a possibility in the future perhaps
- (http://www.claire.co.uk/index.php?option=com_content&view=article&id=182&Itemid=78)

SURF
SUSTAINABLE REMEDIATION FORUM

AMERICAN PETROLEUM INSTITUTE (API)
OVER 600 MEMBER COMPANIES

- Soil/Groundwater Technical Task Force
  - Over 250 research projects (including outreach training) during the last 34 years
  - Curt Stanley (Shell) – Chairman with 2 API staffers and representatives (scientists and engineers) from member companies
  - Strong collaboration with academia, government and consulting
- Hydraulic Fracturing Task Force
  - Providing research opportunities
  - Evaluation of ongoing research efforts (e.g. Pavillion, Wyoming)

ASTM

- One of the largest voluntary standards developing organizations in the world
- Over 30,000 members from more than 100 countries
- E1739 Risk-Based Corrective Action (RBCA)
  - Recognition that existing approach of cleanup to a common value without regard to site-specific risk was untenable
  - Partners in RBCA Implementation (PIRI)
    - Outreach and training to federal and state regulatory programs
    - Funded by EPA, ASTM, Industry, and with strong state regulatory participation
- D18 Committee has now formed a Groundwater Group for Unconventional Gas

COUNCIL OF CANADIAN ACADEMIES HYDROFRACKING STUDY

- **Harnessing Science and Technology to Understand the Environmental Impacts of Shale Gas Extraction**

- The Minister of Environment has asked the Council of Canadian Academies to provide an evidence-based and authoritative assessment on the state of knowledge of potential environmental impacts from the exploration, extraction and development of Canada's shale gas resources. The Minister has also asked the Council to assess the current state of knowledge regarding associated mitigation options.

- http://www.scienceadvice.ca/en/assessments/in-progress/shale-gas.aspx

Closing Thougths

- Experience shows collaborative research is valuable and achieves beneficial results
- Is there benefit in linking with the Canadian work on Shale Gas?
- Do the research themes used by the University Consortium have value here?
  - Improved methods to characterise sites
  - Contaminant fate and transport processes
  - Natural attenuation processes
  - Confining beds, barriers to migration
  - Groundwater surface water interactions
  - Vapour migration processes
  - Remediation of source and plume zones
  - Performance assessment of remedial actions
  - Technology transfer and communications

Q&A

THE UNIVERSITY CONSORTIUM

for Field-focused Research into Contaminant Hydrogeology

John Cherry

Director
Distinguished Professor Emeritus, Waterloo
Adjunct Professor, University of Guelph

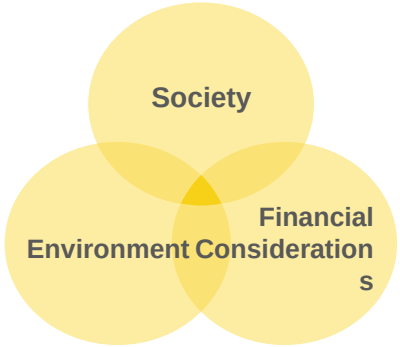
Beth Parker

Associate Director
Professor and NSERC Canada, Industrial Research Chair
University of Guelph, School of Engineering

Tom Sale

Associate Director
Assistant Professor in Civil Engineering
Colorado State University

THE SUSTAINABLE REMEDIATION FORUM - SURF



Mission Statement

"To establish a framework that incorporates sustainable concepts throughout the remedial action process that provides long-term protection of human health and the environment and achieves public and regulatory acceptance."

Sustainability considers the benefits to the Environment and Society and incorporates financial considerations

BACKUP RESEARCH THEMES

From University Consortium

THEME 1

Theme 1 – Site and Contaminant Characterization

1) Improved Methods for Characterization of Contaminated Sites
2) Behavior and Fate of Industrial Contaminants in Sand and Gravel
3) Behavior and Fate on Industrial Contaminants in Fracture Rock
4) Confining Beds (Aquitards) as Barriers to Contaminant Migration

Theme 2 – Impact of Migration

1) Impacts of Organic Plumes Discharging to Surface Water
2) Subsurface Migration of VOCs Impacting Indoor Air

THEME 3

Theme 3 – Remediation Technologies

1) In situ Technologies for Remediation of Contaminant Source Zones
2) In situ Technologies for Remediation of Contaminant Plumes
3) Assessment / Prediction of Remediation Outcomes

THEME 4

Theme 4 – Knowledge Translation and Transfer

1) Information and Technology Transfer To Regulatory Community

Publish research results in highly respected, peer-review journals, inform and Influence the regulatory community towards use of rigorous, highly credible science In the formulation and administration of regulations and guidance documents, Presentations et conferences, meetings and service on advisory panels and committees.