

Minutes of the 8th WCSB Meeting May 2nd, 2007, at Regina (SIR Host)

Attendees:

GSC-Ottawa:

Marc D'Iorio

GSC-Calgary:

Martin Fowler, Kirk Osadetz

National Energy Board:

Jim Davidson, Peter Budgell

AGS/EUB:

Kevin Parks

BC Ministry of Energy and Mines and Petroleum Resources:

Filippo Ferri

Manitoba Geological Survey:

Ruth Bezys, Michelle Nicolas

Northwest Territories Geoscience Office:

Len Gal, Adrienne Jones

Yukon Geological Survey:

Lee Pigage

Saskatchewan Petroleum Geology Branch:

Chris Gilboy, Arden Marsh, Melinda Yurkowski, Erik Nickel

Plains CO2 Reduction Partnership:

Jim Sorensen, Steve Smith.

The meeting commenced at 8:30 with a brief introduction and roundtable followed by:

1. Approval/modification of agenda [8:45 – 9:00]

Comments:

Martin: Mike Cecile developed a logic model a few years ago generated; pay to relook at it – are issues still the same?

Chris: suggested discussion about “industry day” be inserted in pm agenda; decision made to postpone discussion to next year.

2. Program Reviews/Updates (each jurisdiction) [9:00 – 11:30]

See the attached seven Powerpoint presentations, one for each jurisdiction (AB, BC, MB, NT, SK, YT and GSC; NEB gave a verbal report). ‘Highlights’ for each jurisdiction include:

GSC (Fowler):

There have been significant changes in Earth Sciences Sector management over last year including:

- New Assistant Deputy Minister: Mark Corey
- New Energy Business Line DG: Marc D'Iorio; geophysics, remote sensing geoconnections
- New GSC Calgary Director: Bill Reynen – 26 years experience (will start May 22).

Six projects in the Secure Canadian Energy Supply Program were initiated in 2005:

- Program Management Project (Martin Fowler)
- Mackenzie Corridor Pipeline Environmental Assessment (Ron Dilabio)
- East Coast Offshore Secure Energy Assessment (ECOSEA) (Sonya Dehler)
- Hydrocarbon Potential of Gulf of St. Lawrence and surrounding area (Denis Lavoie)
- Arctic Islands Hydrocarbon Potential (Keith Dewing)
- Unconventional Gas Assessment (Dave Hughes) – funding for coal-related activities has ceased, but the coal database needs to get out.

In 2006, four new projects were initiated:

- Groundwater and Energy Development (Steve Grasby)
- Uranium Resources of Canada (Charlie Jefferson)
- PANEC - WCSB (S. Foothills and Williston Basin) (Glen Stockmal)
- Mackenzie Corridor: Access to Northern Energy Resources (Bernie Maclean).

Secure Canadian Energy Supply Program update:

The program consists of investments in:

- Basin-resource assessments – conventional and unconventional (with emphasis on frontier and conceptual plays in conventional basins)
- Energy and groundwater (tar sands, CBM, geothermal)
- Resource evaluation and environmental studies of the Mackenzie Valley.

Emerging Issues:

- CO2 roadmap: Carbon Capture and Storage (CCS) taskforce announced in March 2007; CO2 sequestration recommendations workshop to be arranged
- EOR/CBM production – related to last issue
- Oilsands: a recent report listed 21 recommendations, including a request to accelerate aquifer mapping in Alberta
- Groundwater: protecting water supplies
- Geothermal energy
- Supply information is missing from emerging Energy Geoscience themes; future North American secure supply will most likely reappear on future agendas.

Major logistical issues facing GSC:

- Scientific Capacity issues:
- Demographics – 20% of GSC staff current eligible to retire
- Competitive job market
- Modest intramural renewal
- Difficult to find people for short-term contracts because of labour shortage
- Non-funding of CGMS and ramp down of funding from other government sources for basin analysis (e.g. PERD)
- Because of the above, future GSC Energy Geoscience work will have to be more tightly focused.

