39th ISCWSA Meeting – Long Beach, CA - May 9, 2014

Introduction

(Pete Clark)

- Safety moment
- Highlighted purpose of the SPE Wellbore Positioning Technical Section, as well as the ISCWSA mission
- Introduced committee members and website links
- Angus Jamieson gave a tribute to Dave McRobbie, who passed in December
- Covered the schedule

THUMS Field - The World's Greatest Collision Avoidance Challenge

(Jason Mena & Julien Roubaud)

- Wilmington Oil Field in LA Basin is the 5th largest oil field in the contiguous US
- THUMS are 4 manmade oil producing islands in long beach harbor, producing oil and natural gas
- Subsidence led to prohibition of offshore development; water flooding as a technique to prevent subsidence led to the lifting of the ban
- THUMS is an acronym that stands for the 5 operators that started THUMS
- 10,000 acres (approx. 15 square miles); the offshore portion contains 2,991 wellbores from 1,697 wellheads. Wellheads are 6 ft center to center, with 12 ft between double rows.
- Working around an active port means that everything has to be directionally drilled
- Radial drilling pattern part of initial development plan; helped prevent the need to drill across other wells
- Gyro surveys are run on all wells
- Complicated well profiles are often required due to restricted surface locations

(Questions)

- Lisa Grant – What are the dimensions of the wells being drilled (MD, etc…). Answer – It varies; up to 12,000 ft on the high end. Lisa – What about torque problems with the longer wells due to the anti-collision restriction? Answer – The islands are really able to reach most of the lease without over extension. Lisa – What about gyros in horizontal wells? Mag interference? Answer – Mag interference is significant at surface, but less further down. We generally use gyro higher up, and then switch to magnetics. At the end we'll pump down a gyro to get a final survey.
- Robert Wylie – Can you speak about travelling cylinder restrictions? Answer – If the DD is more than 10 ft off plan, more people get involved. If they're more than 20 ft off plan, things must be re-planned.
- Dwayne – What is your anti-collision software. Answer – Compass and Well Architect. We've developed means for cross checking.

- Roger Goobie – Can you talk about your relief well plans? Answer – We do not have a relief plan because the wells are not capable of natural flow. Our blow out prevention is to turn off the water injection.
- Nick Jones – How many collisions have you had? Answer – Not sure. There are a lot of wells that have been cemented to surface. These are not a large concern.
- David Gibson – Have you come up with best practices for side tracking? Answer – Not specifically for side tracking. It's handled case-by-case. Because the formation is soft, a cement plug is usually sufficient for side tracking. Overall, side tracking doesn't happen often.
- Nolan Duncan – Can you speak to data integrity from the older wells? Do you have to resurvey many wells? Answer – We assign error models with large errors to the older wells. We can't resurvey the cemented-in wells. For wells that can be resurveyed, it's evaluated on a case-by-case basis.
- Jeremy S. – Do you see large discrepancies between gyro and MWD surveys? Answer – Yes we have seen that occasionally. We have acceptance/rejection criteria for survey comparison. The majority of the time the surveys are acceptable. When they are not, we have to investigate further. Often depth discrepancies are a problem.

Improved Geomagnetic Referencing in the Artic Environment (SPE 166850)

(Benny Poedjono, Tim White)

- Challenges in the arctic environment include a small horizontal component of magnetic field. This increases the impact of crustal and magnetic anomalies.
- Crustal maps are created from satellite data for longer wavelengths (> 250 km) and aeromagnetic surveys for shorter wavelengths. 3D magnetic models of field intensity are created. Laplace's differential equation is used to estimate the field vector.
- Crustal anomaly maps are created that start at sea level and continue down to TVD
- Deadhorse magnetic observatory established in Prudhoe Bay in 2010. Certified as INTERMAGNET observatory in 2012.
- Looked at 3 USGS magnetic observatories in the area (they use the same hardware) to analyze time variations in magnetic field during magnetic storms.
- Observations showed a 22 degree change in declination over an hour during one particularly active storm.
- A large magnetic storm occurred on June 1, 2013. The declination differed significantly over the small geographic separation between the 3 observatories. The maximum rate of change in declination was 0.02 deg/second, which was seen at all 3 sites.
- MWD comparison with Deadhorse observatory data showed good agreement. Using this real-time referencing and crustal anomaly map reduces the ellipsoids of uncertainty to the point that drilling can proceed without violating anti-collision rules.

