

## **Protection of children from the effects of a nuclear submarine accident on the Clyde**

### Prevention of thyroid cancer

At least 500 children living in Eastern Europe have suffered from thyroid cancer because of the nuclear accident at the Chernobyl.<sup>1</sup> There will continue to be more cases for another 30 years. Young children were found to be particularly sensitive to the effects of radiation and the cancers among children have been more aggressive than the cancers among adults.<sup>2</sup>

At Chernobyl, radioactive iodine was released into the atmosphere. An accident on a nuclear submarine could also result in radioactive iodine being dispersed. The iodine is absorbed by the thyroid, which is a gland in the neck. This can lead to thyroid cancer. The younger a child is, the smaller his or her thyroid is likely to be and the more sensitive it is to radiation. An infant thyroid is ten times more sensitive to the effects of radiation than that of an adult.<sup>3</sup>

It is possible to protect children and adults from exposure to radioactive iodine. This can be done by taking a tablet which contains iodine in another form, potassium iodate. The tablets are 98 % effective if taken an hour before exposure, 90% effective if taken at the time of exposure, but only 50 % effective if taken 3 or 4 hours after exposure.<sup>4</sup> Several days after the Chernobyl accident millions of children in Eastern Europe were given these tablets, but it was too late. The sooner the tablets are taken after an accident the more effective they will be. If it takes several hours to distribute the tablets then more children will be exposed to radiation, and more will develop cancer.

So long as only the recommended dose is taken there is very little risk from side effects from these tablets. There were no reported adverse effects among the 10.5 million children who were issued with tablets following the Chernobyl accident.<sup>5</sup>

Health boards around the Clyde do hold stocks of the Potassium Iodate tablets and the current plan is that if there was an accident on a nuclear submarine, then they would be distributed.<sup>6</sup> But by then it would be too late. At a minimum these Potassium Iodate tablets should be distributed in advance to schools and nursery schools within this 2 km zone. There is also a case for wider distribution of these tablets to all households. The Navy's other nuclear submarine base is at Devonport in England. Here there has been widespread distribution of these tablets to schools and to many households around the submarine base.<sup>7</sup> But none have been predistributed around Faslane.

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<sup>1</sup> Open letter by Dr Keith Baverstock, WHO, 28 Apr 95

<sup>2</sup> Thyroid effects, ED Williams et al. (<http://www.iaea.or.at/worldatom/>)

<sup>3</sup> WHO Guidelines on the use of stable iodine after nuclear accidents, Dr Keith Baverstock, Implications of short term countermeasures after a nuclear accident, NEA 1995, p 17.

<sup>4</sup> Factors influencing choice of countermeasures, M Morrey NRPB and C Potter HSE, Implications .. , NEA 1995, p 126; also RXMED information sheet on thyro-block tablets (<http://www.rxmed.com>)

<sup>5</sup> Effectiveness and risks of stable iodine prophylaxis, PJ Waight, Implications .. , NEA 1995, p 74.

<sup>6</sup> Clyde Public Safety Scheme, July 1997

<sup>7</sup> Plymouth Evening Herald 23/7/96 and Plymouth Dump Information Group.

## Comparison of arrangement at Devonport and Faslane

### *Schools*

Around Devonport tablets have been pre distributed to 17 schools. No tablets have been pre distributed to any schools near Faslane.

### *Households*

At Devonport, West of the River Tamar tablets have been issued to all households by Cornwall Health Board. East of the river Plymouth Health Board distributed leaflets to 17,500 homes. These leaflets asked if people wanted to be issued with tablets. Following this tablets have been issued to 1,700 homes. No tablets have been issued to any homes near Faslane.

## Response to an accident occurring on a submarine at sea in the Clyde Estuary

The object of the Clyde Public Safety Scheme is to safeguard the public from a nuclear submarine accident *in the Clyde Area*.<sup>8</sup> The Scheme includes specific plans for listed submarine berths, not only at Faslane but also at Coulport, Loch Goil, Campbeltown, Rothesay and Loch Striven. However there are no specific plans for dealing with a nuclear accident on a submarine while it is at sea in the estuary. Nuclear submarines travel several times a week passing Dunoon, Gourock and Helensburgh. This is far more frequent than visits to Loch Striven, Rothesay or Campbeltown. But yet there is no attempt to detail provisions for these areas.

