Darwin – Oilfield Connect

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Speakers: Mark Fraser

Hon. Justice Rachel Pepper: Thank you very much and welcome back. We have our next presenter. Sir, if you could just indicate for the recording your name and who you're appearing on behalf of. Thank you.

Mark Fraser: Yes my name is Mark Fraser and I'm appearing on behalf of myself and my company, Oilfield Connect.

Hon. Justice Rachel Pepper: Thank you very much. Whenever you're ready, Mr. Fraser.

Mark Fraser: Yes, just briefly touch on what my company's doing in relation to oil and gas, supplying equipment relating to the well completion or drill strength. Myself personally, I've had 35 years experience in the industry in the capacity of manufacturing, repairing, inspection, re-certifying equipment associated with down haul (inaudible) So I have just a couple of different slides here showing various, different tools that my company gets involved in supplying. These are conductors. Here's equipment for drifts, handling. Some inspection capability, and then monitoring. This is an important thing that the panel might consider. Some cases where you're talking in complex or high criticality manufacture we use a quality control plan, having a third party witness it partly manufactured to ensure compliance.

So I'll launch in to the presentation and I picked ... I had a submission, which I've already put in. I think you read that before and put some of that into the interim report.

Hon. Justice Rachel Pepper: Yes, thank you very much, Mr. Fraser.

Mark Fraser: So I've done my best not to repeat that, and try not to give you ... Give you a couple subjects that maybe no one has touched on.

Hon. Justice Rachel Pepper: Excellent. Thank you.

Mark Fraser: A couple that will be a little controversial, but we'll see if we can challenge people's ideas.

Hon. Justice Rachel Pepper: Thank you.

Mark Fraser: So the first two is going to be about dealing with the herd effect, the consensus view. And the second we're looking at climate change, and I'll just touch a little bit on well integrity with regards to some misinformation concerns. And last we'll talk a little bit about jobs, locally here in the support side of oil and gas not the operating side.

Hon. Justice Rachel Pepper: Thank you.

Mark Fraser: So when I read the interim report, something jumped out at me about climate change being mentioned, and I noticed in a quick search. I think there is about 22 occurrences of the term "climate change" in the report. So I followed just a little bit of research to see where it takes me, and what I discovered is we got these things going on in the public where we got 97 percent and 95 percent, and there is out there in the community a 97 percent consensus view that climate change is real, and it's warming. So we can see here from the NASA side, they show a trend going up from modelling, and they talk about consensus, and they talk about warming. So what are the facts?

This is another part from a methane website where they actually refer to peer reviews that they come to consensus of the 97 percent. So I looked around, and we find that there is a report that was put out here by Bedford Cook, which talks of 97 percent, and that's what they're quoting from. And I read down a bit further below it, and I found this paragraph and there is something that stood out at me very sharply. They got this, I got it right here for you. While 66.4 percent of the abstracts expressed no position on human caused global warming, of those that did, 97.1 percent endorsed. So basically, they took a sample of 11,944 abstracts, and because 66.4 percent were mute, they threw them out and looked at what was left. I thought that was rather bizarre.

So I dug a bit further, and they come up with these three terminologies used in discussing how they come to these views, and one of them is the unquantified views, where human caused some global warming. In other words, we may be assisting, but it's not measuring how much. Might be a little bit, not much. The quantified view, which is the one the survey is meant to be looking at, is that we caused most of the current warming, and then of course there is the alarmist view, which is that it's dangerous; we should do something straight away. Then, looking to say there's report that was done against the Cook report to analyse how they come up with the numbers, and this is how the statistics break down. I'm sorry, the colour's not really good up there but the total sample of these reports make up 100 percent. They've already excluded 66.4, 32.6 percent of them were actually marked as being causing some, but not explicitly. So we come down to those

which are marked as having the consensus view, so the only ones that were endorsed was actually the 0.3 percent that was endorsed by the authors of the reports.

