BEFORE THE EPA
OMV MAARI FIELD DEVELOPMENT MARINE CONSENT APPLICATION

IN THE MATTER	of the Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act 2012
AND	
IN THE MATTER	of a decision-making committee appointed to consider a marine consent application made by OMV New Zealand Limited to continue drilling in the Maari field in the South Taranaki Bight

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STATEMENT OF EVIDENCE OF FRANK BARKER

FOR OMV NEW ZEALAND LIMITED

Maari drilling process

17 September 2014

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INTRODUCTION

Qualifications and experience

1. My full name is Francis David Barker but I am always called Frank.

2. I have a degree in Mechanical Engineering from the University of Western Australia. I have 40 years of experience in the oil and gas exploration industry in the roles of Drilling Engineering, Drilling Supervision offshore, Drilling Superintendent and Drilling Manager. I have worked offshore on the North West Shelf of Western Australia, Timor Sea, Indonesia (both offshore and offshore) and 5 years in offshore Taranaki drilling & completion operations.

3. I am currently employed as Drilling Manager for OMV New Zealand Limited (**OMV**), based in New Plymouth, and have held that position since October 1, 2012. Prior to that, I worked for OMV Exploration & Production GmbH in Vienna as Senior Engineer Offshore Drilling.

4. My principal role is to manage the drilling and completion of exploration and development wells in the offshore permits operated by OMV. I am responsible for:

(a) the design and construction of wells to deliver the oil and gas to the wellhead;

(b) ensuring that the well construction process complies with the OMV Health, Safety, Security and Environment (**HSSE**) Management System, and is fully compliant with New Zealand legislation relevant to HSSE;

(c) a team of OMV and contractor drilling specialists, including drilling engineers, offshore drilling supervisors, drilling administration and logistics personnel;

(d) working with the relevant regulatory authorities, including Maritime New Zealand (**MNZ**) and the High Hazards Unit of the Ministry of Business, Innovation and Employment to provide the necessary applications to drill, incident investigation reports;

(e) liaising with the OMV AG head office in Vienna, and ensuring that well construction standards are communicated to my team and complied with in the planning, well design and execution of the well construction process; and

(f) the tendering and award of the necessary contracts for services to support the well construction operation.

Code of Conduct

5. I confirm that I have read the Code of Conduct for expert witnesses contained in the Environment Court of New Zealand Practice Note 2011 and that I have complied with it when preparing my evidence, to the extent that it might apply. Other than when I state that I am relying on the advice of another person, this evidence is entirely within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

Role in marine consent application

6. My role in this marine consent application has included the provision of this evidence and, through my team, technical information to support the drafting of the application.

Scope of Evidence

7. In this evidence, I will discuss:

(a) Maari development well construction operations including the existing operations, the development drilling process, the use of drilling muds, the processing of drill cuttings and muds, side tracking of existing wells, the use of explosives, removal of the

Ensco 107 drilling rig (**E107**) legs from the seabed, and activities ancillary to drilling;

(b) Drilling engineering practice including measures to prevent oil spill (safety case and discharge management plan (**DMP**) requirements);

(c) Safety and environmental priority;

(d) Selection of Ensco as the drilling contractor;

(e) Comments on section 44 information;

(f) Response to the EPA's Staff Report and the Genesis Report of the marine consent application; and

(g) Response to submissions.

8. I note that any specifications, figures or dimensions mentioned in my evidence that relate to drilling operations are illustrative only and are accurate at the time of preparation of my evidence. These matters are subject to change as the drilling programme progresses. I note that in any event, all drilling activities will be undertaken in accordance with the marine consent application.

EXECUTIVE SUMMARY

9. The Maari Wellhead Platform Tiro Tiro Moana (**WHP**) has 12 well slots with conductors installed approximately 260-325 metres into the seabed. Further drilling can be undertaken using the existing well slots and conductors rather than requiring any further surface drilling. In total, up to 7 wells will be drilled in the development drilling programme, with up to 5 of these being replacements of existing wells.

10. Drilling muds are used to lubricate the drill bit, bearings, mud pump and drill pipe, clean and cool the drill bit as it cuts, maintain well pressure and lubricate the borehole wall, prevent uncontrolled hydrocarbon flow, clean the hole by lifting the drilling cuttings to the surface, and carry cement and other materials to where they are needed in the well. Water-based muds are used where possible, and in the lower and horizontal parts of a well, synthetic-based muds are used.

11. Drill cuttings and muds are returned to the surface, where they are processed onboard the drilling rig. Processed cuttings are discharged 10m below the surface of the water, and the muds are reused. In total approximately 3,000 cubic metres of drilling cuttings are expected to be produced from the seven development wells.

12. The legs of the E107 have been placed into the holes that were created when the E107 was used for the first round of drilling in 2008/2009. The process of removing the legs from the seabed after the completion of drilling is relatively straightforward and takes approximately two hours.

13. When the E107 is in place and drilling is taking place, two support vessels are present. One vessel is used to supply the well head platform and the other vessel is used to both tow the E107 and as a supply boat for the E107.

14. OMV designs its wells and completions to industry standards. The well designs are examined by an independent Well Examiner. The contracts with service and equipment providers includes the required or appropriate industry standards.

15. Oil spills are unplanned events, and in fact OMV actively plans and takes measures to ensure that spills do not occur. One key document protecting against spills is the DMP. The DMP for the drilling rig contains an Emergency Spill Response Plan, which details how on-board spills and spills to the sea at varying levels of spill size will be handled, and a Well Control Contingency Plan, which describes what operational measures OMV would take to stop an oil spill in the event of a loss of well control.

16. During construction of a well, a barrier philosophy is implemented to ensure that well integrity is maintained. The primary barrier at all times is the column of correctly weighted mud inside the well. The secondary barriers are the blowout preventers and pressure tested casing strings. In practice, mud weights are a very effective primary barrier, and can cope with the potential for varying pressure in the target reservoirs. Blowout preventers are a backup and are always installed but only engaged if required.

17. Safety and environmental priority is central aspect of OMV's business and something that OMV takes very seriously. Rather than having health, safety and environmental matters (**HSE**) as a separate aspect of OMV's business, HSE is considered across every aspect of the business, from initial tendering, to project planning, to operations and to project wrap-up.

18. Ensco was selected as drilling contractor as part of a formal tendering process conducted in 2012/13. Ensco's performance in previous drilling campaigns our team has been involved with was very good, with both excellent HSSE performance and technical drilling results. Ensco has been in business for 25 years and is the second largest offshore drilling contractor in the world.

19. The E107 has a detailed Safety Case, which is readily available to all persons on the rig. Every person receives, on arrival for the first time, a detailed induction about HSE matters.

MAARI DRILLING OPERATIONS

Existing operations

20. The Maari Wellhead Platform Tiro Tiro Moana (**WHP**) was installed in May 2008. The wellhead features a well bay with 12 well slots in a 4 x 3 arrangement, as per **Figure 1** below. In 2008, 10 wells were drilled and conductors were installed. A further two wells and conductors (P10 and P11) were installed in April 2014. Accordingly, there are now

12 well slots with conductors installed approximately 260-325 metres into the seabed. Now that the further two wells and conductors have been drilled and installed, further drilling can be undertaken using the existing well slots and conductors rather than requiring any further surface drilling.

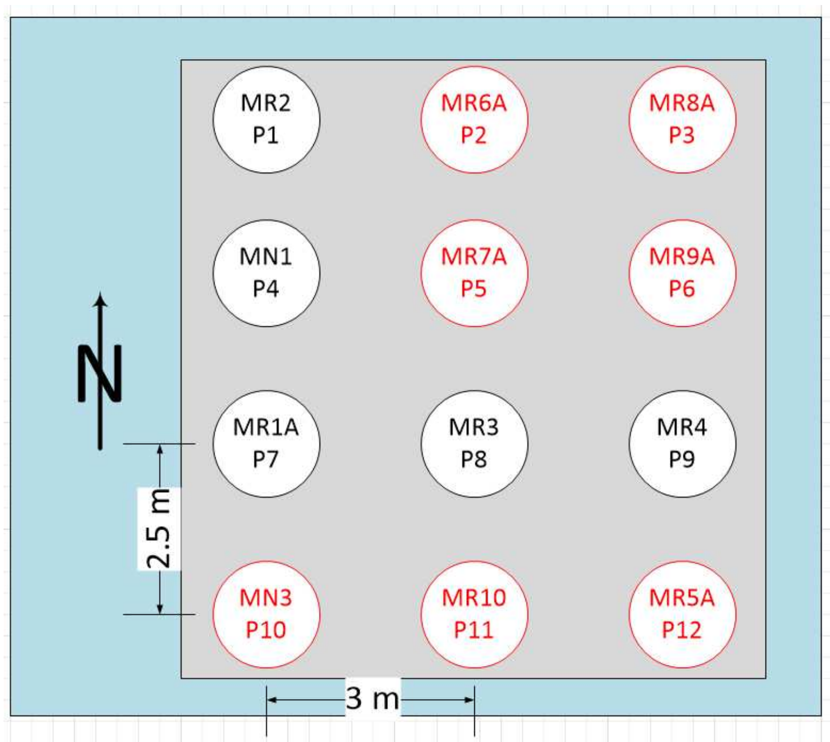

Figure 1: Conductor slots on the wellhead platform. Red indicates wells being drilled as part of the current development drilling programme.