According to the Safety Scheme there should be *pre planned* countermeasures which can be put into effect within 2 kms of the scene of an accident. There are some plans for the area within 2 kms of berths, but no plans for areas within 2 kms of where submarines sail past. In the event of an accident the civil authorities should be told to implement shelter and Potassium Iodate Tablet distribution within the 2 km zone.

At Devonport tablets have been pre distributed and this should be done in areas around the Clyde, at least to schools and nursery schools. Attached is a list of schools and nurseries in the Gareloch and Helensburgh areas, similar lists could be drawn up for Gourock and Dunoon. The list includes pre-school groups because of the particular importance of distribution of Potassium Iodate Tablets to the youngest age group.

The Clyde Public Safety Scheme also describes an "Extendibility Zone" within which countermeasures might be considered. This extends for 10 kms around the potential scene of an accident. Maps are attached which show how the 2 km and 10 km zones should be applied around navigation channels frequently used by submarines

Within the immediate area of an accident there is a 550 m "Automatic Countermeasures Zone" from which everyone would be immediately evacuated except the emergency services. There are also a number of places which are within 550 m of navigation channels used regularly by nuclear submarines. These include Kilcreggan, Rosneath, Rosneath Castle caravan park, Rhu spit and Kidston Park. Kilcreggan is particularly at risk as there is a Degaussing Range 600 m from the shore which is used very regularly by nuclear submarines.

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<sup>8</sup> Clyde Public Safety Scheme letter of promulgation p iii

### Probability of an accident

Scottish CND do not accept that the probability estimates given in the Clyde Public Safety Scheme are an accurate assessment of the risk of an accident occurring on a nuclear submarine.<sup>9</sup> There are a number of factors which make it far more likely that a nuclear accident would occur on a submarine than on a shore based reactor:

(1) At Devonport the Navy have admitted that one of the major hazards which could lead to a nuclear accident is the handling of torpedoes. A submarine carries around 14 torpedoes each armed with explosives which are designed to destroy a submarine and which are also powered by a propellant which could itself explode.

(2) There is an even greater danger on the Clyde from submarines which carry Trident nuclear missiles. Each missile is powered by 50 tonnes of solid fuel. This fuel is a form of high explosive. One nuclear powered submarine can be carrying 800 tonnes of explosive in the form of rocket fuel. There are also up to 96 nuclear warheads on each vessel.

(3) These submarines are lifted out of the water fully armed in the shiplift at Faslane. This shiplift does not comply with the safety criteria for a nuclear installation, as it would not withstand a major earth tremor.

(4) Nuclear submarines can and do collide with other vessels, including oil tankers. There is a considerable risk of a major collision in the Clyde estuary resulting in a nuclear accident.

(5) Safety advice has in the past been overruled on operational grounds. In January 1990 a major defect in all British submarine reactors was discovered. The Atomic Energy Authority advised that all vessels be kept in port. This was overruled in order to keep one Polaris submarine at sea. The decision was apparently made by Prime Minister Margaret Thatcher.<sup>10</sup> The Navy continued to keep one Polaris submarine at sea until 1996.

(6) It has recently been revealed that thousands of Trident parts have gone missing from Faslane. These include computer components, the absence of which could lead to a disaster, given that the operation of Trident submarines is almost totally computer controlled.

### Examples of nuclear submarine accidents

There have been a large number of accidents which have occurred on nuclear powered submarines.<sup>11</sup> The following are the two most serious accidents which have occurred on nuclear submarines in the Russian Navy, the United States Navy and the Royal Navy:

*Russia*            The reactor on submarine K 314 exploded while it was being refuelled at Chazhma Bay. Radiation was scattered across Siberia.(10 August 1985)

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<sup>9</sup> The Safety of Trident, an assessment of the radiological risks associated with the UK Trident programme, Scottish CND, 1994.

<sup>10</sup> Diaries, Alan Clark, entry for 30 January 1990, Mr Clark was Minister for Defence Procurement at the time; Cracking Under Pressure - the response to defects in British Nuclear Submarines, Scottish CND & Faslane Peace Camp, 1992.

<sup>11</sup> Naval Accidents 1945 - 1988, WM Arkin & J Handler, Neptune Papers No 3.