(Questions)

- Lee ? – What total magnetic field value are you using for a threshold to question your MWD data. And do you prefer in-field referencing to observatory data? Answer – You need to use both the crustal variations and the time vary measurements.
- Pat Wallen – Do you have evidence the GPS constellation is being affected by solar activity? Answer – There's some suspicion that the time of flight measurements are being compromised by magnetic storms. This is not currently compensated in standard GPS receivers. The electronics are hardened, so we don't think there's any electronic damage.
- Ezra North – Did you run gyros on the wells with the improved magnetic error models? How did they compare? Answer – (did not catch the answer)
- Adrian Ledroz – How do you correlate declination between MWD tools and observatories? MWD tools don't measure declination. Answer – We only correlated total magnetic field and dip angle to correlate the data.
- Ross Lowdon – Did you look at lower latitudes to see what effect space weather has there? Answer – It depends on customer expectations. We have done some work in Russia.
- Roger Goobie – How do you evaluate the accuracy criteria for the error model that you're using? And what do you do if the surveys don't fit the criteria? Answer – We run two different instruments so we can cross-check. If there's disagreements, and it's on the MWD tool side, we pull it out of the hole and send it to Denver for calibration.
- Phil Harbidge – There's an equatorial electrojet. Have you measured the field changes for this phenomenon? Answer – We haven't looked at this as much. The equatorial electrojet effects dip more than declination. Declination changes less than 1 degree for large storms.

Sub-Committee Activity Report: Collision Avoidance

(Steve Sawaryn)

- Focused on creating a standard collision avoidance method. There's a desire to be able to compare separation factors between companies.
- Created a roles and responsibilities draft document.
- Discussed the need to have a standard collision avoidance report format.
- Engaged in some consolidation activities.
- Would like to have 2 days to work at the next meeting to workout the detail and structure of the targeted products. Would like to have items for review and approval in Spring 2015.

(Questions)

- Ross Lowdon – Are you expecting by March 2015 to have rules that can be adopted by the industry? Answer – Simple answer is yes, but we are having discussions about that a standard entails. It might be more of a good practices document.

Field Acceptance Criteria Based on ISCWSA Tool Error Models

(Stefan Maus)

- The OWSG has created a consolidated set of tool error models which specify 1-sigma error sources and how these errors affect position uncertainty
- How can we check that survey errors are consistent with these tool models, and how do we define whether a survey passes QC?
- Different magnetic field QC values can be Btotal/Dip, B_horizontal/B_vertical, and BtotalDip.
- 0.016 m/s2 is a 1-sigma error in the gravity reference relative to a standard g.
- Magnetic reference field error depends on which reference model is chosen. These come into play when correcting for axial magnetic interference.
- Tool misalignment relative to the borehole (XYM, SAG) are not observable in the survey QC parameters. Sensor misalignments will be observable in the dip angle. These sensor misalignments are lumped into the magnetic biases in the error models.
- Effects of different error sources depend on the orientation of the MWD tool relative to the reference field. This fact should affect the QC criteria.
- Axial interference correction corrects for other error terms as well (such as z-axis magnetometer bias). This the recommended makes QC limits smaller. It also correlates the resulting B_h and B_v errors.
- QC criteria were shown vs. measured depth for the 3 ISCWSA test wells. QC criteria were shown to vary with orientation.
- These QC criteria can be implemented in practice (for instance Baker Hughes is already implementing this dynamics QC calculation in their DDO files). A point calculator can be used as well, where the relevant information is entered for each point.
- An average QC value could be derived from a global average (w/ equal area weighting), or with an average over all well directions (w/ equal angular weighting). Alternately, if the tool meets the assumptions of the tool code, the chance that both the accels and mags pass a 2-sigma QC criteria is about 90%. So if not more than 10% of surveys fail QC criteria corresponding to 2-sigma of the selected tool code, the surveys could be said to be good.
- Importantly, 95th percentile of non-Gaussian distributions are near the 2-sigma level, making the 2-sigma level a general level.