Development drilling

21. Some of the drilling that is the subject of the marine consent application will take place in the two new well conductors (P10 and P11). In addition, up to 5 wells will be drilled as side-tracks from existing wells MR6A (P2), MR8A (P3), MR7A (P5), MR9A (P6) and MR5A (P12). Side tracking is described in greater detail at paragraph 52 and following. In total, up to 7 wells will be drilled, with up to 5 of these being replacements of existing wells.

22. The desired well locations within the Maari Moki and Mangahewa formations require that 3 existing wells must be plugged and abandoned so that the well slot can be used to drill to those locations. All three wells will be horizontal wells. The targets provided by the OMV subsurface team cannot be reached from the existing three wells. The reclaiming of the well slots allows a casing design and well bore trajectory that can reach the desired targets. Three of the wells will be plugged and abandoned in accordance with OGUK and OMV standards. The surface casing string (13.3/8”) will be cut and recovered so that the formation below the 24” casing will be exposed to allow the drilling of a new surface hole in the direction and depth required to meet the targets.

23. **Table 1** below summarises the new wells that will be drilled as part of the current redevelopment drilling programme.

Table 1: Overview of wells to be drilled

Name of Well	MR6A P2	MR7A P5	MR8A P3	MR10 P11	MN-3 P10	MR9A P6	MR5A P12
Type of Well	Horizontal side track from existing injector	Horizontal side track from existing water injector	Horizontal side track from existing water injector	Horizontal from new conductor slot	Extended reach horizontal from new conductor slot	Horizontal side track from existing producer	Horizontal side track from existing producer
Target formation	Mangahewa at Maari	Moki Cycle 1 at Maari	Moki Cycle 2 at Maari	Moki Cycle 1 at Maari	Mangahewa at Manaia	M2A at Maari	Mangahewa at Manaia
Target Hydrocarbon	Oil	Oil	Oil	None: Water Injector	Oil	Oil	Oil

24. The drilling process is illustrated by the cross-section of a completed well shown in **Figure 2** below. A hole is drilled into the subsurface and a casing is installed into the hole and cemented into place. The purpose of the casing is to prevent hole collapse and maintain well integrity. Then a slightly smaller drilling assembly is inserted into the casing and the hole is drilled further into the subsurface. A slightly smaller casing is then inserted into the newly drilled section and cemented into place. The process of drilling progressively smaller

holes and installing progressively smaller casings continues until the well reaches its target. A total of 4 different-sized casings are installed in the wells. Generally, the diameter of the well and casing will be as small as practical to achieve a targeted flow rate, because the smaller the diameter of the well, the less drilling mud, cement and casing is required. The processing of the cuttings and muds is explained later in my evidence.

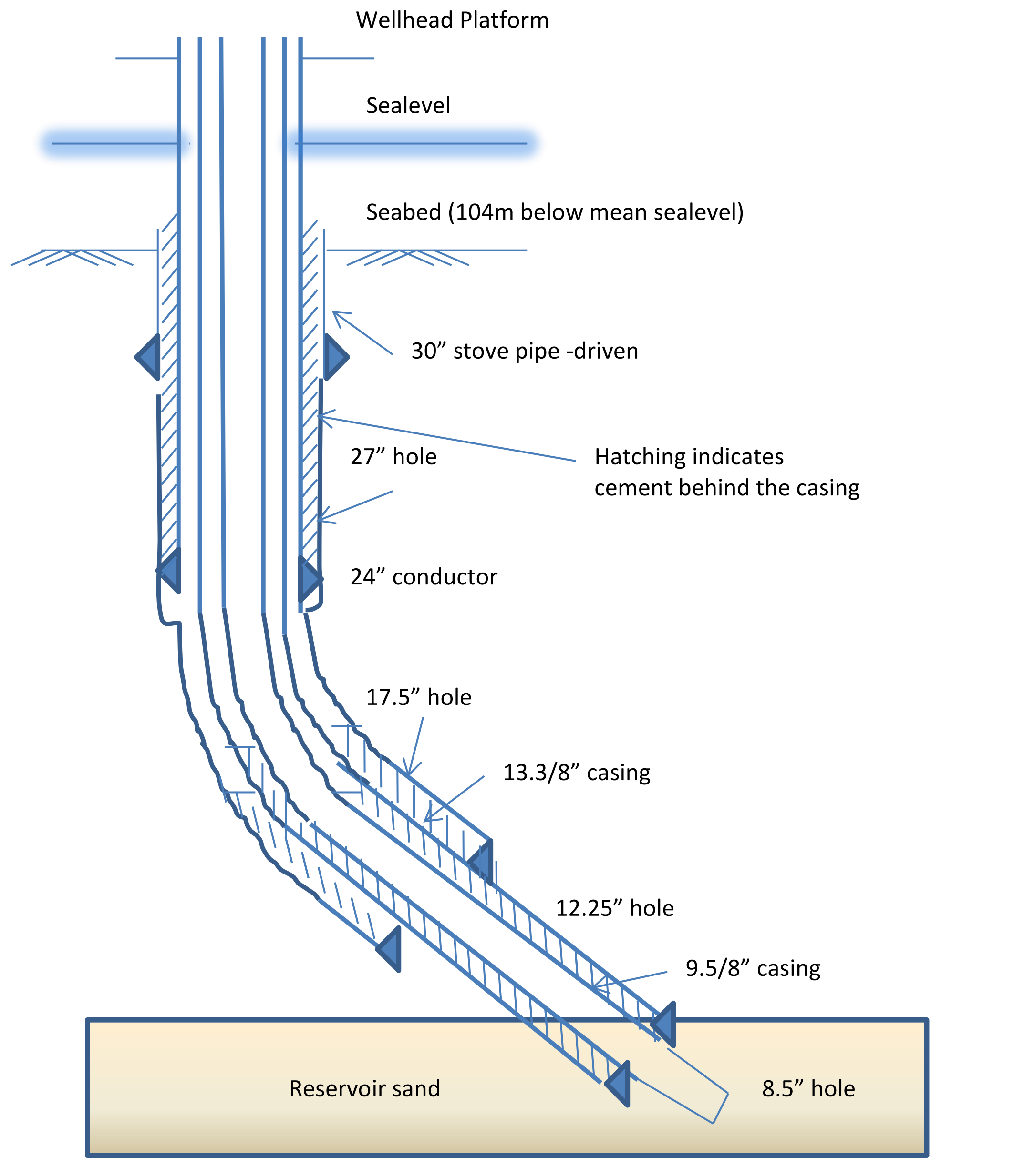

Figure 2: Cross section of completed well with casing installed showing diameters of holes drilled and casing installed

25. The depths of each section of casing for each well are shown in **Table 2** below. The shoe depths are cumulative because each section of casing starts at the surface and then continues beyond the end of the previous wider diameter casing.[1] As can be seen, by the end of the 9.625" casing (between 2160 and 6529m deep, the wells are almost horizontal.

Table 2: Depths of each casing section for Maari wells. Sections shaded in grey are already in place.

Diameter of casing

Well	30" Conductor		24" Casing		13.375" Casing		9.625" Casing		8 1/2" Hole	
	Shoe (m)	Inc (degrees)	Shoe (m)	Inc (degrees)	Shoe (m)	Inc (degrees)	Shoe (m)	Inc (degrees)	Shoe (m)	Inc (degrees)
MR06A	182.50	0.34	260.50	0.62	1250.00	0.00	2800	90.00	4710	90.00
MR07A	185.50	0.06	263.00	0.67	627.82	33.06	3480	84.80	4640	90.01
MR08A	185.71	0.06	262.30	0.38	1100.00	34.60	2160	88.00	3710	90.00
MR10	185.71	0.00	325.00	0.00	1475.00	68.00	3000	90.50	5365	89.70
MN-3	185.71	0.00	325.00	0.00	2040.00	77.23	6529	88.60	8482	90.70
MR9A	185.60	0.00	256.80	0.00	924 *	40	2160	90	4000	91
MR5A	185	0	260	0.6	1800	83.68	6400	90	7480	90.00

*Note: the existing 16" casing for MR9A will remain in place at 924m

Use of drilling muds

26. As part of the drilling process, drilling muds are used to:

(a) Lubricate the drill bit, bearings, mud pump and drill pipe.

(b) Clean and cool the drill bit as it cuts.

(c) Maintain well pressure and lubricate the borehole wall to control cave-ins and wash-outs of the borehole.

[1] Inc is short for inclination in degrees from vertical, measured at the casing shoe (deepest depth of the casing).

(d) Prevent uncontrolled hydrocarbon flow that could lead to well blow outs. The inclusion of heavy minerals such as barite or calcium carbonate (limestone) densifies the drilling fluid which counteracts the formation pressure in the hole and acts as a primary well barrier.

(e) Clean the hole by lifting the drilling cuttings to the surface and allowing cuttings to drop out over the shale shakers (vibrating screens) where the cuttings are separated from the mud and prevented from re-entering the well.