*/Russia* A nuclear armed ballistic missile exploded on a Yankee class submarine near Bermuda. This was followed by a fire. A reactor meltdown was only avoided when two crew members manually lowered the reactor control rods.  
(3 October 1986)

*United States* The USS Thresher was lost when it went into an uncontrolled dive in the Atlantic. (10 April 1963)

A torpedo on USS Scorpion was jettisoned at sea. The torpedo then homed in on the submarine which had just launched it, exploded and sank the vessel.  
(27 May 1968)

*Britain* There was a serious fire on HMS Warspite while it was visiting Liverpool. The fire lasted for 5 hours and it took 2 years to repair the submarine.  
(2 May 1976)

There was a serious fire on HMS Turbulent at Devonport. The reactor was producing power at the time. A sailor was awarded a medal for gallantry for taking off his breathing apparatus in order to give it to the reactor operator so he could perform a vital task. (30 April 1992)

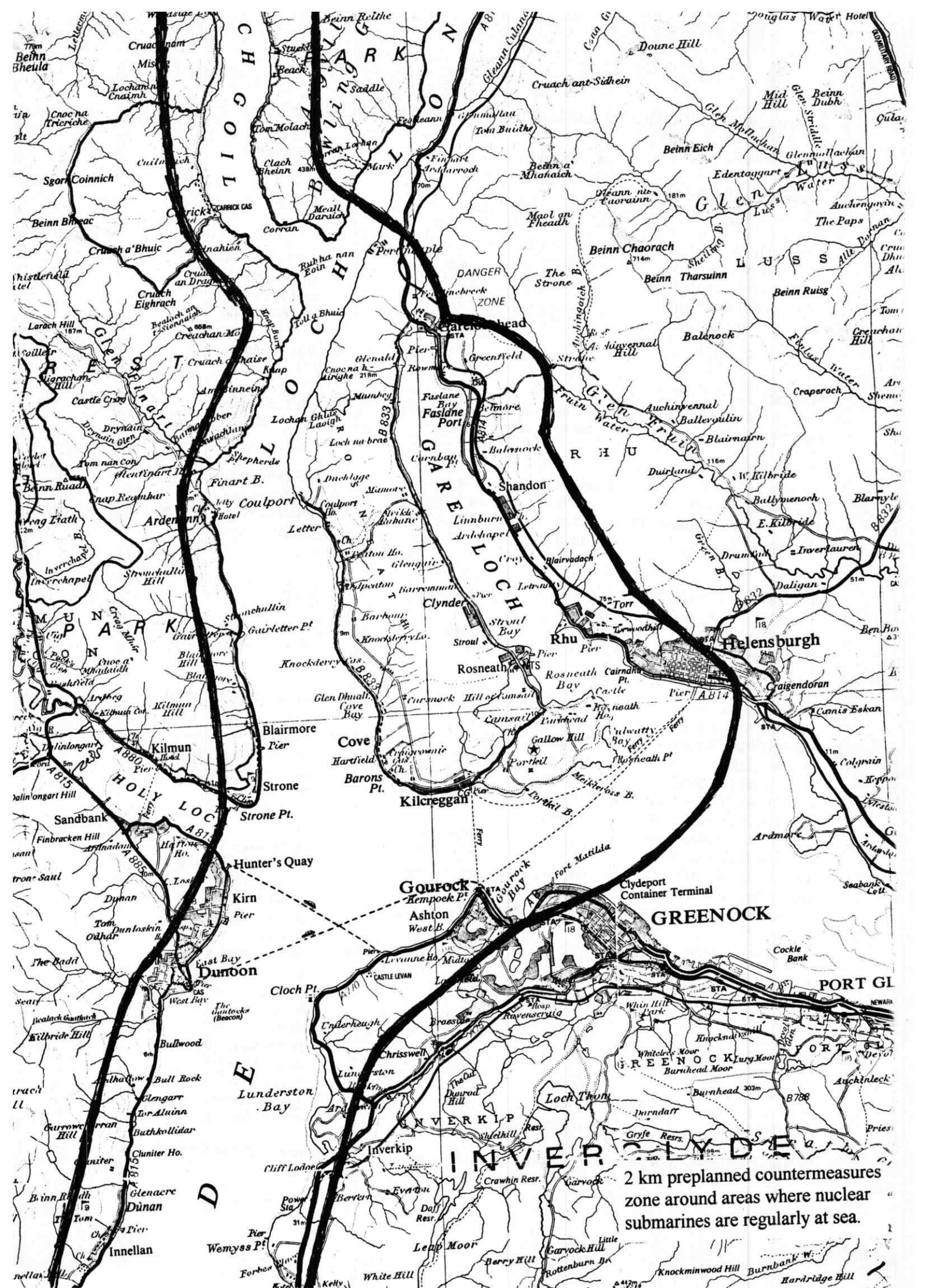
### Conclusion

As a minimum the following measures should be implemented in order to reduce the risk to children from the effects of a nuclear submarine accident in the Clyde estuary:

(1) Potassium Iodate Tablets should be pre-distributed to all schools, nurseries and pre-school groups which are within 2 kms of a submarine berth or within 2 kms of a navigation channel used by submarines.