BC (Ferri):

Core activities are:

- Petroleum Geoscience
- Surficial and Aggregate Geoscience
- Northeast BC Hazards Mapping
- GIS and Spatial Analysis

- Core Facility
- Resource Development
- Environmental Stewardship

Conventional Oil and Gas:

- Refine resource assessments; regional and specific plays; identify high potential; promote exploration opportunities with new geoscience data and
- Increase tenure sales and production

Unconventional Gas:

- New Study - Regional Shale Gas Potential of Triassic Doig and Montney Fms, NEBC
- Upcoming: Cretaceous Shale Gas Potential
- Coalbed Gas (Barry Ryan)
- Shallow and Deep Gas (few studies on deep basin);

Other Related Initiatives:

- Interior Basins – Bowser Basin in write-up stage (partnership with the GSC); Nechako Basin to be looked at next, including geophysical data (also in partnership with GSC); linked to Mountain Pine Beetle Initiative and the need to diversify economy in central BC region
- Partnerships with GSC and AGS on: Interior Basins, Liard Basin, Resource Assessments, Coalbed Gas, and Surficial and Aggregate Program.

AB (Parks):

AGS program update for 2007:

- reborn again – once part of AEUB, now split again into 2 again – Energy Resources Conservation Board but does not expect a lot of changes.
- 26 geologists; 5 geological engineers (and more coming in), 5 computer/DB analysts, 3 GIS Professionals, 7 technologists 10 KM and OPG staff – benchmarks in the 70's and 80's there were around 125 people, lowest 28 in 90's 65-70 good number

Challenges Facing the AGS 2007-2012 include:

- Securing resources for field work
- Demographic change
- Recruitment and retention (does not want to compete with other agencies when hiring; there are pressures in hiring - currently there are over 800 bodies and the is at least 1 turnover each day (14% turnover rate)
- Organizational changes.

Comments:

- *Kirk:* how big is petroleum geology in Alberta government?
Kevin: About 90 people
- *Kirk:* do we need to represent them in the Western Canada Sedimentary Basin Working Group?
Kevin: They are currently more transactional rather than investigatory; the regulations from the 1970s need to be changed – when this is done, there will be more focus on geoscience
- *Kirk:* Shale gas – investigations around this topic and who does them are not known
Kevin: This research is not in-house right now as the focus now and over the past two decades has been on regulatory work, dealing with 20,000 to 25,000 wells a year; in 5 -10 years, it is anticipated that a more blended petroleum geology group will do more research work

- *Chris*: More about logging requirements for uppermost parts of wells?
Kevin: Gamma-ray logs must be run to surface and neutron logs from bottom of casing to 25 m below ground level; industry was supportive of these new regulations; logs come in paper and digital now.
- *Kirk*: More about samples?
Kevin: Samples are still taken from 2WS down; mudlogs do not have to be submitted; to look for shale gas, industry still has to wade through the tour sheets for comments
- *Martin*: Is the likelihood of taxing pore space in Alberta still a possibility?
Kevin: No – not sold pore space, just contents for future disposal puts barrier to CO2 Sequestration.

SK (Gilboy):

Geoscience Framework Projects (multidisciplinary regional subsurface mapping projects):

- IEA Weyburn CO2 Monitoring and Storage Project (Phase 1: 2000 to 2004; Phase 2: imminent);
- NRCan-Manitoba-Saskatchewan TGI 2 Project: Williston Basin Architecture and Hydrocarbon Potential (2003 to 2007).

We normally have 6 Senior Research Petroleum Geologists positions, but only three are currently filled:

- Fran Haidl, who handles the Lower Paleozoic and Heavy Oil
- Kim Kreis, who is looking after Devonian, Mississippian and Potash; Brines; Oil (southeast)
- Melinda Yurkowski, who is looking after Post-Mannville to base glacial cover and Unconventional Gas
- An ad for a vacant position should be out sometime next week, the incumbent will probably attend to Post-Mississippian to base Mannville strata and Oil in the southwest.

We normally have 2 Research Petroleum Geologists positions, but currently 4 are filled, so 2 will likely be promoted over the next several years:

- Erik Nickel looks after the Mississippian CO2 EOR and Storage; Oil (southeast)
- Arden Marsh who deals with the Mannville, Regional Geoscience Framework, and Heavy Oil
- Jeff Coolican, who is primarily involved in Geophysical Log Analysis and Regional Geoscience Framework
- Dan Kohlruess, whose primary function is Geophysical Log Analysis but will help with the Mannville Oil Sands (west-central).

We also have 2 GIS Technicians:

- Megan Opseth and Tyler Music.

Want to point out that the concept of CGMS helped us to obtain additional provincial funding in 2001-02, and we are grateful for that.