(f) Carry cement and other materials to where they are needed in the well.

27. The drilling muds are pumped from the surface, down the drill string to the drill bit. Once the muds exit the drill bit, they are carried up the outside of the drill string and back to the surface for processing and reuse.

28. There are two types of drilling mud used: water-based muds (**WBMs**) and synthetic-based muds (**SBMs**).

29. WBMs consist of the following:

1) Potassium Chloride (KCl) brine with a concentration of about 20% by weight of KCl in fresh water. This brine makes up 95% of the mud volume.

2) Viscosifier - Duovis - which is a Xanthum gum (long chain polymer) at a concentration of 2 ppb (pound per barrel).

3) Fluid loss additive Poly Acrylamide (PAC) added at 2 ppb.

4) Mono-ethylene Glycol at 2 ppb.

5) Magnesium Oxide at 2 ppb to control the pH of the mud.

6) Soda Ash (Sodium Carbonate) at 0.5-1.0 ppb to remove Calcium ions which affect the performance of the polymer (Duovis).

7) Barite or Calcium Carbonate - added as required to control the mud density. The mud density required in these wells is quite low and the concentration of barite will be low.

30. SBMs consist of the following:

1) the base synthetic fluid which is highly refined paraffin with the aromatics removed. This makes up 60% of the mud volume.

2) Calcium Chloride brine with a salinity of 180,000 ppm Chloride ion and makes up 30% of the mud volume.

3) Emulsifier (Novamul EH) which is a tall oil fatty acid (**TOFA**) and is added at a concentration of 8 ppb.

4) Viscosifier Truvis which is an organophillic clay added at a concentration of 4 ppb.

5) Lime (Calcium oxide) is added at a concentration of 6 ppb to control the alkalinity of the mud.

6) Fluid loss additive, Novatec F is a Maleated rosin polymer / glycol ether blend and is added at a concentration of 2 ppb to create a filter cake on the wellbore surface thereby stopping the liquid mud from leaking off into the rock porosity.

7) Calcium carbonate is added at a concentration of up to 80 ppb. Its function is to increase the mud density as required and has dual function of providing a bridging agent to assist with fluid loss to the reservoir sands.

31. I will leave it to other witnesses to discuss the effects of these substances on the environment, in particular **Fleur Tiernan**, **Jennifer**

Skilton and **Rod Asher**. I confirm there are no Polychlorinated Biphenols (**PCBs**) in the muds used at Maari.

32. SBMs must be used in some of the deeper or longer well sections, in order to reduce mechanical friction and provide greater lubrication to deal with the additional torque and drag that exists on the drill string when drilling horizontal well sections, and to provide additional stability in certain clay bearing sections of a well.

33. Another advantage of SBMs is that they are not as readily absorbed into the surrounding rock when drilling through shale (also known as claystone). Shales that absorb water will rapidly swell reducing the strength of the shale which then collapse into the drilled borehole. This collapsing can cause the drillstring to become stuck whereby it may not be able to be pulled free. SBMs do not cause the shales to swell and hence they maintain their strength and are less likely to cause borehole failure.

34. SBMs have a much higher lubricity than WBMs and therefore provide lower friction resistance to the drillstring during its rotation and while running and pulling the drillstring in and out of the well. This is of greater advantage in high inclination wells and especially in horizontal and extended reach wells. Extended reach in this context means where a section of the well bore is drilled at elevated inclinations of say 60-70 degrees over long intervals such as 1000-2000m. In those wells the largest part of the drillstring weight lays on the low side of the wellbore which creates the largest frictional forces resisting the rotation and longitudinal movement of the drill string.

35. The Maari wells include a combination of long reach and horizontal sections therefore SBMs are required for those parts of the drilling process. If the friction forces become too large it will not be possible to lower the drillstring or casing strings into the hole. Similarly those same friction forces can create torsional resistance so large that the drillstring cannot be rotated and therefore the bit cannot drill ahead. The Maari and Manaia sandstone reservoirs contain interbedded shales.

36. Although SBMs enable drilling to be undertaken more easily and at reduced cost, OMV's preference is to use WBMs over SBMs wherever possible, for environmental and health and safety reasons. WBMs, because they are water based, are less harmful to the environment and less irritating to the skin of workers that are required to come into contact with the mud.

37. Accordingly, SBMs are generally only used for the final stages of the drilling of deep wells. In the Maari wells the final horizontal hole sections are typically about 1500-2000m long in the Manaia wells, MN-3 for example, the extended reach section is about 4000m long at 75 degrees to reach the reservoir. The final reservoir section is drilled horizontally for about 2000m.

38. I discuss the use of different types of mud weights and the reason for this in paragraph 76 and following.

Processing of drill cuttings and muds

39. As shown in **Figure 3** below, after the mud (the general term used for drilling fluid) is ejected at the drill bit, it is transported back up the well and is processed on board the drilling rig. Both SBMs and WBMs are processed in this way.

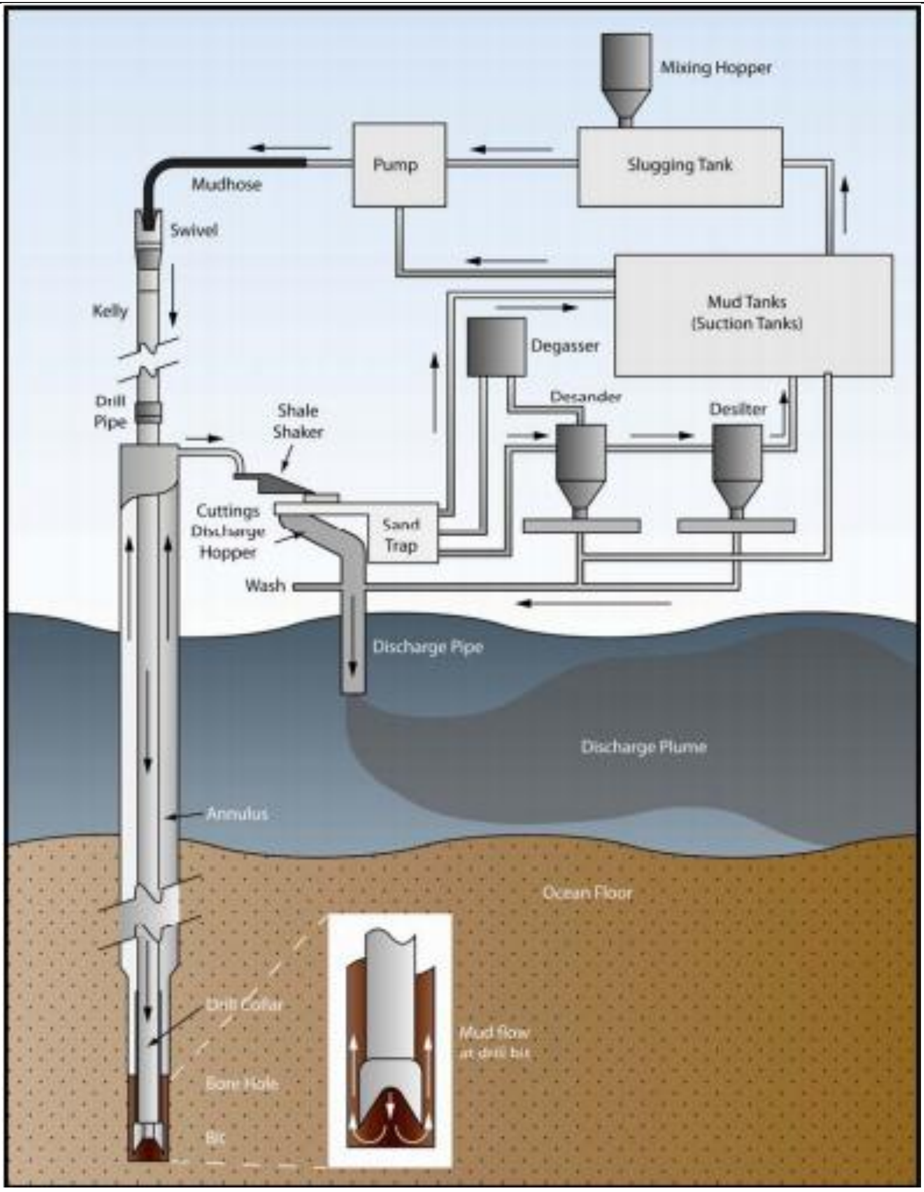

Figure 3: Processing of drill cuttings and muds

40. The quantity of mud that is returned to the rig is monitored to ensure that as much mud as possible is brought back to the rig. If there has been a degree of loss of mud, measures are put in place to reduce or stop the amount of mud lost such as plugging any porosity or fractures in the formation that allow fluids to drain off into that porosity or fractures. This plugging is achieved by adding Lost Circulation Material (**LCM**) to the mud as described in paragraph 42 below.).

41. The mud tanks on the drilling rig are instrumented so that the driller can monitor the level of mud in the tanks. During any circulation of mud down the drillstring and back to surface while drilling is not occurring, the level of the mud tanks should remain constant. If the tank level drops it may indicate that mud is being lost down hole.

