

Scottish CND News

Tireless and submarine problems

This is a partial transcript of the file on 4 program broadcast on BBC at 8 pm on 12/12/00

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(Lt Cmd Corderoy) "we are now in the manouvering room which effectively is the control room for the nuclear reactor and the propulsion systems onboard .. (we were) at sea when the incident occurred, it was a Friday afternoon around dinner time we were on a surface passage going across the Mediterranean sea and simply one of our instruments which would normally give us a steady reading on a level actually indicated a minor drop in that level"

(Julian O'Halloran) Lt Commander John Corderoy the deputy marine engineer was one of the first to be alerted. He realised that a small change on one dial could signal a major fault in the cooling system of the nuclear pressurised water reactor which propels the vessel. Without remedial action it could cause the reactor to overheat leading to a severe nuclear accident. To see where the fault was crew members had to enter the reactor compartment itself where there might be a radiation hazard.

(Corderoy) "We did a controlled shutdown what is called a reactor SCRAM that allowed us to then go down into this compartment into the reactor and try and investigate the source of our small leak we actually discovered that we actually had a very minor crack on a pipe down there which in physical terms most people would accept would be a very small crack however to us in terms of maintaining our levels of safety. We were able to come out and again within our normal operating rules restart the reactor and carry on propelling the submarine."

(O'Halloran) The escape of water was at a critical junction in the cooling system on the wrong side of safety valves which can isolate and stop leaks from other parts of the pipework. The worst place says the Navy for a leak to occur. But if the cracking suddenly got bigger or became a rupture there would be no way of stopping the escape of cooling water and the reactor could potentially overheat leading to every nuclear engineers nightmare - an uncontrollable meltdown. The man in charge of nuclear safety in the Navy, its nuclear regulator is Captain Hurford. He strongly denies a newspaper report that the reactor came within minutes of meltdown. He confirms that despite the risks the reactor was restarted and for a lengthy period after it was first shut down

(Capt Hurford) "The crew then started the reactor back up and monitored the leak rate extremely carefully then having ascertained exactly where it was. At that time the leak rate was very low."

(O'Halloran) Was that not possibly a questionable thing to do to restart the reactor once having discovered that there is a problem and that there is indeed a leak in the primary coolant circuit ?

(Hurford) "There is always a balance to make between operating the reactor which

(Hurford) "There is always a balance to make between operating the reactor which is the submarine's main form of propulsion and submarine safety. Is it safe enough to operate the reactor to maintain safe propulsion for the submarine, to keep out of the way of shipping, to return to port, to keep safe on the high seas ? Clearly there are very close limits such that if the reactor goes outside of those limits it must be shut down and the submarine use other means of propulsion which are much less powerful and are not its principle mode of propulsion."

(O'Halloran) How long did Tireless continue until the second shut down took place ?

(Hurford) "I think it was about 36 hours."

(O'Halloran) Was there a risk at that time, during those 36 hours that the small crack could become either a larger crack or a total rupture ?

(Hurford) "The materials of construction are designed to operate so that they don't fail in a brittle manner. So although there is a very slight chance, the engineering says that this will not happen."

(O'Halloran) But while the reactor was kept running for those extra 36 hours the rate of leakage was growing. When the risk became too great it was shut down for good. Tireless then motored slowly back to Gibraltar on its deisel auxiliary. The Gibraltar government named a team of nuclear experts to advise it on safety issues raised by Tireless. One of them was an independent nuclear consultant John Large. He has been briefed by the Navy on the likely repairs needed on Tireless. He was surprised when we told him that the reactor had been run for a day and a half after the initial shut down.

(Large) "It was very unwise indeed to restart the reactor and it really goes against all the rules of nuclear safety that if you've got a defect you fix it. You don't use trial and error methods to see if the defect is getting worse. For this boat to revert to a nuclear reactor plant in an operational state when it was known that the plant was faulty and they certainly couldn't have had enough information at that time to trully diagnose and we know in hindsight there diagnostics was wrong, seems to me to have been a very unwise operation indeed."