That changes it from a 97.1 percent to a 0.3 percent. Then there was the leaking of emails from IPCC, and in the emails there was communication between the scientists, and some of those that are coming out and being posted on the internet. Some analysis were done on them, and by this paragraph here you can see an email that was between some of the members there, and it's pointing out that they've got 600 with PhDs versus 2,000 without. They're aware of it, but they're going to try and fluff the numbers.

Some of these scientists then had left the IPCC and began a project called the Petition Project, and this is available online. So the petition project, they come up with 31,487 scientists who have signed a petition, of which 9,000+ are PhDs, and in the petition part, if you read the beginning of the second paragraph here, "There is no convincing scientific evidence that human release of carbon dioxide, methane, or greenhouse gases is causing or will, in the foreseeable future, cause catastrophic heating of the earth's atmosphere." I thought that was rather strange because it goes quite different to what I was led to believe and I think most people think is the consensus.

So again, then maybe we should be careful when people are using either push poll or herd effects with numbers and claims of 95 or 97 percent and how they are coming to them. I'll leave that there as a point, and maybe if you want to look into that further and see whether that's a consensus or not.

So the second part, I think what's interesting is that these findings so I thought what is climate warming and what is climate cooling change? So I look at these four terms here, with climate warming being a continuous trend, and they say it's 15 years or longer is the period that you can measure climate with and according obviously it’s a downward trend, and climate change obviously must mean loss of it. So there's a bit of interchangeability in the public as to how they use the words warming versus change. Change would mean up and down both ways whereas pause would be no oscillation at all.

So we look at the man caused, or AGW as being thought that's the dominant driver for climate change, and anyone who is not in that consensus is being a sceptic or a denier, and these are used as derogatory terms in the media, social media.

So why do so many of these scientists not subscribe to the belief of anthropogenic climate change, climate, global warming, as being the dominant driver? So I settle this in two ways. One is what drives climate change and is the climate actually changing at all? And what we find is we got these hockey sticks out there, I think you might have seen one of those

presentations earlier today which shows this hockey stick effect that says we're going to fall, catastrophic events are going to happen very soon, and these are coming out of climate models. Tends to also show that the history is rather stable, and it is used for alarmism, but the data is actually showing that we've had a cooling period in the early 19th century. We had a warming period in the 20s and 30s. We've had cooling throughout the 40s, 50s, 60s, 70s, in fact they were alarming about there being an ice age, we wouldn't be able to grow crops. It's going back into a warming cycle, but more recently it started to taper again.

And some of this data that's coming out is showing that ... and this table is 2015, is that we are 20 years plus of relatively stable, or what they call a climate pause, which means if this is true then it's neither warming nor is it changing, which says a lot about what we should be thinking with regards to alarmism.

Now what does IPC say about this? Well, IPC recognises that the global warming pause, and they recognised it in 2012, that the pause is real, so the custodians of the models themselves come out and say it's real and the pause is on, and the current models are not reflecting what is currently happening, and they can't explain why it has been in a pause since 1997 despite CO2 emissions increasing. This graph shows the cone of divergence there is between real data versus the models.

This illustration sort of helps explain a little bit of what those people who are not agreeing that CO2 or methane are the big drivers, why they are saying it may assist or contribute but not be the driver. The claim is that water is making up, atmospheric water, whether it's in vapour form or precipitating, is making 95 percent of the effect, and we can see there that carbon dioxide is making up 3.62 percent, but only a small portion of that CO2 is caused by anthropogenic causes or activity.

So essentially if we were to talk about sending away, changing from coal to natural gas, we would be reducing the amount of CO2. We would be taking that little red band and reducing it a bit probably put some things back in perspective from the point of view of what these scientists are saying.

One of the claims is that the CO2 is that its warming effect dissipates very quickly. Most of the carbon's warming effect occurs in the first 20 parts per million. I don't know if that's true, but this is what the scientists are saying. They're saying that plants need at least 150 ppm, below that they start dying off. And at optimum, and often used in greenhouses, is rendered at 1000 to 2000. The current numbers of CO2 have risen from about 280 to about 400 in the industrial era. Taking a longer scale, in these models showing temperature in blue was four ice ages, and from current temperatures it's showing that we're technically speaking in an ice age on the long term focus on the 6oo million a year.

