Nuclear Free Local Authorities
briefing

Date: 31st March 2009 **No. 66**

Subject: **Nuclear shipments over the Irish Sea***

1. **NFLA All-Ireland Forum meeting, Dundalk, 13th March 2009**

The NFLA All-Ireland Forum held a seminar considering a number of nuclear issues affecting Ireland – namely the resumption of nuclear material transport shipments across the Irish Sea, radiation protection and monitoring of radioactive discharges into the Irish Sea, nuclear proliferation and the work of Mayors for Peace.

The keynote speaker was the Republic of Ireland's Minister for the Environment, John Gormley, who reiterated the nuclear free nature of official government policy. Presentations were also made by Una Ni Dhubghaill from the Environment Radiation Policy and Air Quality Section of the Department of the Environment, David Pollard of the Radiation Protection Institute of Ireland, Pol D'Huyvetter of Mayors for Peace and Tim Deere-Jones, an independent marine pollution consultant. Copies of presentations are available by contacting the NFLA Secretariat on 0161 234 3244 or emailing office@nuclearpolicy.info. The NFLA Secretariat will ensure all seminar delegates receive a full seminar pack and reports will be included in the NFLA Steering Committee papers for June 2009.

This briefing is a post seminar paper from Tim Deere-Jones providing the NFLA with further information on concerns over nuclear shipments going through the Irish Sea.

2. **Grades of Materials carried at sea.**

Radioactive materials are divided into 4 classes for the purpose of packaging and transport.

The classes range from IMDG Class 7 materials at the lower end of radioactivity through 3 classes of Irradiated Nuclear Fuel (INF) containing uranium, thorium and/or plutonium which has been used to maintain a chain reaction, and also includes both High Level Radioactive Waste (HLW) and Plutonium Mixed Oxide Fuels and Plutonium arising from reprocessing.

INF Class 1 and 2 cargos are defined by their aggregated radioactivity. INF Class 3 is defined as cargo of unlimited radioactivity.

IMDG Class 7 and INF 1 and 2 cargos may be carried aboard normal merchant cargo freighters, RoRo and passenger ferries. INF Class 3 materials must be carried (in specially designed flasks) only on dedicated vessels and not on normal merchant vessels and ferries.

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3. **The BNFL/PNTL/NDA "Pacific" Class fleet of INF 3 carriers**

During the 1970s BNFL (and the French nuclear company Cogema) designed a fleet of vessels for the transport of INF Class 3 materials across the world's oceans. 5 ships were built between 1979 and 1987. These are relatively small vessels, approximately 105 metres long and 16 metres beam. They were equipped with "special design features" including double hull construction (with additional collision resistant features) around the cargo space; separation and duplication of vital systems such as electrics, cabling and fire fighting; and refrigeration of the cargo space.

Three of these vessels have now been decommissioned or scrapped following the discovery of "run away" corrosion of their steel plating. The remaining 2 vessels, Pacific Sandpiper (built 1985) and Pacific Pintail (Built 1987) are still operating despite having been built to the same design and construction standards of their predecessors.

One new vessel, Pacific Heron, has been added to the fleet and 2 more are to be built. The new vessels are slightly larger and have small modifications of the original design. Available details of the modifications do not describe measures to prevent "run away" corrosion.

In addition to its Pacific fleet, BNFL/PNTL/NDA also runs a number of ships for the carriage of INF Class 2 materials. These include the Atlantic Osprey, a converted 'roll on roll off' ('Roll On Roll Off') carrier, built in the late 80's, which is used for the transport of research reactor fuel and MOX fuel and the European Shearwater for broadly similar cargos.