(2) Leaflets on how the public should respond to a nuclear submarine accident should be distributed not only to all households within 2 kms of berths, but also to all households within 2 kms of navigation channels used by submarines.

(3) Potassium Iodate Tablets should be pre-distributed to all households which are within 2 kms of submarine berths or within 2 kms of a navigation channel used by submarines.

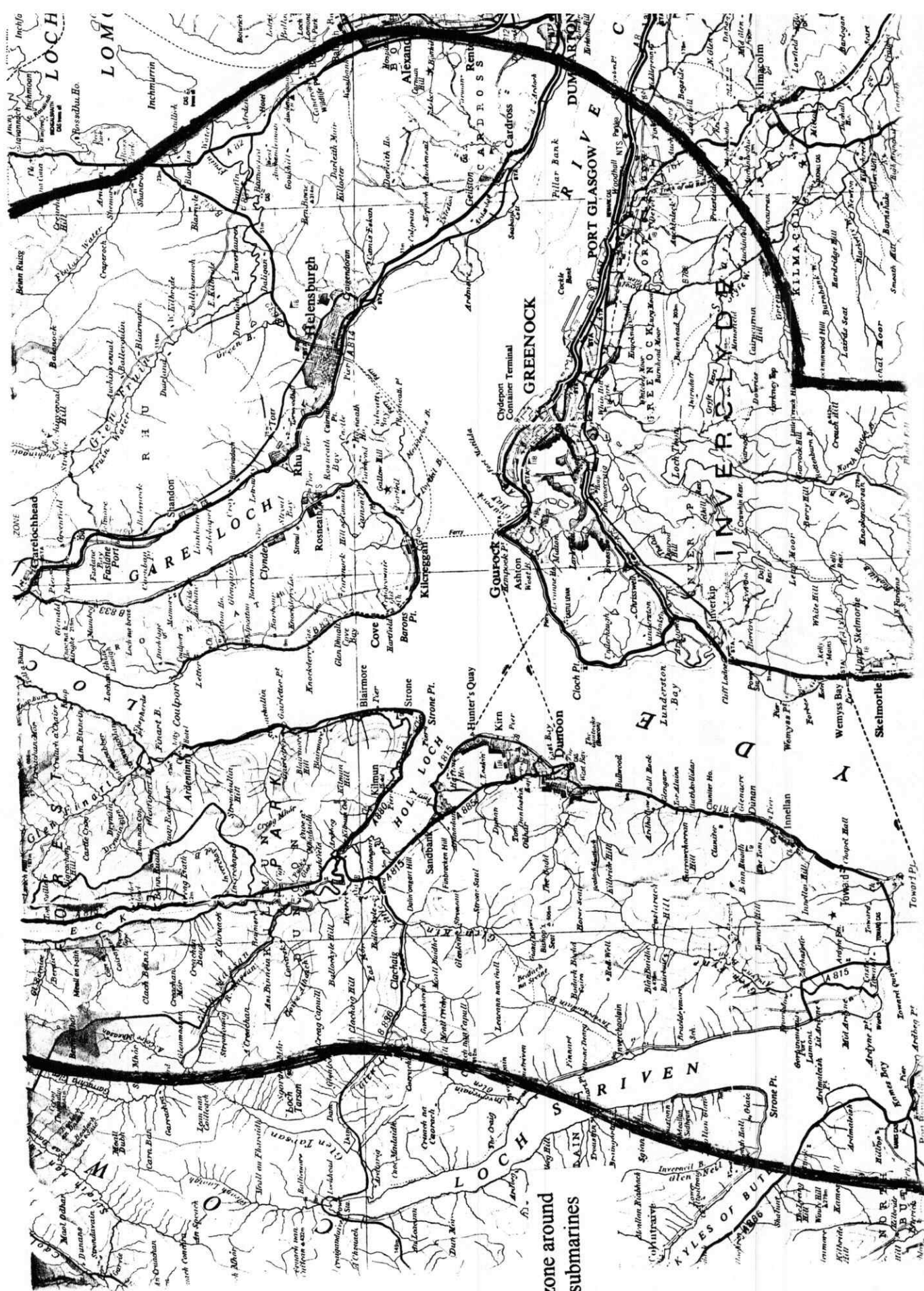


2 km preplanned countermeasures zone around areas where nuclear submarines are regularly at sea.