The black line is showing the representation of the CO2 in atmosphere. It's showing that historically it's been much higher than it is today, and it's also

showing that there's no really strong links between CO2 rise and fall versus temperature rise and fall, which again is one of the reasons why that they're believing that the models are not so accurate.

Okay, finished with that one. I'll just move on quickly to a concern I have with well integrity misinformation, and this is coming out information that's pushed out by say 'Lock the Gate' or 'Don't Frack Northern Territory' in pamphlet form to the public as a form of information that they can rely on. We have these brochures and they show you these images, and of course one of the most concerning things that people haven't really… this image here, which would show a leakage out of the well directly to the amplifier, and I want to challenge that a little bit, and the reason that I would say that I would think that would be highly improbable is to take a look at how a top-view down cross section of the well looks like. You have the outer conductor. You have three layers of casing with cement, and you have in the red there, the annulus, and the annulus is an empty void space. So unlike the image previous, the previous image I'll just go back to that, which is just kind of showing the fluid is running up the casing, all the way up, and then just finding a pathway.

So you have an annulus, and then inside that annulus there's the tubing, production tubing, and the gas flows inside the production tubing, not the casing. So if you layer over that the image of what the pamphlets are trying to say, they're saying it looks something like this. There's no tubing. The gas isn't there and somehow it leaks out through three layers of casing, and I think most of us would look at that and say that's sort of absurd.

Now, just going back to this image again, and looking at how the tubing is, when the well is cased and perforated and fracked, and completion is loading with the tubing, and it's all pressured tested and they flow it, that tubing at the time, if it has any corrosion or if there's a leak or anything, what would happen, it wouldn't make its way to the annulus, and in the annulus you can detect it, the pressure or you could sense the gas or liquids, and there you would have time to kill the well and take remediation action at that point to replace the tubing. I believe there are pertinent points where they can do that. They can run checks on the tubing, the condition of it, like we do anything that wears, as consumables. So they would then bring in a truck like this, which is a work over. It's easy, mobile. Here we are. It can kill a well. It can retrieve the used tubing and replace it with a new production tubing and reflow the well without any concern of it further going through the casing and out into the aquifer.

So I just use this as a bit of an illustration because we hear this saying that 6 percent of wells fail, and there's the word fail. First, I'm simply saying to use a brake pad on a car, something everyone would be familiar with, as a wearing part. So if you send your car to a mechanic shop to check the brakes, and they measure the thickness of the brake pads against the manufacturer's specifications for acceptable wear, and the brake pads are found to be worn below acceptable measurements, and the mechanic replaces the worn brake pads with newer brake pads, would you call this a

brake failure? Or would you call this proactive or scheduled maintenance? I think most people would call that maintenance. That's what you do to maintain your vehicle. You would call it a brake failure if your brakes didn't work and you crashed into something.

So we take that analogy literally. The production tubing, how it is separate from the casing and able to be inserted and retrieved separately. So if you perform a periodic inspection on the production tubing condition, and it's deemed to be outside of acceptable serviceable specifications, and you replace the tubing with a new production tubing, would you call that a well failure? Or would you call that proactive, scheduled maintenance? Again, I would say that is maintenance. That's what you should do.

This would be to me be typical, whether it's onshore or offshore, whether it's conventional or unconventional seam or shale, basically that well configuration is the same. The method of the tubing providing the primary barrier, which is able to be replaced, and the casing multiple layers providing the multiple secondary layers.

