GexCon
A company in the CMR Group

MINUTES OF MEETING

Meeting : **FLACS USER GROUP**

Venue : **TotalFinaElf, Paris**

Date : **11. October 2001**

Prepared by : **Ole Jacob Taraldset**

Participants:

Olga M. Slyngstad	Aker Engineering
Kari Frederichsen	Aker Engineering
Trond Svendsen	Aker Engineering
Chris Savvides	BP Amoco Ltd.
Vincent Tam	BP Amoco Ltd
Douglas W. Hissong	Exxon Mobil
Pierre Foisselon	Gaz de France
Vincent Sauter	Gaz de France
Christophe Bretin	Gaz de France
Claude Lelievre	Gaz de France
Idar Storvik	GexCon AS
Jan Roar Bakke	GexCon AS
Ole Talberg	GexCon AS
Ole Jacob Taraldset	GexCon AS
Olav Sæter	Hydro ASA
Abdelhamid Nazih	IPSN
Emmanuel Faroux	Rhodia
Solveig R. Ryum	Safetec
Rune Johnsen	Safetec
Jo Wiklund	Scandpower
Jens K. Holen	Statoil
Henri Tonda	TotalFinaElf

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Sandra Nilsen	Hydro ASA
Jan A. Pappas	Hydro ASA
Kjetil Kristoffersen	Hydro ASA
Bernd Broeckmann	Inburex
Jason C.S. Kao	ITRI
Jan Terje Birkeland	Lilleaker
Øystein Palmgren	Lilleaker
Lars Bak	Lilleaker
Ingar Fossan	Scandpower
Karl O. Ingebrigtsen	Scandpower
Bjørn Hekkelstrand	Scandpower
Svein-Tore Sivertsen	TotalFinaElf
Martyn Ramsden	Vectratech
Gary Walker	Vectratech

1. Welcome
Olav Sæter (Hydro) welcomed to the meeting. DNV apologized for not being able to attend.

2. Adoption of Agenda
"FLUG-governed development of FLACS and utilities" were removed form the agenda and Jan Roar Bakke had a new presentation on "Effect of geometry representation and model improvements on FLACS explosion load prediction". The agenda was then adopted. It was noted that there would be no presentations by FLACS users.

3. Minutes of previous meeting
Olav Sæter went through the previous minutes of meeting. Chris Savvides, BP pointed out



that his comment about the FLUG-governed development of FLACS was not included. Olav Sæter, Hydro pointed out that his comment about the lower flammability limit for hydrogen in FLACS was missing. GexCon agreed to publish revised minutes (available on FLUG web site).

4. Actions

- FLACS validation report on FLUG web site: 1 December, 2001
- Validation of ventilation graphs should be delivered together with minutes of meeting from last FLUG meeting (110501). After the meeting GexCon found what we believe are errors in the test results and we are currently waiting for a verification. FLUG will be informed when the work is finished and possibly published.
- GexCon to give out complete list of CMR FLACS reports. GexCon will see if the reports of interest to FLUG can be published on web site. The list will be made available on the FLUG web site.
- GexCon to inform FLUG about any changes to the FLUG web site.

- FLACS guidance documents to be published on web site.
- FLUG-wishes list on web site.
- Put more emphasis on "Presentation by FLACS users". Reminder email to be sent out 1 month prior to FLUG meetings and list of presentations 1 week prior to meetings.
- Jan Roar Bakke, GexCon will may hold a presentation on P36 next FLUG meeting.
- Next FLUG meeting: 3rd of May, 2002 in Bergen, Norway
- Possibly FLUG dinner on 2nd of May, 2002. Invitation will be sent out together with invitation to FLUG meeting.

5. Presentations by GexCon

5.1 FLACS update release (FLACS 99r3), Idar Storvik

Idar Storvik gave and presentation about improvements in FLACS 99r3 compared 99r2. These includes:

- Improved stability of numerical schemes around leak points
- Corrected monitor output of pressure impulse
- Additional safe-guards and diagnostics in the code
- Guidance-notes on dealing with instabilities
- Porcalc: improved numerical accuracy in Linux version
- Flowvis: Fixed crash

FLACS99r3 to be delivered Monday 15 October 2001.

Comment Olav Sæter, Hydro: There has been no action on FLUG wishes and no new features in Flowvis or CASD for the last couple of years. Idar Storvik: There will be a new version of FLACS next year or maybe the year after. FLACS for Windows NT will have a new version of CASD which also does post-processing and Flowvis will be removed[1].

Comment Chris Savvides, BP: CASD 5.0 is not useful as it is to slow with large geometries.

Comment Olav Sæter, Hydro: Is there any differences in results from FLACS 99r2 to FLACS

1 At the time of writing the minutes of meeting it looks like Flowvis may be kept in addition to the new post-processing capabilities in CASD.

99r3? Idar Storvik: Only very small differences observed.

5.2 Validation of ventilation by offshore test, Jan Roar Bakke

Jan Roar Bakke gave a presentation about a study performed at GexCon where FLACS ventilation simulation results were compared with results from offshore measurements. The presentation is available on the FLUG web site.

Comment Olav Sæter, Hydro: CASE A are blind predictions performed with FLACS.

Comment Henri Tonda, TotalFinaElf; The wind only travels about 20 meters into the geometry.

There is less scatter in both velocities and directions in CASE B that for CASE A.

Comment Solveig Ryum, Safetec: The living quarter is usually located upwind. This means that FLACS can have problems.

Comment Jo Wiklund, Scandpower: Scandpower use FLACS for Wind Chill Index (WCI) calculations. Uncertainty in FLACS results are larger than the difference between results and accepted upper limits for WCI.

5.3 Oil mist modeling, Idar Storvik

Idar Storvik gave an presentation on the oil mist modeling which GexCon is developing for use in future version of FLACS. The presentation is available on the FLUG web site.

5.4 FLUG-governed development of FLACS and utilities, Jan Roar Bakke

Jan Roar gave an explanation on why this topic had to be deferred to a future FLUG meeting. GexCon are in negotiation about the future ownership of FLACS and are considering different ways to finance future development of the program.

5.5 Effect of geometry representation and model improvements on FLACS explosion load prediction, Jan Roar Bakke

Jan Roar gave a presentation about the effect of geometry representation and model improvements on FLACS explosion load prediction. The following is a list of the FLACS version:

- FLACS-86 First version
- FLACS-89 Gas dispersion models introduced
- FLACS-93 New combustion model, higher order numerics
- FLACS-94 Waterspray, far field blast
- FLACS-95 Improved ignition model and user interface
- FLACS-96 Inert gases in fuels, flashing liquids
- FLACS-97 First to take advantage of full-scale explosion test results
- FLACS-98 Calibrated against the second programme of full-scale test
- FLACS-99r2 Improved turbulence and combustion models

Conclusion: FLACS-86 vs. FLACS-99r2 gives approximately 3 times higher overpressures.



The geometry representation (the amount of geometry included in the model before a simulation is run) is the most important factor.

6. General discussion

- Henri Tonda, TotalFinaElf, had some comments to his presentation on the QRA workshop on the previous day.
- A discussion about a recent explosion on the Danish continental shelf
- Jens Holen, Statoil, suggested that some tests concerning re-circulation behind geometry were performed. Test results are available.