## Schools and nurseries around Gareloch near a potential nuclear submarine accident

<i>School / Nursery</i>	<i>Distance from Faslane base</i>	<i>Age Group</i>	<i>When in use</i>
<b>Clyde Naval Base Faslane</b>			
Tiny Tots playgroup	< 500m	3-5	am Mon - Fri
<b>Garelochhead</b>			
Childsplay Nursery	2.2 km	6 wks - 5 yrs	8 am - 5 pm Mon - Fri
Garelochhead Toddler Group	1.9 km	up to 3 yrs	am Mon, Wed & Fri
Garelochhead Playgroup	2 km	3 - 5	am Mon-Fri
Garelochhead Primary	2 km	5 - 12	all day Mon-Fri
<i>School / Nursery</i>	<i>Distance from channel</i>	<i>Age Group</i>	<i>When in use</i>
<b>Rosneath</b>			
Rosclyn Little Tykes	650 m	up to 3 yrs	pm Tues & Thu
Rosneath Primary	650 m	5 - 12	all day Mon-Fri
<b>Cove &amp; Kilcreggan</b>			
Kintergarten SINA	350 m	3 - 5	all day Mon-Fri
Cove & Kilcreggan Toddler Gp	600 m	up to 3 yrs	pm Tues, am Thu
Cove & Kilcreggan Playgroup	600 m	3 - 5	am Mon, Wed & Fri; pm Mon
Kilcreggan Primary	650 m	5 - 12	all day Mon-Fri
<b>Rhu</b>			
Rhu & Shandon Toddler Group	750 m	up to 3 yrs	pm Mon & Wed
Kanga Rhu Playgroup	750 m	3 - 5	am Mon-Fri
Rhu Primary	750 m	5 - 12	all day Mon-Fri
Blairvadach Outdoor Centre	550 m	11 - 17	all day Mon-Sun incl holidays
<b>Helensburgh</b>			
Kirkmichael Nursery	2.7 km	3 - 5	all day Mon-Fri
Braehead Kindergarten	2.2 km	3 - 5	
Mulberry Bush Nursery	1.8 km	6 mns - 5 yrs	all day
Stepping Stones	1.6 km	2 1/2 - 5 yrs	am Mon-Fri; pm Tues-Thu.
Kirkmichael Toddler Group	2.7 km	up to 5 yrs	am Tues & Thu
Park Church Toddler Group	1.8 km	up to 3 yrs	am Tues & Wed
St Michaels Toddler Group	1.2 km	up to 3 yrs	am Tues
St Columbas Toddler Group	1.6 km	up to 3 yrs	am Wed
Bethesda Toddler Group	1.5 km	up to 3 yrs	am Wed & Fri
Tiny Tots Toddler Group	1.5 km	up to 3 yrs	am Tues & Fri; pm Wed
Drumfork Toddler Group	3 km	up to 3 yrs	am Mon-Wed
Ardencaple Playgroup	800 m	3 - 5	all day Mon-Fri
Colgrain Playgroup	3 km	3 - 5	all day Mon-Fri
Drumfork Playgroup	3 km	3 - 5	all day Mon-Fri
St Brides Playgroup	1.5 km	3 - 5	am Mon-Wed & Fri
Kirkmichael Playgroup	2.7 km	3 - 5	am Mon, Wed & Fri
West Kirk Playgroup	1.5 km	3 - 5	am Mon, Tues, Thu & Fri
Hermitage Primary	1.8 km	5 - 12	all day Mon-Fri
Colgrain Primary	2.6 km	5 - 12	all day Mon-Fri
John Logie Baird Primary	2.7 km	5 - 12	all day Mon-Fri
St Josephs Primary	2.5 km	5 - 12	all day Mon-Fri
Hermitage Academy	2.5 km	11 - 17	all day Mon-Fri
Parklands Special Needs School	2 km	3 - 17	all day Mon-Fri
Lomond School	1.7 km	3 - 17	all day Mon-Fri

*A similar list should be drawn up for schools/nurseries in Gourock, Greenock, Dunoon & other coastal areas.*



10 km extendibility zone around areas where nuclear submarines are regularly at sea.