42. While drilling a new hole, the driller accounts for the fact that mud is filling the drilled hole for every metre of hole drilled so the tank volume reduces at a calculated rate. Any increased reduction in tank levels is investigated by the driller by stopping circulation and observing the fluid level in the wellbore at surface. Once losses have been recognized they can be stopped by adding LCM into the mud. This LCM is usually a mixture of fibrous materials of various coarseness and other material such as ground limestone and marble which enter the loss zone and block the leak path into the formation.

43. Mud can be lost at the shale shakers if drill cuttings block the screens and mud flows across the screens into the discharge ditch which is located at the end of the screens on the shale shaker. The discharge ditch drains to the ocean. The screens are monitored by the driller with a CCTV and a person is assigned at the shale shakers to regularly clean the screens.

44. When drilling is underway, drill cuttings are produced as the drill cuts through the subsurface. The drill cuttings are accordingly made up of the same rock material that is being drilled through. The drilling cuttings are transported by the drilling mud up to the surface and are removed from the drilling mud according to the following process.

45. First, the mud is put through a shaker screen, which consists of a series of large vibrating sieves with different sized mesh which remove any large solid matter from the mud. The mud is then passed through a centrifuge or a hydrocyclone which removes any fine solid matter that is in the mud.

46. In this way, drill cuttings are removed from the drilling mud and the drilling mud is able to be re-used once it has been processed. However, eventually bacteria start to grow in WBMs, at which point they have reached the end of their useful lifespan and they are disposed of by discharging to sea in the same manner as the cuttings described below.

47. Once the drill cuttings have been removed from WBMs, the drill cuttings are discharged overboard from a pipe located about 10 metres below the sea surface. As outlined in the marine consent application, in total approximately 3,000 cubic metres of drilling cuttings are expected to be produced from the seven development wells. This is an estimate and not a maximum, and as discussed later, it would not be appropriate to set it as a limit.

48. Not all mud is able to be removed from the drill cuttings. The volume of mud that remains with the drill cuttings will depend on the surface area available for the mud to adhere to. A given mass of fine particles of drill cuttings will have a greater surface area than the same mass of drill cuttings made up of larger chunks. The industry experience is that for every 1 bbl (barrel) of rock drilled there is about 1 bbl of water based mud attached to the cuttings after they leave the shale shaker. Given the WBM is about 95-98 % water the remaining chemicals (salt, polymer and barite etc) make about 0.05 bbl of chemicals and mud solids that are disposed with the rock.

49. Drilling cuttings that are produced from drilling with SBMs undergo additional processing in a large spin dryer which removes a greater amount of mud from the drilling cuttings than the shakers and centrifuges. OMV aims to achieve an average target level of residual oil on the cuttings for a well of 4.9% of the mass of the cuttings. This was the target specified in the DMP and accepted by MNZ. The DMP treats the 4.9% as a target rather than an absolute limit, and recognises that the instantaneous level may vary on any given day (for example in the event weather prevents OMV from getting cuttings bins off the supply vessel and all the bins on the rig are full, or if there is an equipment failure and the well is being circulated to make it safe while repairs are being undertaken). Two samples of SBM cuttings per day are taken and the residual oil on cuttings is determined by distilling the oil off the samples in a retort and recording the percentage of oil by mass of oil per mass of dry cutting.

50. If the target level of 4.9% is achieved, the cuttings are discharged overboard. If the target level of 4.9% is not achieved, then subject to safety considerations and sufficient storage being available the drilling cuttings are transported back to shore in sealed bins and are disposed of onshore.

51. In addition, a small amount of cement is brought up to the surface when drilling through existing casing and is removed from the mud when it is processed on the rig, in the same way as drilling cuttings. Most of the cement that is used to secure the casing stays in place around the casing. When cement is used to secure the casings in place, a small amount of wet cement is brought back to the surface and is processed on board. There is also a small amount of cement left in the bottom of the casing when drilling out the casing. This cement is also processed on board. Whether the cement is discharged overboard will depend on whether the cuttings achieve the residual oil target of 4.9%. The amount of cement is a very small proportion of the overall drilling cuttings.

Side tracking of existing wells

52. Side tracking of the existing wells is a process that allows parts of existing wells to be used and new wells to be drilled from the existing wells. Side tracking is shown in greater detail in **Figure 4** below. First the lower part of the well is plugged and abandoned with cement. Tubing and casing are cut and removed from the wellbore. In this program the 9.5/8” and 13.3/8” casings are cut and removed such that a 50-60m gap remains in 17.5” hole below the 24” casing. The upper part of the 13.3/8” casing in these abandoned wells requires a mill to be used to mill the cemented casing to the desired depth below the 24” conductor shoe. This gap is filled with cement which provides a base for a directional drilling specialist to drill an inclined hole away from the existing hole. A well can then be drilled in a different direction to the existing well.

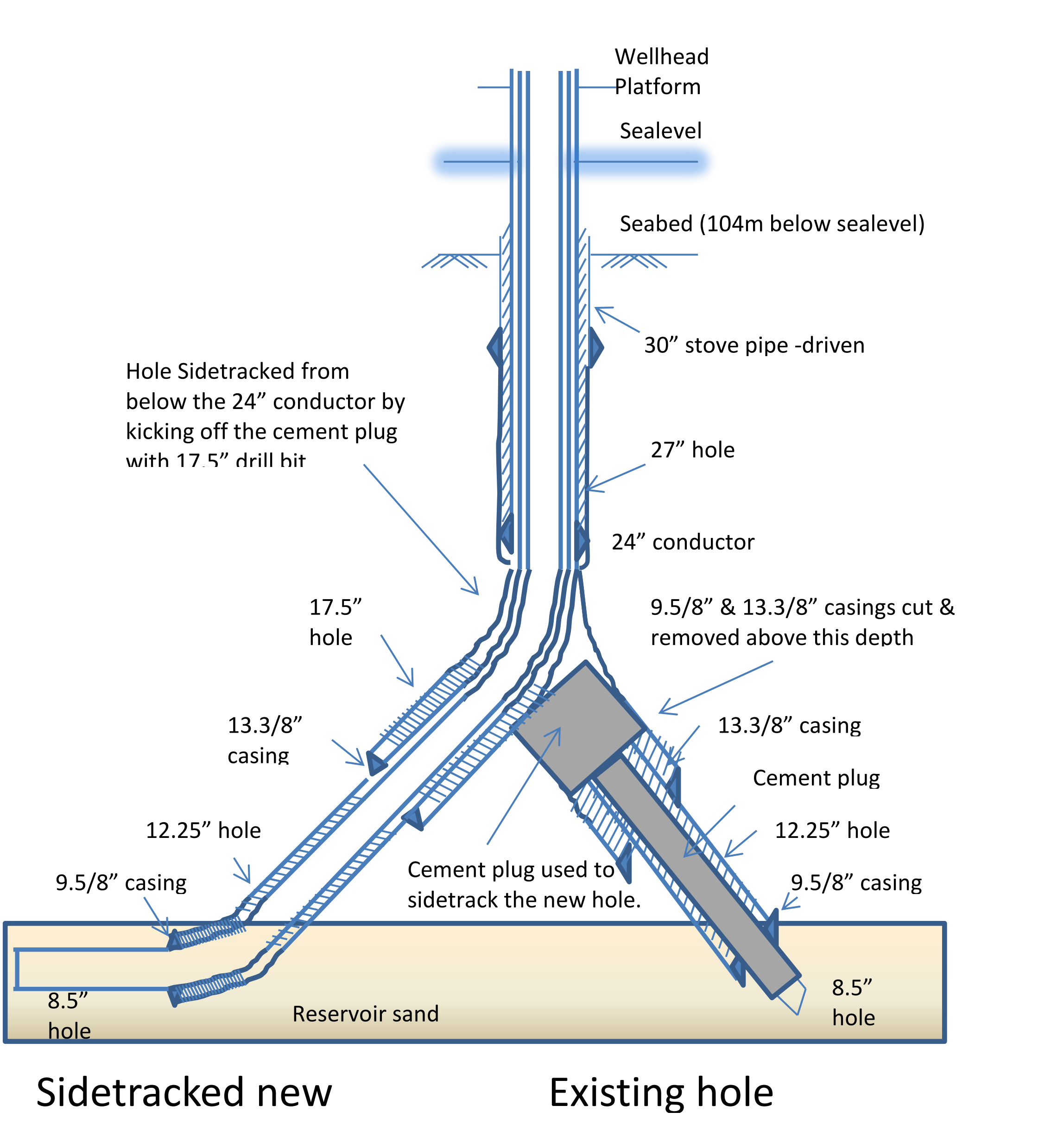

Figure 4: Well that has been plugged and side tracked

53. When the existing casing is removed through being milled, milling swarf is produced. The milling process is similar to drilling except that the bit (called a mill in this case) has a cutting structure designed to cut steel casing. Milling swarf consists of finger-sized slithers of steel which are carried up to the surface by mud flow in the same way that drilling cuttings are carried up to the surface for processing. Swarf is removed from the drilling mud and is brought back to shore for disposal. Specialist swarf handling equipment is installed on the rig. This consists of a large rotating drum with screens that allow the mud to flow through the screens and the swarf is captured on the screen and discharged into skips for disposal.