(Questions)

- Harry Wilson – Most error terms are systematic, so it's possible that the errors are biased and ride a QC line.
- John – I would have thought that someone would be able to tell you whether or not a survey is within the bounds of the model. Answer – You need a simple QC criteria
- Benny P. – IFR2 changes by time, so that lends itself more to the 2-sigma random variation.
- Lisa Grant – Could you not just decide 2-sigma vs. 3-sigma based on the type of job? Harry Wilson – I'm in favor of 3-sigma.
- Neil Bergstrom – Good presentation. I agree with Harry to a point, but I don't want the perfect to get in the way of the good. This is generally beyond what is done at the moment. You could just say that anything outside of 2/3 sigma should be looked at by a specialist.

Vector IFR Surveying by Helicopter

(Gerry Wiseman)

- Field variations are secular (long term changes in the Earth core), diurnal (space weather-induced changes), and crustal.
- IFR is needed to correct for crustal variation. Current methods include conventional aeromagnetic (measured total field), land IFR survey (robust, but slow), and dynamic vector survey (measures the field vectors directly).
- During a land survey, a proton magnetometer is used to measure total field, and then a theodolite is used to measure declination and dip angles relative to a distance point that has been surveyed in by GPS. This is done in a grid.
- A dynamic sea measurement can just map the drilling area, or possibly even just the wellbore route. A high spec attitude sensors and tri-axis magnetometer are used to account for the movement of the measurement platform (a tail bouy).
- Can dynamic vector surveying be conducted from a helicopter?
- How close can the sensor be to the helicopter? Measurements indicate that the sensor won't see interference until closer than 20 meters to the helicopter.
- Tested system in the Moray Firth, with comparison to previous marine and land surveys.
- Trajectory is processed with a Kalman smoother using GPS and an INS. Circles are flown during flight to check calibration.
- Test flight results agreed to within model accuracy to land survey shots and the marine survey.
- Measurements can be taken every 2.5 meters, the method is fast, and the system is portable (non-aircraft specific).

(Questions)

- Robert Wylie – What altitude do you fly at? Answer – The sensor flies about 400 feet above the terrain.
- Neil Bergstrom – Why not use a faster fixed wing aircraft? Answer – The data acquisition rates would have to be higher. The engines and power systems also tend to interfere. One of the biggest source of error we have in the marine surveys is heading dependency. The helicopter helps solve this by running in circles periodically.
- Phil Harbidge – You're using two magnetic systems for redundancy. What if both have the same problem? Do you have an external QC? Answer – We have magnetic theodolites on the ground as a QC.
- Benny P. – How do you deal with the disturbing field? Answer – We use data from a local magnetic observatory. Benny – What do you do about pipelines, etc…? Answer – Small artifacts do not affect us much at our survey height.

Sub-committee Activity Report: Education

(Steve Mullin)

- The purpose of the education work group is to spread the word about the ISCWSA and its products.

- We had a Hits and Misses workshop that was a success in 2012. Then SPE USA contact us requesting a repeat of the workshop in the US. This was done in 2013 in Denver. SPE Europe now wants a repeat over there, to be help in Istanbul in September 2014. The hope is to spread the word to the Middle East. Registration should be open in the next week or so.
- SPE USA would like a repeat at the end of 2015. The intent is to hold this in Miami.
- Phil Harbidge is championing a workshop in the Far East.
- Another workshop is in the works: The Economics of Misplaced Wells. The goal is to run this workshop in the first quarter of 2015. We are seeking a senior guy in reservoir engineering to join the committee.
- A topical lunch will be held in Amsterdam at the SPE ATCE. The goal is to promote the aforementioned workshop. Robert Wylie is looking for additional presenters.
- There are plans to continue developing the E-book. We're open to suggestions. We'll have an editorial management group as gatekeepers of the book (Angus Jamieson, Dave Gibson, Carol Mann, Mike Long, and Steve Mullin). The goal is to identify peer reviewers.
- We will be adding links on the website to various workshops and topical lunches, as well as some other content.

(Questions)

- Angus Jamieson – Contact us if you know a senior reservoir engineer.

