Education initiatives

- From 2009, a new 2-year Masters program “MEngSc (Petroleum Engineering)” to allow students to take a one-semester industry project

- Next year, we will operate the Masters programs on a semester basis, with lectures in the afternoon sessions from 3 to 6pm. This allows engineers in industry to take the Masters program on a part-time basis. For further info, please call or email Akim. The program starts last week of February 2009, and enrollment commences from November, 2008

- If you want to take a Masters but you are not formally qualified, the 6-month Grad Certificate in Chem Eng is a bridging-course starting at the end of July each year, completion of which provides entry to the Masters course [www.handbook.curtin.edu.au/courses](http://www.handbook.curtin.edu.au/courses)

- New Online Masters Program in Partnership with PetroSkills. We have joined forces with Global Training Alliance, PetroSkills LLC to deliver a part-time and online Master of Technology (Petroleum Technology) program to people working in the oil and gas industry. In partnership with Shell, we continue to operate a Master of Technology program for Shell employees. Visit [www.mtechpt.curtin.edu.au](http://www.mtechpt.curtin.edu.au/) for more information

Research initiatives

- We have won a research contract with Petrobras to build an ultrasonic modelling system which will simulate 4-D over models of producing fields, and to educate tomorrow’s students at UENF university in 3D seismic

- We are building a new polyaxial research laboratory to simulate bore-hole problems. External stresses will be up to 50 MPa with pore-pressure up to 21 MPa

Future plans

- Tele-teaching, in which we collaboratively teach students at UWA via video-conferencing, is on track to start next year

- We are developing a B Eng (Pet Eng) degree in consultation with our Industry Advisory Committee (IAC) for operation at a future date. The next IAC meeting to discuss our progress is on 25th November, 2008. We thank all our IAC members for their continued support

We congratulate PhD student Matthew Flett on the award of his PhD. Please see the Technical Paper by Dr Matthew Flett over page.

Any comments- please contact Brian on b.evans@curtin.edu.au
Course enquiries- contact Akim on 9266 7703 or a.kabir@curtin.edu.au
Administrative enquiries- Lisa on lisa.smith@curtin.edu.au
Core flooding enquiries- Ali on saeedia@gmail.com

Keeping the COGS oiled with Curtin Petroleum Engineering- the Good Oil
**Technical Paper**

**Subsurface reinjection of Carbon Dioxide: Influence of Formation Heterogeneity on Reservoir Performance**

**Graduate PhD student: Matthew Flett** matthew.flett@chevron.com

**Background:**
Injection of CO$_2$ into deep saline formations is a viable methods of reducing anthropogenic emissions of CO$_2$. The role of subsurface CO$_2$ trapping mechanisms; such as dissolution and residual gas trapping was evaluated via multiple reservoir simulation models. Formation heterogeneity was varied in reservoir simulation models to evaluate the impact on the migration of an injected CO$_2$ plume and whether the degree of heterogeneity impedes or accelerates the immobilisation of injected carbon dioxide via trapping mechanisms.

**Findings:**
The degree of formation heterogeneity has a significant impact on the subsurface behaviour of injected CO$_2$. Increasing the tortuosity of the migration flow path can progressively inhibit the vertical flow of the plume whilst promoting its lateral flow. The increase in tortuosity of the migration pathways results in increasing the residence time for CO$_2$ in the formation. Ultimately, less CO$_2$ is likely to collect under the formation seal in heterogeneous formations, due to increased reservoir contact and long residence times, thereby reducing the risk of seepage to overlying formations.

Figure 1 shows cross-sections of reservoir simulation models showing porosity. Each has 70:30 Net-To-Gross ratio but different shale lengths (100, 300, 1000, 3000m).

**Conclusions**
- Given sufficient permeability for economic injection of carbon dioxide, then low to mid net-to-gross heterogeneous saline formations with lengthy intra-bedded shales are desirable for geological disposal.
- Detailed reservoir characterisation of any potential geological disposal saline formations is required in order to accurately predict the range of outcomes in the long term flow characterisation of injected carbon dioxide into those formations.

In Figure 2, gaseous phase CO$_2$ plume with 70:30 sand to shale model of 300 m shale length for 50 and 1000 years.

In Figure 3, development of the gaseous phase CO$_2$ plume in 70:30 sand to shale model of 3000 m length for 50 and 1000 years.

Fig 1. Cross-sections, 100m and 3000m shale.

Fig 2a) 50 years, b) 1000 years

Fig 3a) 50 years and b) 1000 years.

*Keeping the COGS oiled with Curtin Petroleum Engineering- the Good Oil*