(O'Halloran) In the light of all this what is you're view of the Navy's rather angry rejection of suggestions that the reactor on Tireless came close to meltdown.

(Large) "If the cracks had gone into a complete failure, because this particular locality cannot be isolated, valved off, because its directly adjacent to the reactor itself, then it means that you could no longer maintain cooling on the reactor and that would certainly put you on a path, a cascade path, towards a fuel meltdown."

(O'Halloran) Are you saying that noone really knows even today how close the Tireless reactor came to meltdown and a catastrophic radiation accident.

(Large) "That's exactly the point. Once you have a crack there it is very difficult for engineers to reliably predict how rapidly that crack will develop."

(O'Halloran) The Navy insists that the crew followed instructions on board and even if a wrong action had been taken there would have been further chances to put thing right. But putting this right in the long term has become a very big task.

put thing right. But putting this right in the long term has become a very big task. By November checks had revealed that a total of 7 out of 12 of the fleet of hunter killer submarines had signs of cracking at the same critical junction in their reactor cooling system. All 7 were withdrawn from service the other 5 were said not to have the problem. The Defence Secretary told the Commons it didn't appear to be a generic design fault. But the Navy's nuclear regulator, Captain Peter Hurford, suggests that all 12 submarines may in fact be affected. Is this then a generic problem with these 12 nuclear powered hunter killer submarines ?

(Hurford) "It clearly is a problem with the majority of our hunter killer submarines. We have checked them all and at least 7 will have to be repaired and it may be in the future that we will use the new design which has been developed for the 7 to be backfitted into the other 5. We think the cause of this cracking occurred was because of the rapid changes in temperature and the design and manufacture of this particular fitting."

(O'Halloran) Do all the 12 submarines in question have that fitting ?

(Hurford) "Yes they do."

(O'Halloran) So all 12 potentially could be subject to this problem ? (Hurford) "Potentially, and that is what we are finding out at the moment as to why 7 are cracked and 5 aren't."

(O'Halloran) The Navy believes the problem was caused by thermal fatigue the effect of rapid changes in temperature of several hundred degrees in the water in the pipes, water circulating at over 170 times atmospheric pressure. But despite these huge stresses this critical section of pipework had never been checked for cracks. John Large, nuclear advisor to the Gibraltar government, says the failure to diagnose the problem earlier poses major questions about inspection and maintenance of these submarines

(Large) "That's quite remarkable, to have a submarine that is 15 years old, it got a working life of 30 years, not to at least look at one in say 3 submarines going into the pool. So there is something wrong with the quality assurance in the procurement programme and in the maintenance programme particularly and that raises questions about how the Navy organises the maintenance of these boats."

(O'Halloran) Are you saying that the correct checks, inspections, should have shown up that the problem was in the making a year or two back before the crack took place in Tireless's pipework.

(Large) "Yes, what you'd expect would be if you've got 2 boats going in for a refit/refuel every year you would expect say every fourth boat the particular junction to be cut out to be examined to see how it was fairing. It is not a difficult job to do. But to miss these does seem to be very surprising. Someone hasn't sat down and planned a proper management approach to this."

(O'Halloran) For the Navy Captain Hurford concedes that the possibility that this critical section of pipework might fail was never even considered in the many years that these 12 submarines of the Swiftsure and Trafalgar classes have been in service.

(Hurford) "This component was analysed against its duty that it saw in service and was supposed never to crack and so the fact that this crack had occurred in this

was supposed never to crack and so the fact that this crack had occurred in this component in the way that it did and caused a leak before we had detected it, is a serious issue."

(O'Halloran) What how big a question mark does this place over your general risk probability assumptions that you have about the whole working of one of these nuclear reactors.

(Hurford) "It places a question on the surveillance that we do when the submarines are in refit and maintenance, unquestionably, and that is something which we are urgently and very seriously reviewing"

(O'Halloran) How long have these various submarines been in service ?

(Hurford) "The oldest of the Swiftsure class came into service in the early seventies"

(O'Halloran) So has this area of the pipework ever been looked at in any of the submarines, the 12 hunter killer submarines now in service ?