54. Approximately 10 tonnes of milling swarf is produced per well, and almost 100% of all milling swarf is be able to be recovered and brought back to shore for disposal. Almost 100% of the swarf is able to be recovered because it does not break down into finer particle sizes like the sands and shales. There is always some residual swarf (a very small percentage of the total) that presents itself in cavities in the flowline and the wellhead spaces later. This residual swarf is cleaned out and placed in containers for return to shore.

Use of explosives

55. Explosives are not used as part of the regular drilling process. However, they may need to be used in two situations:

(a) to perforate a hole in the side of the well to allow oil to flow into the well or squeeze cement into the space behind the cement; or

(b) to free a drill string that has become stuck. This usually occurs deeper in the well due to the higher pressures on the drillstring experienced in the deeper portion of a well.

56. Over the course of drilling the seven anticipated wells, it could be reasonably expected that explosives would have to be used once. It is preferable to not have to use explosives because of the potential expense of damaging the drill pipe and the loss of drilling time if the drill becomes stuck.

57. OMV plans its wells so that they will not become stuck but when unforeseen circumstances arise, the explosives are a necessary contingency when all else fails. The drillstrings have jarring tools in them to allow the driller to apply upward or downward jarring forces to unstick the drill pipe if needed. If the jarring tools are below the stuck point they become ineffective. In this event explosives would be needed to either sever the drillstring or to assist in backing off a drillstring connection above the stuck point.

58. The explosives are specialized for use in drilling fluids at varying temperatures and hydrostatic pressures and are supplied by our contractors who maintain stocks in magazines in New Zealand. The explosion is confined downhole and can only usually be felt as a minor jolt, and only if one holds onto the drillstring at the surface.

Removal of the Ensco 107 legs from the seabed at the end of the drilling

59. The E107 drilling rig has three legs which penetrate 4-5 metres into the seabed. This is relatively shallow because of the strength of the soils of the seabed off the Taranaki coast. The legs of the E107 have been placed into the holes that were created when the E107 was used for the first round of drilling in 2008/2009. The holes on the seabed from the E107 legs can be seen in the sonar image of the seabed in **Figure 5** below. One triangular set of holes was created by the E107 being placed in position for drilling next to the well head platform, and the other set of triangular holes, approximately 50 metres away, was created by the temporary "parking" of the E107 before it was installed in its final drilling position, in order to hook up the anchors required to pull the rig into the WHP.

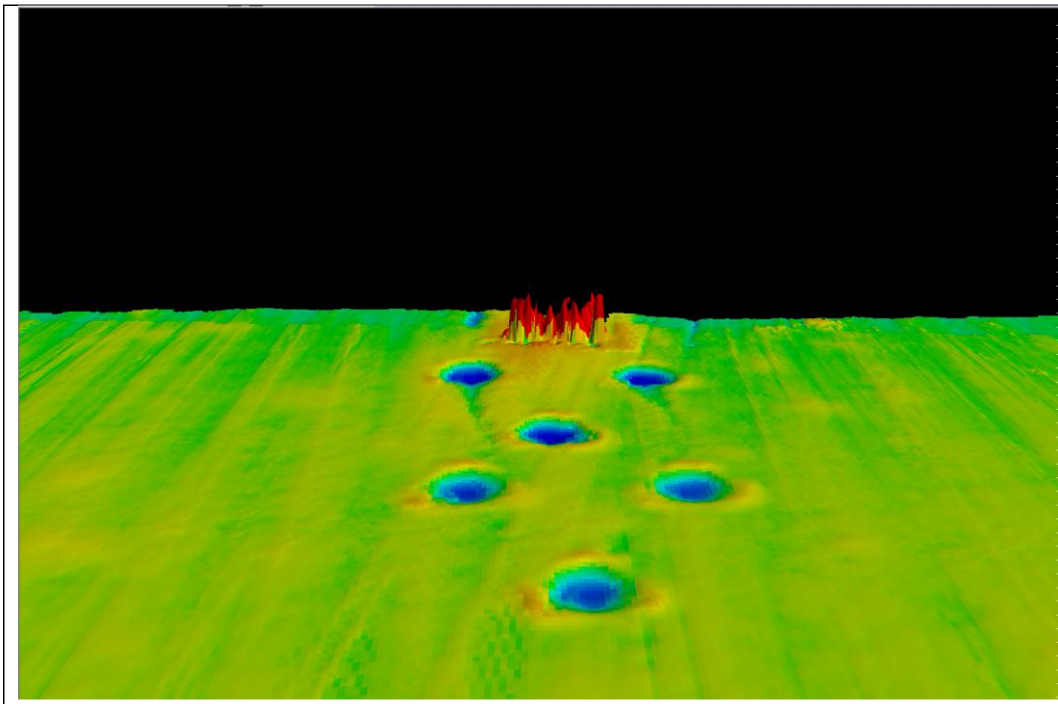

Figure 5: Sonar image of seabed below the well head platform, dated 8 June 2013. The blue areas represent the holes in the seabed made by the E107 legs. The red raised area at the rear of the image represent the legs of the well head platform.

60. The holes for each leg are not drilled into the seabed, rather they are caused by the weight of the rig penetrating the legs into the seabed. The rig is installed into the seabed by loading the rig with ballast water to a greater weight than will be present during drilling, to ensure that the rig is securely mounted on the seabed. Core sample holes were previously drilled and models were created in order to determine the strength of the soil in the seabed before placement of the rig.

61. In order to remove the legs after the completion of drilling, the E107 will be lowered on the legs so that it is floating on the surface of the water. With the support of the rig floating on the surface of the water, the legs are then jacked up and pulled out of the seabed. This is a relatively simple process because the legs of the E107 do not penetrate very far into the seabed. The process of removing the legs from the seabed takes approximately two hours.

62. As described at page 89 of the marine consent application, it is envisaged that a small amount of sediment material will be disturbed when the legs are removed from the holes in the seabed. This sediment will then settle again on the seabed.

Activities ancillary to drilling

63. When no drilling is taking place and oil is being produced at the well head platform, one support vessel, the Pacific Ranger, is used to supply the well head platform. When the E107 is in place and drilling is taking place, an additional support vessel is present. This additional vessel is used to both tow the E107 and as a supply boat for the E107.

64. The additional vessel, Pacific Worker, is an anchor handler and supply vessel equipped with bow and stern thrusters capable of dynamic positioning alongside the E107. It has a large area deck of 13m x 40m for carrying drilling equipment and materials. It also carries bulk powdered materials such as cement, barite, bentonite and liquids including diesel fuel and liquid muds in below-deck tanks.

65. When drilling, there will always be at least one support vessel present at the drilling site that can be used to evacuate the rig crew in the event of an emergency and is on close standby when over-the-water activities are conducted by rig crews . The vessels could, if approved by MNZ, also deploy oil dispersant onto oil spills if required. One vessel also has the facility to install a side collector if required to recover oil from the sea surface. A side collector is a floating catchment boom supported from the vessel that is open in the direction of the vessel travel. Oil collects in the boom and is then pumped out into containers or tanks on the vessel. Both vessels also have firefighting monitors (water cannons) that can project water and foam onto the rig and platform in the event of a fire.

DRILLING ENGINEERING PRACTICE

Industry best practice

66. Industry best practice is now generally guided by standards, recommended practices, procedures and guidelines published by organisations such as the American Petroleum Institute (API), Oil &Gas UK and NORSOK of Norway. These publications cover almost every aspect of drilling and completions operations and HSE. OMV uses these standards where appropriate in the design and construction of its wells.

67. The contracts with service and equipment providers includes the required or appropriate industry standard mentioned above. OMV designs its wells and completions to the industry standards above as set out in the OMV Well Engineering Managing System, Well Engineering Process and Well Engineering Policy. The well designs are examined by an independent Well Examiner.

Oil spill mitigation measures

68. Oil spills are unplanned events, and in fact OMV actively plans and takes measures to ensure that spills do not occur. Section 5.2 of the marine consent application sets out the potential unplanned events that could occur in relation to the development drilling, and hence potential sources of a spill. It also sets out the range of measures that OMV implements to avoid spills. I list these for ease of reference below and then focus on the DMP for the E107 in particular:

(a) Extensive planning, peer review, testing and design of each well.

(b) The installation of a Blowout Preventer (**BOP**) at the rig platform.

(c) The use of drilling fluids, steel casing and cementing.

(d) Sophisticated monitoring systems to detect potential blow outs.

(e) The implementation of an approved DMP.

(f) The existence of an approved Oil Spill Contingency Plan (contained in the DMP).

(g) The use of oil spill trajectory modelling to predict potential impacts from an oil spill.

(h) Oil spill response kits are located on board the E107.

(i) Appropriate access to oil spill response capabilities.

(j) The E107 holds a current International Oil Pollution Prevention Certificate.

(k) A Safety Case has been approved for the drilling programme by Worksafe NZ.

69. The DMP for the E107 was approved by MNZ on 25 March 2014. Appendix C of the marine consent application sets out a summary of the DMP.