Comments:

- *Marc*: CGMS is a top priority within Federal government, and the Department of Finance is trying to find a way to deliver the funding
- *Chris*: Steve Whitaker has left, so Erik Nickel will be the main PGB staff member working on Weyburn Phase 2 – concerns about intellectual property have been

holding up the contract but it is now understood to be close to being signed by the major research participants

- *Chris*: TGI 2 has been in its final stages for about 1½ years; the delays have primarily been due to staff turnover.

MB (Bezys):

6 staff in Sedimentary and Industrial Minerals; their areas of primary focus are:

- Industrial Minerals and Aggregate
- Land-Use Studies
- Phanerozoic and Quaternary Mapping
- Petroleum Studies
- General Investigations

Stratigraphic and Scout Drilling:

- Five drillholes in west-central MB, in support of investigations for Mississippi Valley-type mineralization in, mainly, Silurian and Devonian targets

Phanerozoic mapping has included:

- Map preparation for TGI 2; field visit to Talbot Lake area to log minex core

Stratigraphic database (MSD):

- Continued updates

TGI 2:

- Williston Basin Architecture and Hydrocarbon Potential; the aim is to complete the project as soon as possible

Devonian Three Forks Formation study:

- Manitoba's latest petroleum success story is the Sinclair Field that produces from the Three Forks Fm. The Sinclair Field was discovered in 2004; the field area exceeds 32 000 hectares; Est. reserves are around: 6.8 million m³ and the field is still growing. The purpose of study is to better understand the Fm's deposition and cycles, and identify new areas for Three Forks oil potential – observations so far: Best potential lies in an area where the fm is thickest; Trapping is a subcrop stratigraphic play with fault control during deposition, erosion and diagenesis. Future exploration sites identified to date: include north and south of Sinclair Field along the MB-SK border and along the eastern boundary of SBZ. The report and maps will be available early 2008.

3D Phanerozoic model of southern Manitoba and Saskatchewan for TGI 2

Comments:

- *Kirk*: With Michelle completing work in Sinclair, any plans to look along subcrop to view any other potential, e.g., the Lodgepole or the Silurian?
Ruth: had not considered it.
Kirk: Advantages can be seen in the shallow depths (and therefore lower costs) and more crown land would be available

Yukon (Pigage):

The survey is the primary collector and compiler of Geoscience in Yukon; since 2003, clients include industry/other government agencies public, First nations.

Just new into oil and gas – provide information to regulatory group.

Yukon Digital Surficial Geology Compilation:

- 80% of Yukon covered in over 150 surficial maps – maps scanned and geo-referenced; next Step – create a common legend

Southeast Yukon:

- Central Foreland: driver:NATMAP publishing GSC maps & YGS maps and bulletin-ArcGIS
- Toobally: incorporating into YGS bulletin
- Otter Creek: mapping project started 2006
- Revise Liard: resource assessment - 2007/8 ?

Whitehorse Trough:

- Seismic line interpretation – preliminary published 2005
- Mesozoic stratigraphic studies – 2006 final field work
- Volcanology studies - ongoing
- Geology mapping – 2006 final field work
- Revised resource assessment – 2007/8

North Yukon:

- Eagle Plain – subsurface – Larry Lane
- Peel Project; Devonian Tuttle Fm/resource and reservoir potential; revised resource assessment – 2009
- Bonnet Plume: reconnaissance for new project on stratigraphy, sedimentology, coal

Land Use Planning:

- Required by land claims settlements with First Nations coal
- North Yukon area and Peel watershed
- Incorporates forward projection of infrastructure, job opportunities, total footprint
- Will look at thresholds.

Mackenzie Valley Pipeline:

- Intervention to prevent stranded resource
- Has a tremendous socio - economic impact (not environmental footprint so much)
- Comments: *Martin*: Alaska pipeline will most likely happen before Mackenzie.
Lee: a separate study group for this

Regulatory Changes:

- Proponent-driven selection of land for dispositions; first request for areas of interest has been completed; now in public input stage
- YESAA environmental permitting; Yukon Environmental and Socio-economic Assessment Act; must include cumulative effects analysis
- Natural Gas from Coal regulatory framework in review

Comments:

- *Adrienne*: Comp review - change from old system?
Lee: Call for nominations, then public consult, then release of maps, then call for bids
- *Chris*: level of staffing and issues about retention?
Lee: 30 geologists and support staff; not specialized in oil and gas; work assignments depend on who is available – work back and forth on minerals, oil, and gas

- *Kirk*: Mackenzie pipeline re-evaluate test Eagle Plain?
Lee: Have heard nothing.