The next one I want to touch quickly on jobs. I've seen a few presenters talk about jobs in different ways. About this time last year, I shut down the only oil field service machine shop in the Northern Territory that could machine the threads on the oil field casing or tubing and drawstring, and retrenched all my staff working for me including guys I had trained up over a decade, and we sold off and disposed all the assets, and the cabability is no longer here in Northern Territory. So what people sometimes mention probable, possible, maybe jobs impacted, the moratorium 100 percent did affect a number of people's careers, and a number of the people are still struggling to find full-time work today. If they have got jobs, they are not in a pay similar or career of similar level.

This is an article when we shut this down. So there was a direct impact. This is looking into the facilities, we had a workshop. We had a lot of infrastructure for handling OCTG casing, tubulars, and drawstring. You see a lot of parts stacked there for servicing and repair. Inside the workshop, we are working with bucking machines to make up completion assemblies, casing shoe case assemblies. Actually the image to your left in the background is to cylindrical shaped pieces. Those are called spores, they were property of Pangaea. We were servicing those at the time of the moratorium announcement, and shortly after we had an email to say that all that work was off, and we returned all that back to Pangaea. So we were doing work at that time.

There's some more equipment and lay machines, machining up specialised equipment. These are conductors. These are for offshore particularly because they're larger. They're 36 inch conductors, but we had welding procedures for welding to API 11-04, which is for conductors to code of welding. Some other, one showing large machinery that we use. This is a 36-inch PTB retrieval tool, and some thread you can count on the far side. Here's some other equipment we were working on. This is maintained

starting from your left. This is what they call a flowhead. It had to be stripped down. All the components resurfaced. New seals and things put in and hydro tested as a specific procedure for multiple chamber testing. Here are some other one in the top centre, which is some rises, which had to be fully stripped down and serviced. We sub-contract a lot of work to local inspectors and welding fabricators to do work that was coded.

In the lower centre, there's some perforated tubulars, and on the right ... That section there they lifted up is on the Montara, after the well was put out and cemented inside. This is the cap that was going on top. We made up that cap to go on top. We also made the components of the relief well that went in.

Comparing our company, in Northern Territory, to those of our competitors in Australia, in this graph it's one of the edge a little bit, but we're at the top there. We had a total of 52 individual thread qualifications in Northern Territory, and the nearest competitor in Australia had 26. So I used to love hearing people come to Northern Territory and say, "In the Territory, we need to increase our standards and our capabilities to attract work," when we were doing double the capabilities. And just on the KPI's while we're on this slide, at the time we shut down the facility, we had over 1200 working days no lost time injuries, and the lost time injuries before that were minor in nature. The person was back to work within a day. We had one faulty escape, in 12 and a half years of my tenure, and it was non-consequential. It was picked up on a rack, and we had no environmental escapes, or regulatory escapes.

These questions I put up there look a bit rhetorical, and they're not aimed at obviously this panel or the operators within the oil and gas industry who were not obviously subscribing to having a moratorium. When we look at the impact here, that's probably not being thought about. So post moratorium area, let's say the moratorium has been lifted. Who's going to reinstate the small, medium enterprises that was supporting and servicing the oil and gas industry? How do you bring back the capabilities? I mean, it was easy to turn off the switch, and remove the customers and cause those companies to employ. But has anyone thought about how you get them back? Who's responsible for reinstating those capabilities? Who's responsible for upscaling and training people back to the level that they were at? Has anyone thought about the plight of the workers who lost their jobs and their livelihoods were and are in many cases were still being impacted? Just food for thought.

I got a second presentation just slipped on the back on this. Because it's a technical one, and I haven't looked at it, and it's a bit wordy, so here we go. I'll try and muscle through it very quickly. It may be very important for the panel to see this because it will do the technical side of casing itself.

So the OCTG, I'll just stick it there. The acronym OCTG means Oil Country Tubular Goods. It's a standard name for all casing and tubing in oil and gas. The first one's on the direction of the drilling, and I just put this image up

here. You see the bentsub which I've circled. I've manufactured those and about 1982 as an apprentice. That's how long bent sub for directional drilling have been around, and they're all drawings then. That's an old technology that I don't think they hardly use anymore. The first case of direction drilling that I'm aware of was by Eastman in which in 1934 he designed the wood stud, the kicker. A string. And they still use wood stud today. It's not a defunct technology.