70. In brief, a DMP consists of two key parts. The two key parts require an operator to:

(a) manage operational discharges (business as usual); and

(b) have emergency response procedures to prepare and respond to spills of harmful substances (unintended discharges).

71. The E107 DMP covers information about the E107, how normal operations will be undertaken, and it provides details of the oils and hazardous and noxious materials used on the installation. The DMP must contain:

(a) an Emergency Spill Response Plan, which details how on-board spills and spills to the sea at varying levels of spill size will be handled.

(b) a Well Control Contingency Plan (**WCCP**), which describes what operational measures OMV would take to stop an oil spill in the event of a loss of well control. It includes detail on the response options that would be utilised and command and control elements that would have to be integrated with the overall oil spill response.

72. Mr Welsh addresses oil spill response in further detail in his evidence.

Mitigation measures implemented based on advice from Petroleum Engineering team

73. When a well is proposed, a Well Design Criteria document (**WDC**) is generated by the Petroleum Engineering team (headed by Karl-Heinz Zelt) and submitted to the Drilling Engineering team. This document details the objectives and requirements of the well, and includes information on expected rock strata to be encountered in terms of rock type, temperature, fluid type, rock strength, hydrocarbon presence and pore pressure. In addition, the WDC includes information on the level of uncertainty on all of the above factors.

74. From this document and from regional offset experience and global precedents the Drilling Engineering team generates a Basis of Design document (**BoD**). The BoD outlines the options examined, design challenges and the proposed design of the well to meet both the requirements of the WDC and the well engineering design standards of both OMV and SPD (one of the drilling contractors).

75. Once the BoD is approved and signed by the Drilling Manager, the detailed design is undertaken to define the specific materials and techniques to be used to achieve the well objectives and requirements and account for expected and unexpected uncertainty to accepted company and industry standards. A casing design verification is undertaken, which models the selected materials performance in the range of scenarios that might be encountered during the construction and production of the well to ensure that the materials are appropriate with sufficient safety factors.

76. During construction of the well, a barrier philosophy is implemented to ensure that well integrity is maintained. The primary barrier at all times is the column of correctly weighted mud inside the well. The secondary barriers are the blowout preventers and pressure tested casing strings.

77. The weight of the mud is tailored to provide suitable overbalance to control expected reservoir pressures and account for uncertainty, to industry and company standards. In practice, mud weights are a very effective primary barrier, and can cope with the potential for varying pressure in the target reservoirs as outlined in **Dr Zelt's** evidence.

78. In terms of the secondary barriers, the integrity of the well is verified as each casing section is installed and cemented, through pressure tests applied to both the casing and junctions to the wellhead and BOP. In this way the secondary barriers are verified to perform as designed.

79. The BOP is installed on the wellhead while drilling and functions as a method of shutting in the well should the fluid column be overcome during well construction activities. It is specified to allow closing in on the well regardless of the well construction activity being undertaken, and can be applied to casings of various sizes. The BOP strength rating is determined by the maximum expected reservoir pressure and safety factors applied as per industry and company standards. Prior to removal of the BOP, two barriers must be in place and verified by pressure testing.

80. The BOP is operated by the driller through controls at his drilling station. If at any time the driller determines or suspects that oil, gas or water is flowing into the well causing mud to flow out of the well he can activate an appropriate preventer from his control panel. Closure time is about 30 seconds after initiation. If the preventer that he closes does not seal fully he can close one of the other preventers (ie the Annular). The usual order of preventers used is the annular first and if it leaks then the pipe rams are used. Finally the shear rams are the last resort as mentioned below.

81. The pipe rams shown below are designed to close and seal on the drill pipe, the Annular is designed to close and seal on a various sizes of drill pipe and casing. The shear rams would be activated as a last choice in the event that the other preventers failed to seal. The shear rams are designed to sever the drill pipe and certain casing sizes and seal off the well bore.

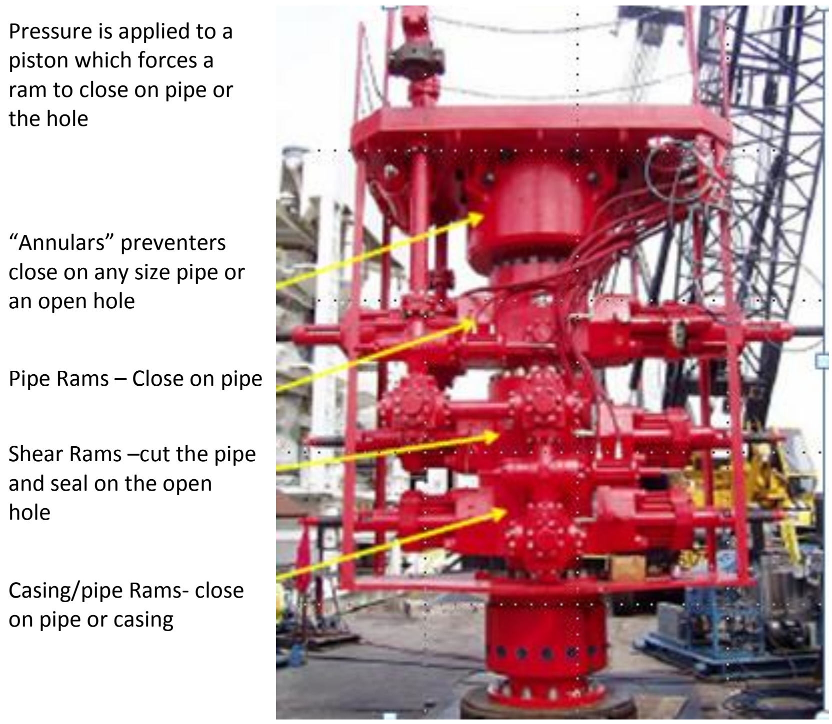

Figure 6: Different types of Blow Out Preventers

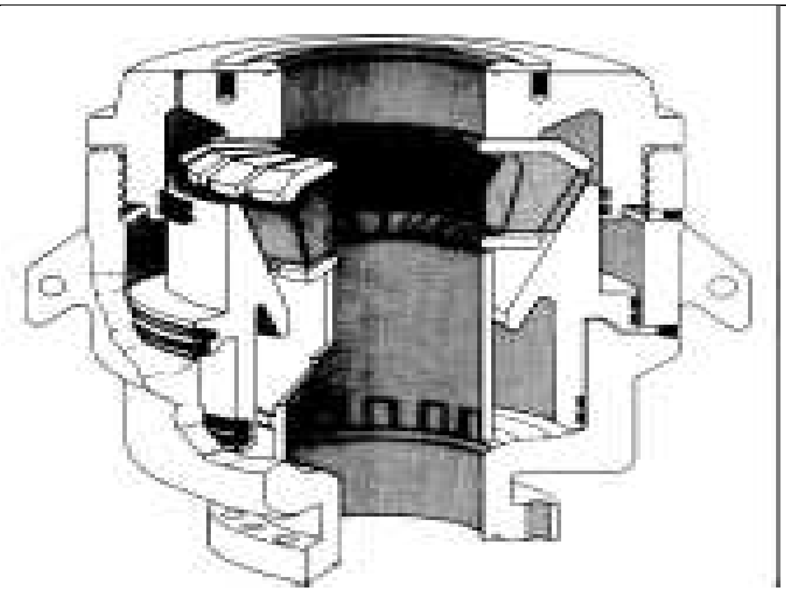

Figure 7: Annular Blow Out Preventer

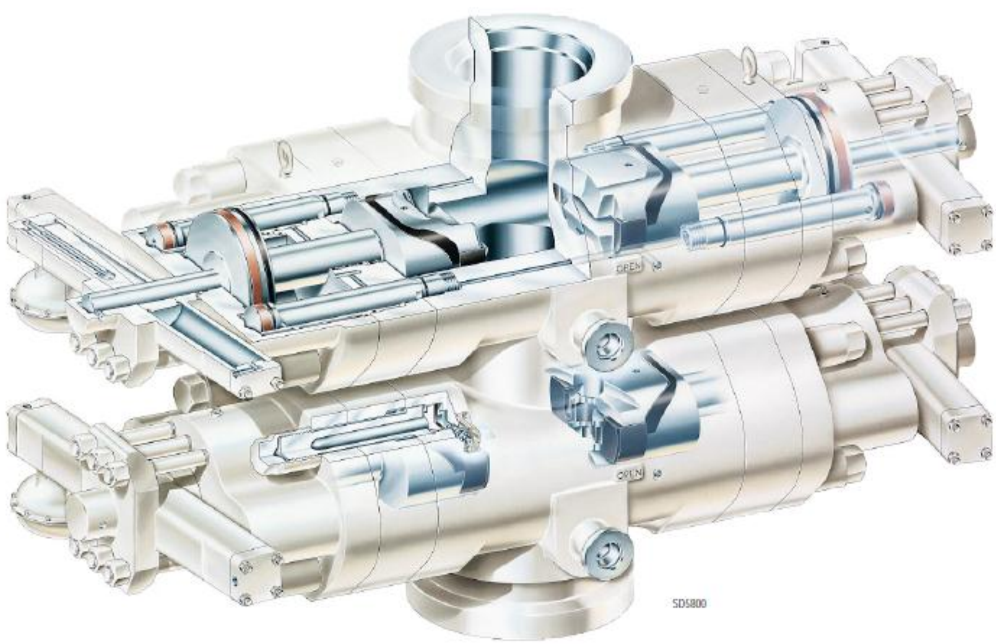

Figure 8: Pipe Ram Blow Out Preventer

Figure 9: Shear Ram Blow Out Preventer

82. Throughout construction of the well the pressures encountered, rock strata, hydrocarbon presence and rock strength are monitored via various means and reviewed against the expected values. Should any departures from the expected values occur, the design of the well is revisited to ensure that the well's integrity is not compromised prior to well construction continuing.