4. **Design flaws of PNTL vessels.**

I. Since the 1990s studies have reviewed double hull designs and found various weaknesses:

a) Leakage of (fuel derived) hydrocarbon products into double hull void spaces with the subsequent risk of gas build-up (explosion and fire hazard)
b) Moisture build-up in the void spaces
c) Difficulty in venting the void spaces of gas and moisture
d) Difficulty of inspecting and maintaining the void spaces
e) Potential for "run away" corrosion to affect the integrity of the structure

A 2001 Greenpeace report on the PNTL fleet warned of these issues. The Pacific Swan, Crane and Teal have subsequently been decommissioned and scrapped.

II. Partial double hulling only:

The general industry interpretation of double hulling is that the vessel has at least 90% double skin sides and bottom throughout. PNTLs have double skin protection around the cargo holds only. Published plans of the ships indicate that the cargo holds extend for approximately 60% of the vessels.

Thus 40% of the ship is single skin only. Single skinned areas include the bow section (housing the duplicated emergency back-up generators, bow thrusters and engines, main salvage towing brackets) and the stern section (housing crew accommodation, the bridge, all communication and navigation equipment, main engines, main generators and primary steering gear).

III. Claims of 'unsinkability':

The owners/operators of the PNTLs claim that the double hulling features (are subdivided into numerous watertight compartments ", that "subdivision of the hull is preserved by the use of watertight doors" that these features mean that the vessels could survive the flooding of a "number" of such compartments, that this provides the ability to "withstand damage and remain afloat", "high reliability and accident survivability" and "ship within a ship" features.

However, these claims lack scientific and technical credibility in the context of known double hull design flaws (see 1 and 2 above) and marine accident data: e.g.

Chemical tanker Ievoli Sun: built 1989 to the standards of IMO Code for the Construction of Ships carrying Dangerous Chemicals in Bulk. Apart from a small section of the bow, this vessel was 95% double hulled and similar in size and dimension to the PNTL ships.

Despite stringent design features (including 35% more double hulling than the PNTLs) intended to help the vessel survive the effects of flooding and to keep unsymmetrical flooding to a minimum consistent with the safety of the vessel and cargo, Ievoli Sun took on water during a heavy storm, forward cargo compartments flooded, vessel became bow heavy and un-manoeuvrable and sank in the English Channel with a full cargo of hazardous chemicals.

IV. Collision resistance

The claims of unsinkability rest in part on claims for the collision resistance of the PNTL ships reinforced, double hulled design features. In support of those claims it is stated that the PNTLs have been designed to survive the impact of a design collision vessel of 24,000 tonnes travelling at 15 knots. In current sea conditions, with super tankers of 350,000 tonnes and gas tankers, bulk carriers and super container ships of over 100,000 tonnes all travelling at average speeds of 15+ knots, the claim of collision resistance is not credible.

5. **Shipboard Emergency Plans:**

The IAEA says that INF flasks are designed to such a high standard that any loss of radioactivity as a result of a maritime accident is “not credible”.

However, the International Maritime Organisation accepts that accidents leading to a loss, or potential loss, of radioactivity are possible and stipulates that all ships carrying INF cargos should carry shipboard emergency plans (SEPs) providing for both small and routine emergencies and large scale incidents.

IMO guidelines stipulate that SEPs should cover reporting of the incident; actions taken to prevent, reduce, control and mitigate the loss of INF material; procedures for coordinating SEPs with adjacent national and local authorities and for the safety of both personnel and ship. The guidelines offer NO advice on preventing irradiation of personnel on other vessels, irradiation of immediate and adjacent sea areas, irradiation of seabed, inter-tidal and coastal environments and irradiation of terrestrial environments.

6. **BNFL/PNTL/NDA Emergency Response teams**

The company states that it has a team on “standby at all times” to be despatched “in the event of a serious fire or collision” (grounding, foundering etc are not mentioned).

The company states that the emergency team is “a fully trained and equipped team of marine and nuclear experts”. However, company statements show that this is not strictly true, that 3 of the 8 team members have no defined nuclear or maritime expertise and are plainly on the team to represent the company’s interests. The team consists of: 2 Head Office Staff (undefined expertise), I PR Officer, 2 Health Physicists, 2 Package (flask) Engineers, 1 Marine Superintendent.