(Hurford) "No it hasn't, because the design of the component was understood and the calculations showed and experience showed that there would be no problem." (O'Halloran) But the calculations were wrong ?

(Hurford) "Clearly there is something wrong with that component that caused the crack and we don't know if it was the calculations or whether it was the way it was made and that what is being found out in the analysis at the moment"

(O'Halloran) but anyway it is a huge and fundamental problem to the whole of reactor safety in British nuclear submarines, certainly the nuclear powered submarines that don't carry the nuclear missiles.

(Hurford) "I wouldn't deny that this is a serious problem."

(O'Halloran) The grave reactor faults in the conventionally armed submarine fleet come in the wake of cuts which has left it less than half the size that it was at the time of the collapse of communism in Eastern Europe. The defence analyst and former naval officer Joanna Kidd of the International Institute of Strategic Studies says that while the fleet has been dramatically cut the tasks it must perform has not and she says that even when faults are known about the schedules are now so tight that the repairs cannot always be completed in the time available.

(Kidd) Refits are worked into a ship or submarine schedule so that in theory every 8 to 10 years a long period of perhaps 6 months to 2 years depending on which ship or submarine it is for deep maintenance to be carried out. However quite often the schedule means that even if the refit is not completed the ship or submarine will have to go to sea at a particular date. So that if for example a ship has a problem with its engine which for it to be properly remedied would require that the ship spend a further month alongside, may be forced not to spend that month alongside but go back to sea and be operational again even although the engine may not be working properly. These are the type of stresses which we have been seeing over the past 10 years. Simply because the Navy has fewer ships and submarines to carry out the tasks which it has to perform.

(O'Halloran) Of the 5 hunterkiller submarines which don't have cracks or signs of them 4 are under refit or repair. This has left only one, HMS Triumph, able to go to sea, which quite soon ran into trouble, hitting the bottom off Scotland and having to be taken back for repairs. So in recent weeks so in recent weeks the whole hunterkiller fleet was out of action. The Navy has lost the use of around a quarter of its front line fleet. Not so long ago there would have been deisel submarines but these have been sold to Canada. So says Joana Kidd the Tireless affair has been a severe humiliation for the Navy.

(Kidd) It was a massive blow. Firstly I'd say for reasons of pride. Only 5 countries in the world have nuclear powered submarines. The United States, Russia, China, France and the UK. These 5 countries also happen to be the 5 principle nuclear powers in the world. Having nuclear powered submarines is as it were a badge of respectability in the naval world. So for reasons of pride it was a massive blow, also for operational reasons. The Royal Navy 6 years ago decided to get rid of all its deisel powered submarines so really we only have nuclear powered submarines we have no fall back. Provided that you're nuclear powered submarines work there isn't an argument for having deisel powered submarines, however if maintaining your nuclear powered submarines is so difficult that hardly any of them work, so that you don't have a capability it would be more sensible perhaps to have deisel submarines which are less likely to have these massive problems that nuclear submarines have.

(O'Halloran) Operational commanders must put on a brave face and hope that the submarine fleet will be repaired before the next regional conflict breaks out. Another key role of these submarines is to give cover and support for the four bigger Vanguard submarines armed with Britain's independent nuclear deterrent, the Trident missile. Running the submarine fleet day to day is Commodore David Russell he said that other methods have had to be found to cover for the hunter killers known in the Navy as SSNs.

(Russell) The effect is that we have to put other methods and other means in place to provide the missile carrying submarine with the information it would normally have. We have used other surface forces and we have changed their readiness for operations in order to provide that. Sadly that requires a disproportionate effort because there are somethings which submarines are much better at doing than other units and there are some things that only submarines can do. So we have required to do some of those things in order to fill the gap.

(O'Halloran) We paying billions of pounds to keep the Navy going. Is there not some embarrassment that something so fundemental has happened that has put the great majority of nuclear powered hunterkiller submarines out of action.