Global Geomagnetic Field Models from DMSP and Satellite Magnetic Measurements

(Patrick Alken)

- Satellite missions to measure the magnetic field of the Earth include the Orsted Mission (1999-2013), the CHAMP Mission (2000-2010), the Swarm Mission (2013-), and the DMSP Mission (doesn't have research quality magnetic data; primarily a weather satellite).
- The DMSP mission is being used to fill a data gap, but the data contains jumps on the order of 10-20 nT. The data has to be cleaned.
- The time stamp on the measurements needed to be estimated. Errors due to the time stamp could be on the order of several nT. The noise in the data set makes the estimated time stamp noisy from day to day, so it must be smoothed.
- Then the data is calibrated for scale factor errors, non-orthogonality, and offsets via processing the scalar magnetic field intensity values. A thermal cycling effect is evident in the estimates of these parameters over the course of the year.
- Finally, the transformation from the sensor frame to the inertial frame must be calculated, and then the transformation from the inertial frame to an Earth-fixed frame.
- Calibration procedure was successful in cleaning the data (reducing residuals) so that it was suitable for calculating a main field model. Compared the resulting main field model to the Orsted Mission data, and the RMS error was approximately 12 nT. A similar comparison to the Swarm Mission data, but using the vector field measurements, shows about 11 nT of disagreement at 1-sigma.

- This data was used to fill a gap and fed into the High Definition Geomagnetic Model. A GUI tool (plus an Excel interface) allows one to exercise the field model. Uncertainty estimates are provided by the GUI tool, including a note about whether or not you are getting full resolution.

(Questions)

- Neil Bergstrom – There is no Swarm information in the HDGM, correct? Answer – Yes, it is not yet available to us. It should become publically available in June.
- Andy Brooks – You're providing error estimates. What is their nature? Answer – In the regions where we have aeromagnetic data, we reduce the uncertainty relative to the BGGM error. In other regions the uncertainty is basically the same.
- Tim White – How long will the Swarm mission last and are there going to be any follow-ons? Answer – About 10 years, and no, there are no new missions planned.
- Patrick Walter – BGS releases accuracy estimates for different locations on the Earth. What do you do? Answer – I'm aware of their work, but we view the ISCWSA errors as more of a climatological thing. At this time, we decided against a more complicated uncertainty output, but we have discussed the idea.

OWSG Land Drilling Survey Management - Operator's Perspective

(Lisa Grant (Shell), Neil Bergstrom (Devon), David Baker (Chesapeake), Jonathan Lightfoot (Oxy))

- Loss – What are the primary challenges you face?
- Neil – Primary challenge at Devon is taking surveys from directional contractor and put in a database. We have very little in the way of quality control. Trying to raise the level of quality control, including amongst our lower level contractors. The leading cause of wellbore collision is human error, especially in regard to surface position.
- Dave – One of our biggest challenges is education. The users of our data don't understand the uncertainty involved. We have drilled so much data that we cannot possibly go back and re-verify every survey. Quality management and setting standards are big pushes at Chesapeake.
- Lisa – People don't understand that the well is not always where the line is on the page. Understanding how the uncertainty plays with the well objectives is a huge problem. It's not just anti-collision. It's reserves and being able to drill relief wells. In every plan section that we send out we are starting to add uncertainties. Going for a mindset shift, including understanding the impact of survey acceptance criteria in making the error model meaningful.
- Jonathon – Oxy has many of the same issues just mentioned. We have fields that we've acquired with inclination-only surveys that we're now trying to drill in horizontally. Often times when we spot check surveys, we find problems. There are gross errors in well planning frequently. We're putting together training programs for well planning and directional drilling to try to prevent gross errors.
- Lisa – We're looking at wellbore position as a process safety issue.
- Ross – Education seems to be coming thru fairly strongly. Where do you think we are in terms of standards?

- Jonathan – We're in full support of using the OWSG models. We're taking a lot of the good stuff that our Long Beach group is doing and putting that into our global standards.
- Lisa – We're in the process of rolling out a global standard. Some of them are essentially required, without exception. There's a cart and horse issue with education and standards. We've finally decided to roll out a standard, and then put the education in place. One of the hardest efforts will be breaking the paradigms that currently exist.
- Dave – At Chesapeake we are at the early stages. We don't yet check the survey data that comes from the field to a great extent. We do have some checks, but it's been challenging to get everyone on board with that. We're trying to educate our people by breaking the process down into identify, locate, and position.
- Neil – Devon is drilling a lot of wells in existing fields. Horizontal wells through fields with vertical wells that have very poor survey data. Usually collision in these fields is an economic issue. We have a policy of temporarily abandoning all the wells on a pad where there's a chance of collision. One big problem in the industry is that the majority of anti-collision issues never get reported, even up the chain within a company. We need a near miss indicator. Something that tells us how many times we've come close to hitting another well.