Northwest Territories (Jones):

We are akin to a provincial-type geological survey with about 20 geologists and 10 support staff (including librarian, IT support and GIS technicians).

Have a unique structure in that all government geologists in Yellowknife, whether territorial government or federal, work together in one building which we occupied in 2002.

Program areas (programs made along geological sub-discipline lines, not along employer lines):

- Minerals and Bedrock Mapping
- Petroleum Geoscience (6 people)
- Geomatics and IT
- Information Services
- Outreach
- Resource Assessments.

NTGO Funding Sources:

- GNWT ITI & INAC A-bases
- Resource assessment funding – PAS support
- Diamond research funding (shared with Nunavut)
- Sunsetting funding (05-09) includes Energy MC III – Peel Petroleum Project support (salary, O&M - guaranteed over 4 years)
- Strategic Investments in Northern Economic Development (SINED) – bedrock mapping, geophysical surveys, mineral deposits research, etc. (\$2 million)
- Polar Continental Shelf Project – field logistical support.

Minerals and Bedrock Mapping Group (petroleum now on par with this group):

- Regional bedrock mapping
- Mineral deposits studies
- Diamonds and gemstones
- geophysical surveys*
- Related studies with partner organizations (GSC, universities, etc.)
- Database compilations (e.g., *KIDD - Kimberlite Indicator and Diamond Database*).

Petroleum Geoscience Group:

- 7.8 billion now 16.2 billion – pipeline costs have changed through its history
- Regional-scale basin analysis
- Petroleum systems studies
- Stratigraphy and sedimentology
- Data compilations and interpretations
- Resource assessments and pipeline route permafrost monitoring (GSC).

Resource Assessments Group:

- Qualitative and quantitative resource (mineral and petroleum) assessments for candidate areas under the NWT Protected Areas Strategy and for informed land use planning decisions
- GSC *PETRIMES* method for petroleum assessment
- Assessments are required for *permanent* land withdrawals
- State-of-knowledge compilations and field-based geochemical surveys.

Geomatics and IT Group:

- GIS-based field mapping (Pocket PCs) since 2000; used by Peel in 06 (mixed results with measured section work, but great for traversing, sample collection etc.).

Information Services Group:

- Gateway - online access to digital information
- NORMIN - online access to mineral showings and references
- Distribution of NTGO publications
- Scientific editing
- NT GoMap: an advanced web-based GIS application launched April 2007.

Outreach Group (2 outreach-dedicated geologists with a proactive program; not an afterthought):

- Road guide to Dempster Highway – to be shown at CSPG this year
- Geoscape poster major deliverable this year
- Most projects identify outreach products as deliverables.

NTGO-supported Conferences

- *GAC-MAC Annual Conference*: Yellowknife, May 23-25, 2007, ~300 delegates expected; coincides with International Polar Year
- *Yellowknife Geoscience Forum*: Yellowknife, November 20-22, 2006, 800+ delegates annually

NEB (Davidson):

NEB has two groups:

- Northern – Brent (working with NWT, YT and GSC on stratigraphic tops correlation projects and other preparatory work for resource assessment; 2 new geophysicists recently hired to work in this group)
- Southern – with a new geologist – Peter Budgell – new to the O&G Board
- New report – overview of HC development and economic analysis
- Conventional gas in Saskatchewan assessment – will be meeting with Steve Rymes on Friday
- Resource assessment on to be done on CBM in Alberta with EUB and AGS – currently road blocked as EUB wants more data, so not much done
- Possibility of reassessing conventional oil in Williston Basin as a partnership between GSC, SIR, and NEB.

Challenges facing NEB:

- Demographics – 5 geoscientists of whom 2 are approaching retirement (and difficult to hire more in current job market)

Comments:

- *Ruth*: Williston Basin date?
Jim: possible release in 2010
- *Kirk*: Joint resource database successes; move to other areas?
Jim: Have done joint work in Alberta and BC, but not yet in SK.
Kirk: Undiscovered resources provide leverage potential – there were some resultant discoveries in SK years ago, but the assessment work stopped, probably due to GSC re-organization
- *Kirk*: Impetus to re-evaluate Mackenzie and Beaufort?
Jim: We're looking at re-examining;

- *Kirk*: CAPP dropped carrying any reserves that were not consistent; outstanding contradictions maybe an impediment
Jim: NEB needs to set priorities
- *Kirk*: We need to have commonly acknowledged reserve base
Adrienne: need more of a feel of what Dale Issler has
Kirk: never done reserve numbers; relied on NEB fed agencies
Adrienne: can use the geology
Kirk: no-one else is doing it; glaring contradictions between boards and pipeline proponents without a common reserve base how do you provide an advantage assessment.
Jim: re-organized needed but where is the priority;
Kirk: Can't see a higher priority; Giles Morrel does not do reserve calculations – NEB's INA regulators with NWT, Indian and Northern affairs.