7. **Emergency Plans by Coastal States**

The 1973 Protocol “Intervention on the High Seas in Cases of Pollution by Substances other than Oil” accepts that “some coastal states consider that it is their responsibility to define techniques and means to be taken against a marine pollution incident and to approve such operations which might cause further pollution”.

UK National Contingency Plan for Marine Pollution says that in the case of an incident involving a ship operated by BNFL or its subsidiaries, a set of “special arrangements agreed between the MCA (coastguard agency) and those companies apply”. (This is a unique situation, as the MCA does not state its preparedness to operate any such agreement with any other company carrying Hazardous Materials)

It has emerged that BNFL/PNTL/NDA have written the plans, retain the right to edit or amend them and retain all rights of ownership, publication and operation.
Thus the "special arrangements" are not the property of the MCA, MCA has no rights or authority over them, the "special arrangements" are "commercial in confidence and under the ownership and authorship of another authority", MCA has no right to release any detail.

This is an unprecedented scenario permitting BNFL/PNTL/NDA to be the lead agency in drawing up the marine emergency response plans for incidents involving their ships and cargos in UK waters. The UK government, which through its Maritime Coastguard Agency, is supposed to take the lead in responding to maritime emergencies involving pollution from all other sources, has plainly relinquished control in the case of INF, HLW and Plutonium MOX carried aboard the PNTL ships.

8. **Irish Marine Contingency Plans**

Regional plans exist (some still under construction to new templates). A National Marine Contingency Plan is NOT in place. Existing plans are oil based (1 approved for HNS) but none for nuclear. The Irish Government does have "consultations" with BNFL/PNTL/NDA and others (Fishers: the fleet managers) re "movements" of the ships. As of yet I have found no evidence that the Irish Government consultations have included discussions of "at-sea" emergency response plans.

9. **Irish National Emergency Plan for Nuclear Accidents**

This is designed to respond to a radiation emergency arising from a major nuclear accident abroad with the potential for irradiation of the Irish environment. The nearest potential emergency site referred too is the west coast of the UK. No at sea response is mentioned.

10. **Places of Refuge.**

Following the Prestige oil spill (2002) a consensus emerged among international bodies (EU, IMO, UN, ISU etc) that when a ship is in distress there are circumstances when it is desirable to take the ship to a place of refuge in order to carry out operations to repair or stabilise the ship and to repair, stabilise or transfer the cargo in order to minimise the risk of loss of vessel and/or cargo and in order to minimise the risk of pollution occurring.

EC Directive 2002/59/EC orders that member states should "draw up plans whereby ships in distress may, if the situation so requires, be given refuge in their ports or any other sheltered area in the best conditions possible. Where necessary and feasible, these plans should include provision of adequate means and facilities for assistance, salvage and pollution response"

The 2003 IMO Resolution A.949 (23) "Guidelines on Places of Refuge for Ships in Need of Assistance" urges coastal states to establish procedures to identify, authorise and prepare Places of Refuge, urges that each Place of Refuge authorised should be the subject of advantage/disadvantage analysis and that appropriate site specific contingency plans should be drawn up.

The Resolution recommends that a qualified Inspection team from the coastal state should board and inspect both vessel and cargo to gather data before granting Place of Refuge. The resolution also notes that coastal states have the right to over ride decisions made by the master and owners of the ship and cargo and that coastal states may refuse Place of Refuge BUT "should weight all the factors and risks in a balanced manner and give shelter whenever reasonably possible". The resolution also stipulates that if a Place of Refuge is granted, "the Company" will be required to provide a "security" to cover any expenses incurred.

11. Local Authority issues in authorised Place of Refuge situations

In breach of containment scenarios leading to escape of radioactivity, shelter and evacuation of public may be required for unknown time scale. There are no recommended evacuation/shelter zones in the case of INF ships in difficulty.

In order to prevent contamination of agricultural food chains, agricultural stock will require shelter or evacuation for an unknown time scale.