(Questions)

- Angus Jamieson – You've spoken a lot about education. What do you think the understanding level is at the senior management level regarding the impact of misplaced wells? Lisa – I've had some of these conversations. Right now I think we're in an acceptance of denial phase. The production data can be explained by the fact that you're not actually getting the precise spacing you want. Remember, though, your real customer is the subsurface. We should be looking at dollars per barrel, not dollars per foot.
- ?? (from Oxy) – There should be a license to operate in well planning, etc… Having a specific, documented set of criteria required to perform certain work is lacking from what I've seen. Neil – I don't see that happening in Texas. Lisa – It comes back to education. People have to understand that you need it.
- Pat Wallen – I'd like to know if there's an interest in an app for I-phone or Android to survey surface locations as a QC. Neil – A good grade GPS costs less than $2,000. There's no way Devon would take data from a phone.
- Harry Wilson – US land is very price sensitive. Do you think the price sensitivity will subvert your efforts? Because what you're proposing requires people, rather than tools. Neil – I would make the comparison with the airline industry. They have a very good safety record and are price sensitive. Lisa – We're looking toward automated, real-time QC. Then you can increase coverage with fewer people.
- ?? - What about independent QC advisors, such as with seismic surveys? Dave – We're starting to develop a program where we have guys go out and inspect things on rigs that they have traditionally not checked.
- Angus Jamieson – There was a suggestion at one point of having an ISCWSA exam associated with the E-book. We could take this up in the Education Work Group.
- Roger Goobie – Schlumberger has a question of the day that they send out. We could do that sort of thing within this group.

Sub-committee activity Report: Error Model

(Harry Wilson, sitting in for Steve Grindrod)

- Went over the history of the ISCWSA error model (genesis was in 1995)
- 2000 SPE paper covered magnetic tools
- 2007 SPE paper covered gyro tools
- The error model sub-committee started in 2005
- Rev 3 of the MWD model is considered the definitive version, with definitions on the iscwsa.org site
- The ISCWSA is focused on generating the general model. The "tool model" is the application of tool-specific standard deviations to the general model, or framework.
- The ISCWSA has been able to agree to a set of standard inputs to the general model, thus creating a generic MWD "tool model." This is generally what is referred to when people say they want to use the ISCWSA error model.
- Many companies have added terms to the ISCWSA generic model. Compass will soon be shipped with the OWSG error models, which are not exactly the same as the ISCWSA error model.
- We need to consolidate the ISCWSA error model into a current, living document.

(Questions)

- Bill Elks – How do we get specific error models endorsed? Harry – I don't know that the ISCWSA can do that. What's important is the link with QC. Pete Clark – Chevron is going to standardized models.
- Steve Sawaryn – The error models are a key component of the collision avoidance side. We need some sort of coalescence of the models, and we need a management process going forward. Especially an explanation for how deviations should be handled.

Survey Depth Correction Management and Workflow - Practical Implementation

(Angus Jamieson)

- Currently, we can correct for tool misalignment (check shots), survey resolution (slid-rotate vs. rotate-slide effects; can go to the slide sheet), sag (apply sag correction), combining surveys together, mechanical stretch (almost a by-product of a torque and drag analysis), and temperature effects
- Friction factors don't factor into the calculations very much while near vertical, where the effect of mechanical stretch on TVD uncertainty is most significant.
- Steel will stretch by 1.3 m / 1000 m / 100 degrees C
- Stretch correction software is not difficult (gave an example); mechanical and thermal stretch add together.

- For stretch correction: Every other industry corrects for stretch, it's easy, there's a better match with wireline, TVD will be more accurate, the geo model will be improved, enables improved horizontal landing.

(Questions)

- Neil Bergstrom – I agree with Angus on the stretch corrections. Harold Bolt wrote a great work on wireline stretch correction. I think there's a video on the SPWLA website.
- John ?? – Drillers may pay for this because they get to keep their contingency sidetrack budget.
- Kevin McCaird – I agree with the need for depth correction. Is there any though about directly integrating this into the minimum curvature calculations? Answer – I think people generally like to see the raw data so they can see the effect of the correction.
- Robert Wylie – Have you looked at the case where the drill pipe is crammed into the hole to the point right before buckling? Answer – That really doesn't make that large of a difference over the length of the well.