3. Summary of progress on the Structural Compilation ('Faults') Project for the WCSB, with participation from AB, MB, SK & BC (by Parks for AB, Marsh for SK, and Nicolas for MB) [11:30-12:15]

See the individual PPTs attached for two (AB, SK) of these three presentations (no slides for MB).

Lineament Study of the WCSB in AB (**Parks**):

- Compilation of faults in the WCSB loosely sponsored as 'a good thing to do' by people at the table
- Hampered by lack of resources to acquire seismic, so difficult to get a picture at a glance about subsurface framework; whether lineaments are real or not is not evident as interpreted structures are not based on seismic information.

Lineament Study of the WCSB in SW Manitoba (**Nicholas**):

- First phase of compiling a structural database of MB's Phanerozoic and Sub-Phanerozoic linear structures in SW MB is nearing completion. This phase has involved the identification of documents containing figures and maps showing lineaments of all or part of the province. So far over 60 documents, generated between 1957 and 2006, that depict one or more lineaments have been inventoried. These lineaments include Precambrian and Phanerozoic faults and shear zones, Gravity linears, Magnetic linears, Photo and topo lineaments (such as escarpments), and miscellaneous lineaments including domain and lithologic boundaries and unconformities.
- Most of the documents containing MB lineaments are publications produced by federal and provincial geological surveys and papers in various journals and periodicals. Some of these documents are MB Mines Branch Assessment files. Next phase is to digitize into ArcView shape files and add attribute data

Lineament Study of the WCSB in SK (**Marsh**):

- Short staffed, pushed to limits with conferences
- SK has cross-border continuity
- Need for BC to provide some input into stratigraphic data.
- Dinu has databases and is working with them.
- Database is now consistent with coding – 8 digit code.
- Divestco is doing the same thing – trying to build an interprovincial database and is struggling.

- Andrew Nimegeers wrote an SOI paper in 2006 and noted that a number of lineament zones have multiple lines.

Questions to be answered:

- Where to go from here once initial compilation done – is it feasible to have an end?
- It is very relevant to industry – eg – production away from subcrop along trends.

Comments:

- *BC*: Nothing down
- *Steve*: Long term? - characterize compilations?
Chris: At this time simply a compilation
Arden: How valuable is enumerating importance of lineaments on a 1 to 5 scale? Difficulty in assigning values based on geophysical well logs, as very little seismic information. The question becomes “How do you assess and can you take it further?”
- *Kirk*: Until bibliography and compilation are complete, it’s difficult to ascertain importance of, e.g., Sinclair along Brockton-Froid – what is the significance of the trends? We can use seismic documentation – any type of anisotropy of permeability due to fault trends.
Kevin: Visual bibliography – deciding on relative importance is up to the interpreter – could provide initial power at a hearing as information has been reported; first step is getting the information together – it shows a complicated picture and raises questions about why lineaments are interpreted to be where they are
Kirk: It is a misconception that the WCSB and Williston Basin are undeformed – e.g., Avonlea’s vertical dipping beds; and problems encountered especially during injection and storage; permeability and porosity differences might at times be helpful in lineament determination
- *Steve*: Will well locations be a layer?
Arden: Not yet – but they could be
- *Steve*: Knowing lineament-zone locations is important in assessing risk associated with CO2 EOR and storage in ND
Chris: In the Weyburn Project, identifying lineaments was considered to be very important; the scale of information differed though, with one area covered in detail using several methods, others covered broadly. Ian McIlreath with Encana has emphasized this to be a most useful product
- *Kevin*: Inter-provincial agreement about many lineaments suggests they are real
- *Kirk*: Interesting to note the relative absence of mineral production from the essentially undeformed part of the Western Canada Sedimentary Basin – yet in the NWT, there is the Pine Point Pb-Zn deposit, and the Cordillera has lots of growth on the mineral side
- *Martin*: Time frame?
Chris: Once the product is out, we’ll have to keep it up to date
Adrienne: 3-year closure was decided at last years meeting
Kevin: Closure not likely – it will be ongoing
- *Ruth*: How do we present this lineament information?
Kirk: There has been good progress on this project in spite of pressures; maybe it could be modeled after Wikipedia; get it up and running and make it available so that it can be added to as more information becomes available (e.g., when idea first discussed, suggestion made to try to motivate industry to provide seismic information that documented faults; provinces can continue to populate the map, and industry could eventually add information, and maybe even take over populating the map with lineaments, but with our agreement