The problem with using either bent subs or wood studs to keep them there is that you have to keep pulling the string out to run wire lines to see where you're up to, and then go back and drill a bit and go back and see where you're at with logging equipment. So the invention of putting multiwell drone, MWD or logging well drain, LWD, in with the tool assembly and then having a steerable motor head that you can literally steer it through and get live data, obviously makes great efficiencies with the ability to horizontally drill. So I just put that up there that horizontal drilling is just not the same as what happened yesterday. It's an evolving technology that's getting better and more efficient all the time. There are other ways of directional steering a well. Using jetting and so forth.

Now let's go into OCTG. Just want to touch on ISO. What ISO is, but they think it's just for managing an office environment, but no. There's many other standards in ISO. There is a lot of homogenising between oil and gas standards and ISO standards, and this is an ongoing process. There's literally so many standards. We should keep standards being separate to the meaning of regulation. So some people mix up the two. The standards are there. The well development and there on a constant improvement process. When we deal with OCTG, Oil Country Tubular Goods, we are dealing with casing tubing particularly, and the accessories that go with them. There are a number of standards and substandards with that. So API 5C is aparent. This will do. You can see there is a number of there like API 5C1, API 5B and so forth. They do other specific things.

There are threads that come with API that are standard within the API standard, API 5C standard, but these threads are not gas type. These are okay for liquid, so if you're looking for say oil, water, but not suitable for gas. So you would say these are okay for probably on the outer casing, surface casing, example. That would be fine, but you wouldn't want to have those to be in your primary, necessarily. I mean, it’s up to well designers as to how they go about it. Now this is actually a bit confusing because the sign says no gas, that has a gas seal. It's actually two inches and it was timed. So the original would show the thread without the seal, and the arrow is actually pointing to where the addition of the mechanical seal is machined onto the end of the threads.

The companies, which designed the threads to go on the casing go through a rigorous process in which there's FEA done first to the analysis there, but then they also there is, which they got mechanical devices to do tension, compression, bending, burst pressure, collateral pressure onto these to come up with ways to show you the capability of the connection so the

engineers can draw upon. There's a number of companies that manufacture or are the patents of these thread designs, a number of these threads are up there listed. There are websites that the engineers use to get specific information and performance values for the casing and the threads. There's different kinds of threads that are designed for coupled or semi-flush or flush, depending on the applications.

I'll skip over this just for time. Going through the specific sizes, basically. I'll just pause this one for five seconds. This is just showing sort of flagging points in time where different material grades arrive, and just to touch on that particular point. A lot of people refer to water bores, or what a farmer would normally relate to a water bore, which is a different standard, and they would typically use grade 3-50 as their minimum requirement, which is a mild steel. These materials up here are high alloys, and some of them are nickel alloys, grades, which are used for oil and gas. So it's a completely different standard, and they're different well thicknesses, and have different properties for instance for resistance to hydrogen, stripping and so forth. So in other words, fit for purpose.

It's identifications and colour banding and stuff that you would go into measuring equipment to make up. This is just showing using a bucking machine to input the inputs and make it up, and there's a graph like when you're making up a connection. I've got the number of values, which I'm showing that the graph looks good. And the way you read it as its going on along in time you see that there's no torque. It hasn't lifted. There's no torque. That's just the beginning of the make up. As it starts to go up the thread in gauging, and you're getting a little bit of pressure between the box thread starting to expand and the pinning thread starting to press because it's tapered as they engage. And it comes up to where it kicks at shoulder. That's the shoulder of the steel engaging, and it goes up to where an optimum band, and then it shuts off. If you don't get a gauge like that, if you get something that looks like this, it may be an indication that you have a banding. I think that's about the end of it.

Perfect.

Hon. Justice Rachel Pepper: Thank you very much, Mr. Fraser. Just before I move to Dr. Jones, I just want to get the first part of your talk perfectly clear. So do you accept that climate change is happening?