There are no recommended evacuation/shelter zones in the case of INF ships in difficulty. Radioactivity may escape into, and pollute, air and water.

Unlike oil or chemical spills, there are no strategies for containment or collection of radioactivity on or from sea water.

In the event of an at sea loss of INF enormous amounts of shoreline radioactive waste will be generated (contaminated seaweed, flotsam, jetsam, beach material)

Decontamination techniques include flushing/washing with water, burial/covering with soil: and necessitates identification of dump sites, transport of wastes, identification and management of transport routes, transport units, decontamination of units.

Regular monitoring and assessment of radioactive hazard for unknown time scale

12. Nuclear Transport Accidents in the Irish Sea

There have been about 45 movements of INF 3 carriers through the Irish Sea since 2004. Transports exit the Irish Sea through both the North Channel and St Georges Channel. The transport of INF 1, INF2 and IMDG cargos is poorly documented and the precise numbers of such transports remains unclear.

There have been a number of accidents/incidents involving vessels carrying all four classes of radioactive cargo in the Irish Sea. Some of the incidents have been the subject of Department of Transport investigations. They include the following:

SS Ardlough 1986*: 1 complete loss overboard of radioactive Californium (alpha emitting) desk cargo during storm conditions south of the Isle of Man. The cargo was never recovered and its fate remains both unconfirmed and unpredicted.*

City of Manchester 1999: *disabling engine room fire aboard a general container ship carrying 10 tonnes of fissile Uranium Dioxide, in 2 separate containers (1on deck and 1 in the hold). The Uranium Oxide was sourced from the BNF Springfields nuclear fuel factory, near Liverpool, and was en route to a reactor at Salamanca (Spain). The vessel drifted out of control, in the busy sea-lanes of St Georges Channel, until a rescue tug arrived and towed it into Milford Haven (a Nuclear Free Port in a Nuclear Free Local Authority). The fire was eventually extinguished and no cargo was reported lost or damaged.*

INF 2 and INF 3 carriers *have also experienced a series of fires and other incidents.*
20 accidents/incidents were recorded in the decade 1991 to 2000, 12 of them in UK waters including the Irish Sea. UK incidents include: 2 collisions in harbour; 1 "at sea" near miss collision at cruising speed; 5 fires (3 in 1999), burst and leaking fuel and lubrication pipes in the engine room and accidents to shipboard personnel.

Also: ***MV Mont Louis*** *(North sea: mid 80s) general cargo vessel, sank. 60 casks of Uranium Hexafluoride scattered over sea bed, eventually recovered after prolonged salvage operation. Reported: "no SIGNIFICANT release of radioactivity".*

13. **Recommendations to NFLA member authorities**

- NFLAs should seek to clarify with the UK and Irish Governments who controls an 'at sea' response to an accident involving a ship containing nuclear materials.

- NFLAs should urge joint emergency planning exercises between UK and Irish coastguards and appropriate national bodies and coastal local authorities considering the scenario of an accident involving a nuclear shipment.

- NFLAs in Ireland should encourage the national government and coastal local authorities to identify potential places of refuge on the Irish coast. The Irish government also needs to develop contingency plans for the sites that are identified.

- Coastal local authorities should be contacted to develop emergency plans considering issues such as clean up and response demands, the heavy investment of finance required, appropriate personnel, short and long-term response, transport units, decontamination technology, health staff and waste dump sites.

- Coastal local authorities should also be contacted to consider the affects to income if an accident leaves to issues such as fishing bans, reduced tourism, public health impacts and consumer caution on good produced in the area.

* This briefing was produced for the NFLA by Tim Deere-Jones. Tim is an independent marine pollution and radiation consultant. He has previously worked for the World Wide Fund for Nature and Friends of the Earth Wales. He was particularly involved in the Sea Empress oil spill off the Pembrokeshire coast in 1996. The NFLA wishes to record its thanks for the production of this briefing.