- Kevin:* How to make a digital atlas and deal with intellectual property? moving to a different environment will require a collaborative effort – at leisure we can start adding details; perhaps we can address these issues in p.m..
- *Adrienne:* NWT would like to be a part of this – it has a great implication – how do we jump on board?
Chris: Dinu and Arden could be main contacts
Adrienne: Dinu has been contacted – NWT to look at next fiscal year.
 - *Kirk:* Industry very receptive – value added to industry especially in the NWT
Kevin: If you have better information, need to share it if industry has regs issues
Peter: Has this been presented to industry?
Kirk: Encana, potash industry etc. have shown universal support – and acknowledge it is too large a topic for individual corporate work.

4. Provincial (AB, BC, SK, MB), State (ND) and Federal (GSC TGI) contribution to Climate Change Initiatives, including Plains CO2 Reduction Partnership (PCOR) – presentation by SK (Erik Nickel) and EERC (Jim Sorenson, Steve Smith) [1:00 – 1:30]

The reader is referred to the appropriate PowerPoint slides

SK (Erik Nickel):

IR's role is to extend eastward from Encana's Weyburn Pool to Apache's Midale Pool; the project is abandoning GOCAD and will be using Petrel

AB:

Pennwest has five wells in this EOR CO2-flood project, which is being monitored, but not seismically at present; characterization of geological framework (AGS involved); Pennwest has seen some break through; and there are some thief zones; royalty tax credits in effect; trucking food grade CO2 to the site.

Province is carrying out acid gas studies at relevant operations to identify problem sites – reviewing processes.

BC:

Delineation of potential areas and point sources – really in the initial stages.

MB:

Mineral Resources has funding for an engineer to examine potential for CO2 EOR and storage; Kirk wondered if sufficient depths are reached by any producing pools as about 1000 m needed for CO2 to become super-critical.

EERC (Jim Sorensen):

Overall, US divided into seven partnerships looking at potential for storing CO2 in the nation's sedimentary basins

When originally submitted, the ND-and-area proposal built around Williston Basin; DOE was cool to using Canadian data, but Weyburn experience important asset in Phase 1 kick off as Canada was quite far ahead at the time in terms of CO2 sequestration; Bachu brought EUB on board and then BC also joined the Plains Partnership

Phase II of PCOR has 60 members (Phase I did not include Nebraska nor points south); research is primarily based on geology and performing field-validation tests that develop

Measurement, Monitoring and Verification (MMV) protocols, regional sequestration strategies, best separation/source matches, regulatory and permitting strategies, environmental benefits and risks, and information needed to monetize C credits. Phase II also involves the restoration of wetlands to aid uptake of carbon, and the collaboration of state geological surveys to resolve stateline faults. Operators are trying to get hands on CO₂ for EOR, so putting CO₂ into saline aquifers seems pointless now but will be needed in future when EOR usage dies. Phase II program comprises a single demonstration project focused on EOR, a saline aquifer disposal in Canada. The 10 year program has a \$67 million budget for one project, with 2 smaller projects costing \$4-5 million, then ramp up to Phase III

EERC - ZAMA (Steve Smith):

Zama Field Validation Project:

Putting acid gas (both CO₂ and H₂S) from gas processing plants into a pinnacle reef; H₂S included as there is no market for sulphur at this point. Currently, the composition of the injected product is ~ 70%CO₂, ~ 30%H₂S - ~24 tonnes/day, matching the voidage in the reservoir.

AGS is handling the geological characterization of the field:

- Isolated system, although there is an underlying aquifer (not being penetrated)
- Variable permeability/porosity
- Capacity for CO₂ is 1M metric T
- Extremely heterogeneous complex pinnacle reef
- Geomechanical work being done to prove caprock sustainability (will it fracture?)
- Sampling programs set by EUB

There has been no breakthrough so far (i.e., no production of CO₂). Goal is to establish Best Management Practises (BMP) for MMV.