Mark Fraser: I'm unsure. I actually started off on that little journey based on the interim report thinking that climate warming was real, and that the consensus was that it was real. I had no reason to think the other way.

Hon. Justice Rachel Pepper: When you say consensus, are you referring to public opinion or are you talking about scientific literature?

Mark Fraser: Yes, public opinion ultimately. There's that noisy people out there saying that majority of scientists agree that the science is done. Let's not talk about it, you know? Anyone else who's against it, then they must be in the

minority, and I just thought that was about how it was. I had no idea that there was science out there that would refute that. So it was a genuine discovery, but I'm not saying that I have the ability to endorse what they say. I'm just saying that there is something that I discovered, which is quite compelling. It's compelling because it's not just the detractors or the sceptics or the deniers saying this. IPCC itself has come out and said they accept that their models are wrong.

Hon. Justice Rachel Pepper: Have you read the 2016 report?

Mark Fraser: I have not read that, no.

Hon. Justice Rachel Pepper: Right, well, with complete respect, I think that you probably should, and I think it's probably fair ... Someone will correct me if what I'm about to say is wrong, but I think it's fair to say that absolutely everybody on this panel accepts that climate change is real, climate change is happening, and it's human caused.

Mark Fraser: Okay. Again-

Hon. Justice Rachel Pepper: So, I cannot imagine the evidence would be presented at this panel that would cause us to change our views on that. Thank you. Yes, Dr. Jones.

Dr David Jones: A couple of questions. You show a very clear diagram of the production tubing, and the casings. It appears to me that when this termed sustained interim pressure is raised, people think of that as a failure. Where what you are telling us is it's essentially a symptom of the production tubing might be leaking, you go in and replace it. Is that correct?

Mark Fraser: More or less, yeah.

Dr David Jones: Okay-

Mark Fraser: You could imagine if ... Even if you had a catastrophic failure of say the tubing, and whatever was inside the production went into the annulus, you then still got to look at the time it's going to take to then work its way through the first, secondary casing, and then the cement, and the next casings, and so on until you can get to the aquifer. There will be significant lag time before it come into that for them to come and intervene.

Dr David Jones: I know the image of liquid rises in people's minds, and of course that the sustained water pressure through the top of the well, but in the case of shale gas, providing there isn't a failure in the Christmas tree, I don't imagine that would happen.

Mark Fraser: I've never seen it, no.

Dr David Jones: The second question writes, you talk about standards and regulation. You're saying the two aren't necessarily related, and I accept that, but on the other hand we have seen presentations from DPRA drawing section that says there are any different standards in the world that could be used to do this. We don't worry which standards that the companies use so long as they use a standard, but in my mind that does a stress on the regulatory system because if you go all these multiple standards over a limited number of people are trying to assist in compliance, then there's an issue. Do you have any comment on how we could perhaps conceptualise this in making our recommendations?

Mark Fraser: The standards for casing itself and for the drill strength ... There's no multiples of them, there's just API 5CT for casing and tubing. There's no other.

Dr David Jones: I guess my point was probably a bit broader in the industry in general.

Mark Fraser: Yes.

Dr David Jones: There appears to be, in terms of well integrity and so on and so forth, in well construction there appear to be quite a number of different standards.

Mark Fraser: Yes.

Dr David Jones: Which certainly in my mind anyway would at risk for regulatory confusion, or at least overload anyway.

Mark Fraser: Possibly. I don't know if I got the fix for you there, but it's sort of like the standards are often related to a specific thing. It depends on whether you're doing a specific thing as to which standard you're going to apply. So for instance, a draw pipe is going to be API 5DP. The draw claws is going to be under 7-1-2. So the Wellhead simply above is API 6A. So there's a standard that covers those things, and they're the key ones, just the ones I just mentioned there. The 5DP, 7-1-2, and the 6A. There's a few of them that cover basically everything from the casing, tubing, the wellhead, and the drawstring that's used on the drawing.