(Russell) I personally feel very embarassed that the submarine flotilla which I run and operate day to day for the Flag Officer Submarines is not able to fulfil its task which is why I and all the people who work for me and with me are doing our best to make sure we get them back to sea as quickly as we can consistent with safety. But I would feel more embarrassed, I think, if we hadn't, when the problem occurred, dealt with it in the proper way which we did. Now that I feel very proud of. So I am very sad that the problem occurred and I'd much prefer it hadn't but given that it did I think that we can take a little bit of pride in the way that it was dealt with on the day

(O'Halloran) But the Navy is still faced with local concern about nuclear safety in Gibraltar. Since the reactor on Tireless was finally shut down on the 14th of May it has not been restarted and in an effort to demonstrate that it is completely safe the crew have been developing their skills as tour guides showing visitors around their vessel.

(sailor) This is the galley of the submarine. So what did you produce for lunch today

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(O'Halloran) But the cham offensive has left some people in Gibraltar unconvinced. We are next to a long line of cannon on the Kings Bastion which overlooks the waterfront in the central of Gibraltar berthed on the South Mole that is a jetty just a few hundred yards across the water. And as the repair process is far more extended than anyone at first expected groups in Gibraltar have become uneasy about the continued presence of the Tireless close to homes, schools, shops and businesses of the 30,000 people who live here.

(Caruana) Gibraltar is a small place. The berth is 500 yards away from our town. The whole of Gibraltar is a small place so that if there were an accident, an escape of some sort we are not talking about the remote corner of some rural county in England we are talking of the whole country of Gibraltar being affected by it and this has given rise to understandable anxiety and concern in the population at large and has become a very acute political issue

(O'Halloran) Gibraltar's Chief Minister Peter Caruana. He has trodden a careful line trying to reflect local worries without being obstructive towards the Ministry of Defence. Gibraltar is a British dependency and on defence Whitehall calls the shots. But the Chief Minister says that the prolonged visit by Tireless and repairs to it have focused attention on how Gibraltar would deal with a radiation accident

(Caruana) There is a safety plan which is similar to the one that operates in every other British port where nuclear submarines visit. The Gibraltar emergency services rehearse it once a year but of course the Tireless situation has brought into focus an issue in relation to this public safety plan which no one had focussed on before. Are we well equipped given how proximate the source of the accident would be are we well equipped to respond to it.

(O'Halloran) How difficult would it be to evacuate Gibraltar in a hurry ?

(Caruana) It would depend on the nature of the accident. Certainly the smaller the place, the closer the source of the escape is to the population the higher the risk. This is precisely the reason why that factor needs to be taken into account when choosing the location for carrying out such repair work.

(O'Halloran) A major problem is that Gibraltar lies on a narrow peninsular. The only escape route by land is a road that leads through the border post which is often clogged with traffic. Environmental groups say there would be pandemonium if a rapid evacuation were needed and that people simply couldn't get out. The Navy's nuclear regulator, Captain Peter Hurford, says that in the event of a bad nuclear accident he trusts that Spain wouldn't impede the evacuation of Gibraltar

* Gibraltar

(Hurford) Of course in an emergency such as a nuclear accident would be, unlikely though that is, the Spanish authorities would be informed by the Gibraltar authorities and clearly restrictions such as there are on the borders would be, what happened at the border would take the emergency into account and I am quite sure that the ease of movement of people would be helped by the police the customs and all the authorities that are normally involved in controlling the border.

(O'Halloran) Does Britain have any guarantee of that in fact ?

(Hurford) I don't think we have a positive guarantee. We have normal working relationships of course with the Spanish and I am quite sure that they would take the emergency into account

(O'Halloran) So is it possible that people would have to evacuate beyond 2 kilometres in Gibraltar ?

(Hurford) Evacuation beyond 2 kilometres is very unlikely but it is conceivable.

(O'Halloran) And in fact a lot of these things, all of these things are considered to be unlikely. Nevertheless the plans must be there to work if the worst happens.

(Hurford) Yes that is a basis of emergency planning

(O'Halloran) The Navy says taking *Tireless* back to Britain would from its point of view raise extra nuclear safety risks but environmental groups in Gibraltar demand its removal. They have recruited an expert to help them, Dr Frank Barnaby, nuclear physicist, peace campaigner and military analyst. He says there are ways of getting such a stricken vessel back to Britain so that work could be done at a designated repair berth.