Comments:

- *Kirk:* Why was producer well placed so low? Might this not lead to early breakthrough?
Steve: Apache would have best answer
- *Kirk:* Are there any benchtop miscibility studies?
Steve: Already done at U of C and U of R
- *Kirk:* What percentage of injected fluid is missing?
Steve: Not known
Jim: Tests are to be done
- *Martin:* What does the H₂S do?
Jim: Looking at our experimental tests, H₂S lowers miscibility pressure in the whole system
- *Kirk:* What is possible future of the program?
Steve: Nine reef pinnacles to start the program (currently at #4), with another 9 to 15 planned
- *Martin:* Any comments about the economics?
Jim: Don't have to process H₂S
Kirk: The large capital cost at point source to meet injection standards is cut down if H₂S from plant is used
Steve: Some issues with asphaltenes with wax dropping out in pipeline at surface; want to resolve the problem without heating the line
- *Martin:* Canadian government's roadmap is posted on the web; outlines what the federal government sees in terms of capture and storage Report on CO₂ capture and movement through western Canada – want to solve problem of CO₂ capture in tar sands by 2038
Jim: Many partners involved with tar sands wanted somewhere to store CO₂, not use it for EOR; looking for saline aquifers as nearby operations are too shallow

- *Kirk*: CO₂ should be resource not pollutant; incremental oil recovery of conventional oil alone could double reserve lifetimes with a 17:1 energy O/P to I/P (strongly contrasting with current 5:4 in tar sands)
Martin: studies in US to convert CO₂ into methane using methanogens (also at Medicine Hat).
- *Kirk*: SaskPower planning plant with CO₂ sequestration stream
Martin: Cleanest power plan going in east of Calgary (Enmax) announced two weeks ago – zero CO₂ emissions from plant are anticipated
Kirk: Important to manage excess heat
- *Martin*: PCOR as well as Bill Reynan and the GSC want to be on top of the CO₂ storage issue
Jim: Having utility companies at the table with their different interests helped him to understand the issues (e.g., of the need to remind decision makers that geology is complex and has to be studied)
Kirk: Focus of this group
 - 1- Communicating opportunity if CO₂ is significantly increased
 - 2- Geological opportunities – position CO₂ as a resource – no-one thought of taking such small reservoirs as Zama and using them
 - 3- Assessment of risks: e.g., understanding the top seal integrity – controlling capacity for sweep – if oil pressures lower then mechanical pressures then can manage increase size.
- *Chris*: CO₂ storage with EOR reduces the net reduction of CO₂ emissions because of the hydrocarbons being produced; this is not generally pointed out.
Jim: Net effect is negative to the atmosphere; another positive view is that CO₂ EOR is a bridge to getting to saline-aquifer sequestration. CO₂ storage in oil pools generates an infrastructure (perhaps including a system of Carbon Credits) that can later be used put CO₂ into aquifers.
- *Chris*: Is PCOR developing an aquifer-injection project?
Jim: not at liberty to say – under negotiation.

5. Review of Progress

Structural compilation and possibility of Western Canada Sedimentary Basin Atlas Update

How do we manage the web-based WCSB structural compilation?

Kevin: once it's done (shape files etc.), each jurisdiction hosts their own version, but there needs to be one portal for all data so user does not have to go looking for it (i.e., need a collaborative workspace which grows as necessary – similar to the 4-dimensional atlas that CGMS might use down the road)

Kirk: What about combining somehow with the WCSB Atlas?

Kevin: Intellectual property is a question - WCSB Atlas is an AGS – CSPG publication (1994); may be legal implications if more is changed than the Atlas's digital form; inclusion of new primary data may be problematic; as far as chapter copyrights go, the authors surrendered any ownership prior to publication; some data can be used but a major re-write overall is about due.

Kirk: Is it more efficient to start at ground zero? Based on the WCSB Atlas experience, it would likely take about 2.5 years to assemble contributors so it might be easier to prepare a letter of release to get the Atlas's funding partner (CSPG) to surrender copyright

Kevin: The structural compilation is a new contribution – perhaps release as a single product?

Kirk: First seek copyright surrender as it is very difficult to get industrial volunteers

Kevin: CSPG want to do this. AGS has started the process.