Dr David Jones: But these particular construction standards ... Is it the gas company that makes sure you follow those? At some point there is a regular, the government regulator comes in and says, "How is this thing constructed?" Which is another kind of overlay as well. I guess it depends where you fit in the chain of the system.

Mark Fraser: From the point of view of a supplier, when you receive an inquiry from an oil company, they are very specific in what they're asking for. So they'll ask for an accessory based on size, its poundage, its grade, and in other dimensional features that it requires. Everything that we supply then has to comply to a standard which would be typically API 5CT for casing for instance, and everything has to have traceability, and traceability is probably something

that's not well understood outside of the industry, but very well understood within industry.

So essentially API 5C OCTG is manufactured at a steel mill, a section is taken off as a coupon, and it's put through a laboratory test to give it chemical and mechanical properties, and that generates a little cert with those properties written on the cert. Every piece that comes out of the section has a heat number, a badge number with it, and that remains on the product all the way until it goes to the well. If at any time that traceability is lost, it's deemed scrap. It doesn't get used. Anyone who is supplying steel must supply steel from a mill that has been certified by API themselves, and there's actually on the API website they have the ability for you to check the active licence of a manufacturer mill to ensure that they are currently licenced to manufacture under API 5CT. So it's a whole process from beginning to end of maintaining that so even in a workshop, if you're asked to take say a full section from mill and cut it in half and make two short pieces out of it, the first thing you have to do is transfer the traceability numbers onto both halves before you cut it in half. Cause at any point you lose traceability, it can't be used. And this goes on for also using solid or worse bah-stock to make other accessories that go into the well.

Whenever a connection is made up, the connection make up at the bucking machine which I showed before. The equipment that is used to make up has to be calibrated. The staff who are doing the work have to be trained, and have to be properly trained to their particular task. Every connection that's made gets logged as to the traceability of the material and the piece associated with has its own unique number, and the graph is kept and maintained as part of the certificate of performance. It goes with the job. That's for all the mill makeup, or the workshop makeups.

Separately, they have to rig their own ... They got the ability to log the makeup of the other side of the connection they makeup onsite. So we can keep a full watch on the whole way through from mill through to the well as to what's going in and that it's the right material. I think most of the material coming out of Europe, Japanese and American mills are, I've accepted as being okay. Chinese is the thing that people get concerned about. There are some Chinese mills that do produce very good, high quality API 5CT in some of the lower grade casings, like LAT or P1-10, but they're still struggling with the high end or the chromium type materials. And there's a few of them that are not quite so consistent. Not so ... Yes.

Hon. Justice Rachel Pepper: Professor Hart.

Prof Barry Hart AM : You told us about the unfortunate demise of your company, and also made us aware of issues of reinstating, re-skilling, SME, service capability. Could you give us any thoughts, probably from your own experience, of the time that you think it would take to achieve the re-skilling and reinstatement in service industries?

Mark Fraser: The hard thing is to call a start of a facility would maybe cost say three to five million dollars. For a small company, that's a lot of outlay, and you have to look at a number of factors, from the volume of work you're going to get, and the likelihood of further interruptions down the track. Whether or not there's somebody on track with another decision to pull the carpet out, so to speak.

I just would like to speak on another area here, because I see a lot of people bring up this subject about local content and how that all works. One concern I have that I think is possibly one of the sources of the problem is the way that the procurement logistics is being trained to behave in a fashion that is more like a central purchasing, and then what happens is you have purchasing, procurement managers, procurement officers based in say Sydney or somewhere afield. They'll tend to use people in their area, because that's who's there. That's who knocks on their door as opposed to having regional procurement people. I think one of the ways to get past that hurdle of getting actual real tangible, real local content is to somehow put into the mix that there needs to be some level of local procurement capability, so it's able to be familiar with the local capabilities.