(Barnaby) What is behind the naval view of repairing *Tireless* is to get the thing back to sea as soon as they can. This is overriding all considerations of the safety of the people of Gibraltar. I see no reason why the thing should be done under these conditions. The operational requirements of the Navy should take back seat.

(O'Halloran) Don't you accept that it does introduce a new element of risk for the Navy to take that submarine back to Britain

(Barnaby) I think that it dramatically reduces the risk to the Gibraltar people. I think that a good way to do it would be to lift it onto another ship and bring it back on that ship. We know that it has been done with a number of nonnuclear submarines and I don't really see why *Tireless* in the present position with piping sealed off couldn't be brought back to Devonport in the same way.

(O'Halloran) Back in Devonport, a major base for the nuclear submarines, the problems of *Tireless* will do nothing to calm stirrings of discontent over nuclear submarines which have echoes of Gibraltar.

(woman) The more you talk to us the more we realise how dangerous this is. This is the most dangerous thing that has ever come to this part of the country. You are proposing to put it into the place where it can do the most significant harm. Why is it going here ?

it going here ?

(clapping)

(O'Halloran) A recent public meeting on plans for a new naval jetty in the River Tamar to the North of the Royal Dockyard. It's to load ammunition on and off submarines. Thereby removing the risks from heavily populated areas next to dockyards. But some people will now be nearer to ammunition loading and nuclear submarines.

(naval spokesman) It is taking the ammunitioning of ships and submarines out of the close proximity of people

(woman) No I'm afraid I can't accept that

(O'Halloran) Fears have also been stirred up over what to do with disused nuclear powered submarines in the Devonport naval base

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(O'Halloran) .. If the risk in these places stemmed from civil nuclear plants safety would be vetted by the nuclear installations inspectorate, clearly independent of the nuclear industry. For the ports and basis safety is approved by none other than the Navy's own internal nuclear regulator, a situation which is in need of reform argues Dr Frank Barnaby, nuclear adviser to the environmental groups in Gibraltar

(Barnaby) Naval reactors and nuclear submarine facilities should be put under the auspices of the Nuclear Installations Inspectorate. While the Navy does their own regulation, so to speak, that is not a satisfactory situation. I think that the moral of the Tireless story is that the Navy have too many things their own way. They are too much in charge of the design of nuclear submarines, completely in charge of the nuclear regulation of nuclear submarines. Both of those should stop and there should be an independent body to look into particularly the regulation of the nuclear facility.

(O'Halloran) But the Navy's nuclear regulator Captain Peter Hurford says that his safety decisions are made quite independently of operational commanders and he says safety plans in Devonport and elsewhere have to steer a sensible course between alarming the public unnecessarily and planning what might have to be done if the worst happened.

(Hurford) What we are trying to do is to give people the best advice that could cover the majority of accidents that could reasonably happen which happened outside of that set of parameters and this would be very unlikely, as I say we are talking about events round about one in a million Then rapid advice about the events would have to be given to the public via the media which almost certainly would be listened to by everyone as emergency actions were being taken

(O'Halloran) But are those risk probabilities really credible if you have just had a series of faults on your submarines for which there was no probability of occurrence in the handbook, in your knowledge ?

(Hurford) The scenarios for reactor accidents are based on statistically analyses on what could happen. The faults that have recently been found are in no way reactor

- what could happen. The faults that have recently been found are in no way reactor accidents.

(O'Halloran) Given that the safety that hundreds of thousands of people is at stake isn't there a point to be made for having independent scrutiny of the safety arrangements and indeed the safety exercises ?

(Hurford) I have a very close personal relationship with the Nuclear Installations Inspectorate, they observe and comment on the exercises which we hold. As the authority they are formally involved in agreeing how far out our detailed emergency planning should be where submarines are berthed so I believe that even now there is a degree of independent Health and Safety Executive oversight of what we do as well as my own independent oversight.

(O'Halloran) But at the end of the day its you who are responsible and its you who make the final decision ?

(Hurford) Thats right and I dont believe I can be criticised for not being independent in this regard.

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