SAFETY AND ENVIRONMENTAL PRIORITY

83. Safety and environmental priority is central aspect of OMV's business and something that OMV takes very seriously. Rather than having HSE as a separate aspect of OMV's business, HSE is considered across every aspect of the business, from initial tendering, to project planning, to operations and to project wrap-up. For example, during the tender process, HSE is one of the factors used to evaluate tenders, along with technical, commercial and financial factors.

84. Once a tenderer is selected, OMV will carry out an audit of the tenderer's HSE systems before any work begins. OMV also carries out an investigation into the competence and suitability of the tenderer's key personnel. This usually involves ensuring that a person has appropriate experience in the industry generally or using certain types of equipment. The contract also stipulates that if the tenderer wishes to replace any of the key personnel, the tenderer must obtain written approval from OMV for the replacement.

85. Although OMV has dedicated HSE staff members, all employees are responsible for HSE matters. Prior to a drilling campaign, OMV will run two to three day workshops which are attended by around 250 people, and have been attended by senior OMV managers and the Managing Director, Peter Zeilinger. These workshops consist of interactive sessions on various matters including the project objectives, safety leadership, environmental matters and safety culture. Prior to the beginning of the Maari drilling campaign, three such workshops were held. From time to time, OMV has identified workers who have demonstrated a poor attitude to HSE matters at these workshops. In such a case, OMV will exclude these workers from working on the drilling rig.

86. Before a rig arrives for a drilling campaign, OMV will carry out an environmental and safety audit of the rig. This audit involves independent experts examining various areas such as the control systems, management systems, emergency shut down systems, firefighting system, lifeboats, life-rafts, fire and gas detection and alarms, cranes and other lifting equipment, airconditioning and ventilation equipment and environmental systems on the rig, including such things as the drains and water separators and waste management systems. The rig's management system to identify, secure and inspect the potential dropped objects from the derrick and substructure of the rig is also audited.

87. In addition to the environmental and safety audit of a rig, OMV carried out a drilling rig acceptance check prior to accepting the rig, which involved checking and testing hundreds of items on the rig. Independent expert inspection companies (such as Lloyds, Sparrows and HOSE) were used to inspect the general drilling safety systems, well control equipment, well control systems and the cranes and lifting equipment If an item requires further action in order to comply with the inspection, the item is classified as either Critical, Major or Minor:

(a) Critical items are those that could cause serious environmental or safety issues, and could involve loss of life.

(b) Major items are those that could injure people or cause environmental incidents.

(c) Minor items are not matters that pose a serious environmental or safety risk.

88. Prior to any drilling beginning, it is OMV policy that all Critical and Major items are closed out. Any Minor items are managed and closed out over time, and are not serious enough to justify preventing drilling operations commencing.

89. Once drilling operations on the rig have begun, OMV operates what is known as a "Carecard" system. Every person on the rig is required to take note of any HSE hazards or unsafe practices, as well as any positive HSE measures. The items noted are put into a database and are reviewed on a daily basis. If any items require corrective actions, these are tracked until the corrective action has been completed and the item has been closed out. Workers do not have a choice whether to note down any HSE issues on the Carecard system or to stop work when they identify an HSE issue; rather they are required to. This obligation helps to develop a positive HSE culture which encourages workers to look out for each other.

90. In addition to the Carecard system, each shift on the rig begins with a meeting at which any hazards or HSE issues for the day are discussed. This gives the workers an overview of the potential hazards that they might face before undertaking a certain type of work. In addition to these meetings, there are weekly HSE meetings held between the rig and onshore staff. At these meetings, any incidents in the previous week are discussed, as are any outstanding incident reports.

91. The rig also has a program for the maintenance of safety- and environment-critical equipment, which is equipment that would cause harm to people or the environment if it fails. Safety-critical equipment includes fire-fighting equipment, lifeboats, and gas detection systems. Environment-critical equipment includes such items as oil-water separators and oil spill response equipment such as absorbent material and vacuum units to clean up deck spills and skips to store the soiled absorbents for transport to shore for disposal. Each critical piece of equipment has a prescribed maintenance plan which requires certain maintenance on a weekly, monthly, six-monthly and yearly basis. The E107 drilling rig usually operates with all maintenance up to date. If any maintenance item is overdue, this is generally because a spare part has not yet arrived at the rig.

92. If maintenance on safety- or environment-critical equipment is overdue, appropriate steps are taken to remove any risks posed by the overdue equipment. For example, if a lifeboat cannot be used because it is awaiting the arrival of a part, the number of people on board the rig will be reduced to ensure that all people on board the rig can be safely evacuated onto the operational lifeboats in the event of an emergency.

93. In addition to the maintenance program on safety- or environment-critical equipment, 28 weekly audits are carried out on environmental and safety systems. These audits cover defined areas of operations where inspectors (rig managers and/or HSSE staff member) review the status of safety equipment, housekeeping, secondary retention on objects that may drop, signage, use of Personal Protective Equipment (**PPE**), status of Permits to Work, status of spill kits, status of drains and drain plugs and work practices.

94. Prior to any job beginning on the rig, a Job Safety Analysis is undertaken. This involves all people involved in the particular job going through a risk assessment of the hazards for the particular job. Once those hazards are identified and assessed, any controls or measures to mitigate or eliminate the hazards are identified. The Job Safety Analysis system requires a constant re-assessment of hazards

and controls or measures as circumstances change. This helps develop a culture according to which workers are aware of changing circumstances and are encouraged to stop work (with immediate effect) and reassess hazards if circumstances change.

SELECTION OF ENSCO AS DRILLING CONTRACTOR

95. Ensco was selected as part of a formal tendering process conducted in 2012/13. A number of drilling contractors were invited to bid. The tenders were evaluated on a number of factors:

(a) Technical - including HSSE, operability, project management experience and rig specification.

(b) Commercial - pricing and exceptions to OMV's contract.

96. The initially selected rig within the Ensco fleet became unavailable due to it being contracted by another operator while OMV were evaluating the tenders. Following discussion with other qualified drilling contractors, OMV finally awarded a contract to Ensco to bring the E107 to New Zealand for this campaign.

Ensco Experience

97. Various members of the OMV drilling team (including the Drilling Manager (me), Drilling Superintendent and two Drilling Engineers) have previous experience with Ensco both on OMV projects and those for other operators in New Zealand. Ensco had both the Ensco 56 and E107 jack-up drilling rigs in New Zealand from 2006-2009.

98. Ensco's performance in these campaigns was very good, with both excellent HSSE performance and technical drilling results. The E107 commenced operations in South-East Asia in early 2006. The E107 drilled a total of 15 wells in 2007-2009, namely the Origin Kupe and OMV Maari development wells and one exploration well each for Westech Energy and Origin Energy. The wells drilled in that period are virtually identical to the requirements for this campaign and hence the rig was deemed to be technically acceptable for this programme.

99. Ensco has been in business for 25 years and is the second largest offshore drilling contractor in the world. It has experience in nearly every major offshore basin on six continents including in the US Gulf of Mexico, Australia, North Sea, Mediterranean Sea, West Africa, South East Asia and Brazil. It has a fleet of about 70 offshore rigs including 46 jack-up rigs. Other than New Zealand the E107 has worked in Malaysia and Vietnam.

100. A total of 56 Ensco personnel work on the rig each day. Twelve of those are Ensco staff who form the main offshore management team. The remainder are contracted local personnel who make up the drilling crew, deck labour, catering crew and medic. All the Ensco staff have many years of experience. The local staff are employed based on their local or international offshore and onshore drilling industry experience.

Ensco's safety case

101. The E107 Safety Case consists of four parts:

(a) Introduction;

(b) Facility Description;

(c) Safety Management System; and

(d) Formal Safety Assessment.

102. Each of these parts is described in greater detail below.

103. The Introduction sets the overall tone of the document and identifies components such as the management commitment, the scope of the Safety Case and Ensco's commitment to continuous improvement.

104. The Facility Description contains a description of the operating parameters for the facility including subsections that describe the systems onboard which relate to the safe operation of the facility. Systems, which are provided to mitigate an emergency and reduce the consequences of identified possible major accidents, are also described.

105. The Safety Management System (**SMS**) summarises the processes of which are relevant to HSSE and details Ensco's policy and objectives. This part also details the processes in place to confirm implementation of the HSSE processes maintenance and effectiveness of safety critical activities, equipment and systems.