Sub-Committee Activity Report: Operator Wellbore Survey Group (OWSG)

(Neil Bergstrom)

- There are now some minutes up on the website.
- The mission statement was agreed upon. All meetings are started with an anti-trust statement. Only purpose is to promote good practices.
- The OWSG is not a decision making body, and its recommendations are separate from those of the ISCWSA.
- Next meeting planned for July in Houston.
- Working on format for transfer of raw sensor data.
- Have created a standard set of OWSG tool error models.
- Generated a standard for display and application of declination and divergence.
- Some coordination has occurred regarding well planning and wall plot checklists
- Recommendations for "good" wellbore survey practices.
- Proposed initiatives include standard values for MWD QC, minimum operating and reporting procedures, a software test suite for testing directional software.
- Want to allow the operator or a third party to reprocess the raw sensor data.
- (see the slides on the ISCWSA website for more information)

(Questions)

- No definitive format as of yet, but it's being worked.
- Lisa Grant – The panel feedback is echoed in Neil's slides. We're trying to have a common message.

Sub-Committee Activity Report: Well Intercept

(Mike Long)

- Mission statement is to promote good practices.
- Bulk of the meeting was devoted to discussing relief well planning guidelines.
- Hope to add a section to the E-book, which would cover the lexicon and good practices.

(Questions)

- None.

Gyro Survey - Practical Basics

(Ben Hawkinson and Steve Mullin)

- History of wellbore surveying. First instruments included a plumb bob and a compass.
- Modern day tools generally use North seeking rate gyros.
- North seeking gyros are a little slower than MWD, but more accurate.
- Continuous gyros are even more accurate.
- MEMS gyros are inaccurate, but very survivable
- Spinning mass gyros are very survivable, and fairly accurate
- Fiber Optic Gyros and Ring Laser Gyros are most accurate, but not very survivable. Also, they are large.
- Both GyroData and Scientific Drilling are using spinning mass gyros.
- The Earth rotational rate is 15.041 degrees/hr. The magnitude of the horizontal vector depends on latitude.
- In continuous mode, the rate of rotation of the sensor is measured as it traverses the wellbore is measured. The rate is integrated to get orientation, and the results are referenced to a very accurate initial orientation at the surface. This type of survey helps highlight the aliasing effects of infrequent MWD surveys.
- The Theory of Inertial Navigation Systems, by Andrew Lawrence was recommended as a good gyro reference.
- Two major categories of gyro surveys as North seeking (GyroMWD and drop surveys) and continuous surveys (faster running speeds are preferred as drift is time dependent).
- Gyro instrument QA is primarily concerned with sensor errors. There is both a factory calibration and a field calibration.
- Mass unbalance is one of the primary drivers of error in gyro surveys. It can vary significantly over time, and one purpose of the field survey is to keep tabs on the mass unbalance.
- Comparison against the theoretical horizontal Earth rate for a given location is the primary QC method. Additional QC measures are gyro output stability and bias stability.
- Gyro survey raw data is more complicated than MWD raw data. During gyrocompassing, measurements are taken in 4 directions to find the projection of the Earth rate into the plane normal to the wellbore direction. A sine wave is fit to the data as part of the data processing.

(Questions)

- Mahmoud ElGizawy – Continuous gyro vs. MWD, what are you measuring? Answer – When you're running gyro in continuous mode, you're not using the accels to measure inclination. Answer : Integration of the gyro attitude gives you inclination.
- Andy Brooks – My understanding is that the gyro error model using the same implementation for north seeking and continuous surveys. Is the error model correct? Adrian Ledroz – We use the accels for QC and calibration, so the performance we see is consistent with the model. Andy – Do you prefer in-run or out-run surveys? Ben – Typically the in-run is better. Adrian – We look at the drift on the both runs and do some averaging.
- Simon McCulloch – (wanted to revisit the speed vs. accuracy chart)
- Harry Wilson – GyroData includes 6 tool error models because there are about 6 different ways of implementing gyros downhole, but the values are not representative of real tools. They are for testing only. GyroData has their own private models with correct values.

Webmaster's Report

(Phil Harbidge)

Treasurer's Report

(Robert Wylie)

Closing Statement

(Pete Clark)