The other part of that is also to homogenise some of the actives or the operatives. For instance, if pangea, as example origin and santos each required inspection services on an ad hoc basis, and they each have their preferred person who happens to be the state. We end up with three different teams of FIFO. If they combine together and spread the work out sensible, you could possibly have one local company, which had continuous going from one, to the other, to the other one. I think this is probably the smarter way to move towards generating more local content.

Prof Barry Hart AM : Could I just continue on with that? I think you mentioned how many of your staff you were required to retrench? Was it 17?

Mark Fraser: No. it wasn't that many no. We had a bit over 12, but we had nine by the time we closed because we let some go. We let them-

Hon. Justice Rachel Pepper: So 12 (cross talk) you had to let go of 12.

Mark Fraser: 12 would be the hire end of it, Yeah. I think it's important to understand that sometimes in the language of who, people's titled on who works in the gas industry. I had an electrician ... We had over 200 vendors, I would say 150 of those would be local in Northern Territory here. So we would be using them for all kinds of things. Some would be only once and a while, some would be every day. All the time. And then we had truck drivers were coming in our yard all over and again, some of those truck drivers were owner-operators, and when oil work dried up, I believe that they had to sell the trucks and there was impacts with mortgaged, loans against their house and so forth.

We had an owner-operator who fit all, serviced our equipment, and I had to sit down and tell him you know we had got no more work for him, and we were one third of his income. So there's all these people they don't get seen

they're invisible, some of them would call it a trickle-down effect, but yes. It's real to me because I see that.

Prof Barry Hart AM : Give me a feel for the size of the loss of turnover that you suffered.

Mark Fraser: It's hard to quantify, because the difficulty with the kind of work that we're doing is we're fixing things, or modifying things as they're required. We're not the front end where you're buying the new, or manufacturing things or modifying things afterwards. So to get like a mechanic to try to predict how many cars are going to break down, a panel beater trying to work out how many panels you'll fix, so ...

Prof Barry Hart AM : Was it two million? Five million? Ten million?

Mark Fraser: I would say just under a million.

Prof Barry Hart AM : That's pretty significant. The other point I wanted to get your view on is I could mount an argument that this sort of situation, terrible as it was, is a consequence of our capitalist society and changes in technology, things like that that happens all the time. What's your response to that?

Mark Fraser: Good question. That is true. I think the argument then would be between whether we are talking about whether the coal, we got gas, and then we got renewables. And it's about what stage are we with technologies and at what pace we need to move and how evolved we are with what. I certainly agree that we need to start to move away from coal towards gas because there's more things coming up with coal, with regards to other things, mercury and sulphur, and other things that come into atmosphere beyond the CO2. So natural gas obviously is a very good fit to come into that space. Lowers our CO2 at the same time.

We see in America that they're documenting how their transition from coal to natural gas has had a great benefit on their environment. The next thing is obviously, as you pointed earlier, is that natural gas is, unlike coal, unlike renewables, it's also used in manufacturing. Whether it's used as an energy source, whether it's used as a raw feeding ingredient into things chemical in nature. So we still got that, that's going to have to be ongoing with natural gas. Renewables are coming, but at the moment they can't come without a fair bit of grants and subsidies. As much as label of greed laid at the feet of resource companies, we should also be extremely wary of impacts on individuals involved in renewables that they aren't equally as ferocious at being a bit greedy with how much money that they want to make out of renewables and push along a sense of urgency in that sense.

There's things like wherever the lithium battery for South Australia, but when we go back and look at some of the technology used in lithium mining, it's not always environmentally that friendly. They are dewatering from brackish aquifers. They're putting out huge ponds. There's a huge amount of salt drawn up. There's lots of things I see in the processes that have been used in lithium making, and if we look at that on a long term scale, how

many lithium batteries are we going to build around the world? And how much lithium mining are we going to do, and what are all the impacts of that.

So I think we need to take a step back sometimes and have a quick look of where we are on that process.

Prof Barry Hart AM : Thanks.

Hon. Justice Rachel Pepper: Thank you Mr. Fraser. We're now, we've run over time. Thank you very much for your presentation today. Thank you.