106. The Formal Safety Assessment (**FSA**) represents the detailed description of the risk assessment processes undertaken during the development of the Safety Case. The FSA involves a series of related assessments conducted by Ensco for the E107 facility. It also presents the information relevant to identified Major Accident Events and demonstrates the levels of risk from these and their related hazards to personnel on the facility. Components of the FSA include:

(a) Hazard Identification;

(b) Hazard Register;

(c) Fire and Explosion Analysis;

(d) Non-flammable Hazards analysis (eg Marine hazards);

(e) Escape, Evacuation and Rescue Analysis;

(f) Emergency Systems Survivability Analysis;

(g) Smoke and Gas Ingress analysis;

(h) Qualitative Risk Assessment; and

(i) Studies that demonstrate that risks have been reduced to as low as reasonably practical (**ALARP**) and a Remedial Action Plan.

107. The Safety Case also includes Appendices which contain the references to material used during the development of the Safety Case, including:

(a) Facility drawings;

(b) Facility certificates and licenses; and

(c) References and abbreviations.

108. Ensco personnel on the E107 have computer access to Ensco corporate policies and procedures and rig specific procedures for drilling marine, helicopter and rig move operations. The Preventative Maintenance System is also computer based and all heads of departments (Drilling, Marine, Electrical, Mechanical) have access and maintain the rig though this system. The E107 Safety Case is available on the computer system and is readily available to all persons on the rig.

109. Every person receives, on arrival for the first time, a detailed induction which includes the Ensco Safe Systems of Work, Permits to Work and Energy Isolation, alarms and roles and responsibilities in emergency situations, safety meeting attendance, pre-tour meetings, Job Safety Analysis, lifeboat stations, emergency escape and HSE requirements including reporting of sea mammals siting. The induction also covers the DMP and the requirements to report oil spills loss of containment of mud or other fluids to the ocean.

EPA STAFF REPORT

Comments on report

110. Paragraphs 98-107 comment on metals that can be present in drilling discharges, and paragraph 101 notes limits that apply for cadmium and mercury in the United States of America (**USA**). I cannot comment on the suitability of the USA limits but I note that the concentrations of cadmium and mercury in the barite are less than the limits noted in the EPA Staff Report, ie cadmium 1ppm and mercury 0.2ppm.

111. Paragraphs 96, 97 and 121 comment on the level of residual oil on cuttings discharged into the marine environment. As outlined earlier in my evidence, the 4.9% level used at Maari is a MNZ target (rather than an absolute limit) as specified in the DMP and is achievable with the centrifugal dryers proved by MI Swaco on the E107. Setting this as a maximum level or setting a lower level would be inconsistent with the DMP, and would also mean increased handling of skips from boat to rig to wharf, trucking from wharf to the disposal site and the return of the empty skips.

112. For the well sections drilled with WBM, the level of 100 ppm of oil in the mud is based on calculations of oil in the rock porosity, the limited volume of rock drilled and the volume of mud (dilutant) used to drill the formations above the main reservoir section. Any lower limit would involve large amounts of dilution of the mud or transporting large volumes of cuttings and mud to the shore for disposal. I cannot comment on the other figures used internationally nor the basis for those.

113. I confirm that OMV complies with all of the blowout prevention measures listed in paragraph 157 of the EPA Staff Report.

114. I agree with all of the EPA's observations in paragraph 294 of the EPA Staff Report.

Comments on EPA's proposed conditions

115. Condition 4: I note OMV already does advise all personnel about obligations under the DMP. Continuous training & information are provided to all personnel depending on their roles and responsibilities. However, I note that we have no way of guaranteeing that all personnel “understand” their obligations.

116. Condition 7: the Person In Charge (**PIC**) on the E107 is the Ensco Offshore Installation Manager (**OIM**) rather than being an OMV employee. In my view this condition should not specify a particular position; I note OMV’s version of this condition left it to OMV to appoint a person with responsibility for compliance management, and I consider this more appropriate.

117. Condition 8: again, OMV is the consent holder but we do not have operational procedures for the Ensco BOP. Ensco have the procedures for installation, maintenance and operation as it is their equipment.

118. Condition 13: we currently a) Report to MNZ and b) prepare daily activity reports and c) report any incidents or non compliances with the DMP to the MNZ. These are all available on the rig.

119. Condition 14: Note the Consent Holder (OMV) does not have operational procedures for the transfer of fuel for this facility. The rig operator (Ensco) does have those procedures and they control and monitor the transfer of fuel from vessels to the rig. I am not sure what is meant by a record of monitoring in relation to fuel transfers. This condition would need to be reworded if it is to remain.

120. Condition 20: OMV already does this in relation to its arrangements with MNZ.

121. Condition 36: I understand that the site that MI Swaco use for disposal of cuttings has all the necessary resource consents.

122. Condition 38: This target reflects our current DMP, which also states that we would dilute any mud with oil-in-water greater than 100 ppm to bring it down below 100 ppm before then discharging it over board.

123. Condition 40: I understand the reference to unused cement to mean cement still in the cement tanks on board the rig. We will drill out cement from every casing shoe and any time we set cement plugs to control loss of circulation we will have cement cuttings come to surface and it is our intention to dispose those to the seabed. Also after placement of cement some cement contaminated mud is returned to surface which we discharge overboard. The cement cuttings are inert. After every cement job, the cementer flushes out his cement pump and tanks with water of any residual cement and discharges this over board as is allowed by the DMP. If condition 40 prevented this process, we would have to provide a means of taking this flushed fluid into transportable tanks for taking back to shore. This would be out of proportion with what I understand to be the low level of effects of this aspect, and would also be a more onerous restriction than the DMP imposes.

124. Condition 41: E classification is about ecotoxicology testing used in the United Kingdom and Netherlands offshore petroleum operations. MI Swaco provided ecotoxicity data for all components of the SBM and these are in the well supplements of the DMP for the E107. Each of the products has been classified to the New Zealand standard.

125. Condition 42: This is a major undertaking. I do not think we can analyse on a daily basis the levels of these heavy metals in discharges, and there is already a process in place to monitor the seabed benthos. The constituents of drilling discharges are largely prescribed by the drilling fluid mixture/additives, and specifications of drilling discharges should not be highly variable over time. As such, daily monitoring of the discharges seems excessive (e.g. production water monitoring is undertaken quarterly). I also note that the requirement to cease drilling until any exceeded levels return below a set level would be a major issue for OMV, as the drilling rig is very expensive to have on site and a delay of even a week would cost OMV several million dollars.

126. Condition 43: This condition is not clear as to what deposited means: deposited on the seabed or on shore or both? Also, as indicated earlier, the figure of 3,000m^3 of cuttings is an estimate rather than a maximum, and it would not be appropriate to impose it as a maximum.

127. Condition 45 is not acceptable. Wells MR6A and MR8A both started drilling from ~262m. If for any reason we have to reclaim MR9 back to the 24" conductor shoe than we will be drilling the new hole from 257m.

128. I understand that this condition is designed to ensure that the seabed is not directly disturbed by drilling. The Impact Assessment states that the conductors were installed approximately 300m into the seabed. This was not intended to be a minimum start depth for drilling. If there is a preference for a condition to ensure that the seabed is not disturbed by drilling, this could be achieved through a condition that specifies that drilling must commence from existing conductors. The platform is supported by the seabed soil and it is critical that the seabed down to about 28 m is not disturbed or washed away by drilling operations. So a 30" stove pipe was driven into the seabed on each of the conductor slot locations to approximately 34-36 metres below the seabed. This then allowed drilling operations to commence through these stove pipes by drilling in 24" conductors and cementing them back to the seabed without affecting the soil above that depth.

GENESIS REPORT

129. Some of the matters raised in the Genesis report have been addressed earlier in my evidence and in my response to the EPA staff report above, and I do not repeat those matters here.

130. Table 3-1 on pages 8-12 of the Genesis Report sets out a good summary of the drilling process.

131. Page 15 of the Genesis Report queries the number of support vessels used during the drilling programme. As mentioned earlier, there are two support vessels.

132. Page 15 of the Genesis Report queries OMV's approach to well clean-up. Prior to running the screens into the hole, the well is cleaned up by circulating the fluid until clean as determined by passing the mud through a facsimile of the screens to be run. The screens will be run and the liner hanger set (without setting the liner top packer). The well and the screen annulus is then displaced to a water based breaker fluid (acidic) designed to dissolve the calcium carbonate filter cake. The liner top packer is then set and a Fluid Loss Valve (**FLV**) is closed, isolating the screens from the casing above the liner top packer. The annulus above the liner top packer is displaced to calcium chloride brine. The upper completion including the pump is run, the FLV is opened and the well is pumped using the electric submersible pump. The well clean up liquids remaining in the well bore will be produced directly to the floating production, storage and offloading unit. Any remaining clean up fluids on the rig will be returned to town for future use.

CONCLUSION

133. As OMV's Drilling Manager, I am confident that OMV has taken and continues to take all necessary steps to ensure compliance with OMV's global standards and to meet or exceed New Zealand regulatory requirements. More specifically, I am confident that OMV has ensured and will ensure that the offshore operation is conducted in a safe and environmentally prudent manner.

Frank Barker

17 September 2014