Martin: What about the NWT? North of 60 needs to be addressed. CSPG has an appetite and may not release co-ownership; we are not advocating a complete re-write

Chris: The Saskatchewan component certainly has a lot of new data that could be incorporated

Kevin: Do we as a group want to engage the CSPG as a part of this to help them reach a decision?

Kirk: Do we have the capacity? - GSC probably doesn't

Martin: Maybe we should take this on through this Working Group

Kirk: The atlas is possibly the finest of its kind in the world

Chris: needs updating but original is good

Kevin: What is the vision here – a Single product available on everyone's website with each jurisdiction on their own? Current versions would have to be date stamped.

Ruth: MB TGI took the lead – did not want to go through MB government – completely independent of government policies. AGS can host if they want to but can revisit this later. As far as MB/AB data are concerned – put up whatever changes wanted; shouldn't be a problem. The message for Dinu, Arden and Jim is: Get something up as soon as possible.

Adrienne: We need to be realistic about what we can do. Are we spreading ourselves too thin? This is our 8th year. Can we start with a web site with a history page. Do we want to do it?

Chris: If Kevin and Adrienne could work on a website, we could all feed into it; AGS could set up a link from the website to the Structural Compilation

Martin: Mike Cecile emeritus keen to work on it – should talk to him first

Adrienne: NWT is prepared to set up a beta site (ghostsite)

Kirk: Joint planning needed to maximize efforts - provide links to website use it more as a portal than as a main site for results

Adrienne: If have website that shows how we work together then can sell upwards

Kevin, Adrienne: We should follow up on the idea of having coordinated marketing joint pavilion or co-placement at conventions such as CSPG.

Kirk: Funding might be a problem.

6. Conclusions and Discussions

1 – Structural Compilation:

AGS to co-ordinate online access with initial output from MB, SK, and start up with NWT, YK(?) and BC. What is the timeline? AGS to start immediately using distribution list to inform

2 – WCSB Working Group Website:

Preliminary design by NWT. What is the timeline? Beginning in July, design logo; use distribution list to circulate preliminary versions for feedback

3 – CSPG 2007, 2008; NAPE:

Continue to have booths close together (block if possible) at 2007 CSPG; each jurisdiction with a booth might identify itself as a member of WCSBWG and show the Group's mandate and the logic diagram; at the 2008 CSPG, a talk will be prepared about the Structural Compilation Project and each jurisdiction will also present core displays. At NAPE, try to get some information out about WCSBWG.

4 – WCSBWG Industry Day:

Hold this in conjunction with CSPG 2008 Core Conference:

- Lunch session at GSC building or ARC – recommendation to be made to GSC’s incoming Calgary Director
- To be organized by GSC; a WG member to speak on each of the themes (one member per theme for about 15 minutes each):
 - o Structural compilation
 - o Programs
 - o Geological storage of GHG
 - o Raise need for federal support of energy geoscience
- Each jurisdiction to prepare 2-3 displays; who does what will be decided in November – early December)

5 – Ninth WCSBWG Meeting, 2008:

MB to host WCSBWG meeting next time; not around CSPG; in Winnipeg next June; half-day field trip - TBA

6 – Inter-Jurisdictional Knowledge Transfer Opportunity:

- Possibly job-shadow for one week to one month provided office space sufficient
- Prepare Staff expertise database showing major and minor areas; an Information Directory showing “go-to” people would be useful
- Compare capacities and staff-retention strategies

Martin: GSC is planning a 2- to 3-day workshop to transfer Resource Assessment Knowledge; will be run by Peter Hannigan

7- Getting Geosciences and Energy Issues onto Political Agenda (e.g. at Energy Ministers’ Conference):

- NGSC tends to report just to Mines Ministers’ Conference and tends to focus on mining-related issues
- The political perception is, essentially, that oil companies are rich and can carry out their own geoscience research
- PDAC really pushes industry hard – CAPP does not push
- Provincially are we generally well heard – e.g., SK has good political backing right now
- Half the jurisdictions at the Energy and Mines Ministers’ Conference have split portfolios (i.e., 1 energy minister, 1 mines minister) whereas the other half have a single minister for both energy and mines
- At the Industry Luncheon, CSPG 2008, invite key people and raise this issue
- Pembina Institute is the energy equivalent of the Frasier Group in mining – perhaps look at cultivating a relationship

Kirk: How do we try to change the current status quo?

Suggestions: Keep in touch with political decision makers; WCSBWG could be a catalyst; there is a substantial tendency amongst politicians to view resource exploration and development as a technological issue rather than geoscience.