



Looking towards the Irish Sea



Ancient Track

MOORSIDE

“Biggest New Nuclear Development in Europe”

Myth V Reality



RADIATION FREE LAKELAND
LOVE THE LAND

A report by Radiation Free Lakeland
September 2014

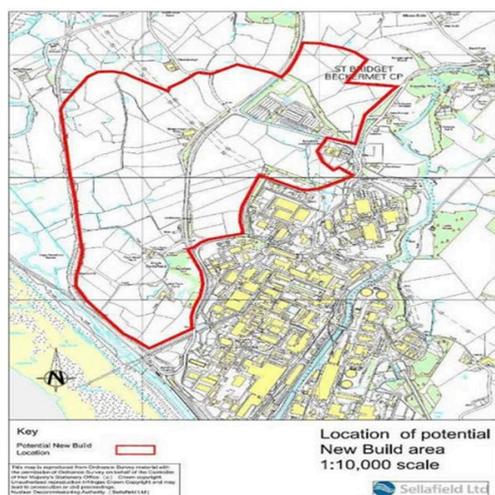
Radiation Free Lakeland was founded in 2008. It is entirely voluntary and stands up for the protection of habitats and species from nuclear developments.

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SUMMARY

Despite having no solution to the problem of nuclear waste¹ the UK government is pressing ahead with its agenda to build new nuclear reactors². The government's Nuclear Decommissioning Authority has agreed to sell 199 hectares of farmland in order to build up to 3 new nuclear reactors in Cumbria³. The reactors and associated nuclear build would be called 'Moorside.' The area is outside the Sellafield site and would take over existing farmland, shore, woodland and marsh called Greenmoorside including the farmhouse of Petersburgh. Greenmoorside is in public ownership having been bought by government as a buffer zone around the Sellafield site. Petersburgh is privately owned. Greenmoorside stretches from Sellafield towards Calder Bridge, Braystones and Beckermat and to the Irish Sea. The river Ehen, designated as a Special Area of Conservation runs alongside the boundary⁴. The consortium wanting to build the reactors is called NUGEN⁵. NUGEN is 60% owned by Toshiba (merged with Hitachi) who designed, built and serviced the reactors, which directly contributed to the Fukushima nuclear disaster⁶



In an interview with Construction News, 15.9.14, CEO of NUGEN Danny Roderick describes the 500-acre area as "brownfield."

¹ <http://cumbriatrust.org/>

² <http://www.nuclearsupplychain.com/new-build>

³ <http://www.corecumbria.co.uk/>

⁴ <http://westcumbriariverstrust.org/projects/pearls-in-peril>

⁵ http://nugeneration.com/our_site.html

⁶ <http://www.greenpeace.org/international/en/getinvolved/They-profit-you-pay/>

NUGEN: A Match Made in Heaven or Hell?

In June 2014 a deal was made with Toshiba by the Nuclear Decommissioning Authority on the extension of a land option agreement on Greenmoorside⁷. This deal gives nuclear developers a green light to buy publicly owned land. The consortium's figurehead is NuGeneration Ltd (NuGen), described as a "UK based nuclear energy company." Toshiba has a 60% stake and GDF SUEZ a 40% stake.

TOSHIBA Hitachi is the company who designed the reactors and supplied the architecture for the Fukushima nuclear plant. As Greenpeace International⁸ point out:

Toshiba and Hitachi are, in effect, being paid to clean up their own nuclear mess. That's right, these companies have now made money from Fukushima twice, first from building and maintaining reactors, and then again for cleaning up after those reactors failed. How do these companies get away with this? They are protected by dusty, old nuclear liability laws established in the 1950s, which place the burden of paying for nuclear disasters on the operators of nuclear power plants (in this case TEPCO), while companies that design or supply nuclear reactors are protected from paying, no matter what the circumstances of their involvement. After Fukushima TEPCO could not afford the cost of the nuclear disaster and was nationalised, shifting the majority of the costs onto the government, and therefore the Japanese public. This is the situation in Japan and nuclear liability laws are the same in almost all other countries. When nuclear companies are not liable for the huge costs of nuclear risk, what incentive is there for them to avoid it? None.

GDF SUEZ⁹ is a French multi-national corporation dominating the world market in waste, fossil fuel energy and water. GDF Suez have been accused of directly aggravating an unprecedented humanitarian and environmental crisis in the Amazon. Indigenous leader Ms. Guajarara met with corporate social responsibility representatives at GDF Suez in March and came away dissatisfied with the company's assurances that it had fully consulted and compensated the region's indigenous peoples over the Jirau dam's impacts¹⁰.

"The action of GDF Suez are toxic to the environment while destroying the voice and cultures of indigenous and traditional peoples," said Ms. Guajajara. "We need confront them over their true record."

⁷ <http://www.businesswire.com/news/home/20140630005476/en/Toshiba-GDF-SUEZ-Complete-NuGen-Deal-Europes#.VBNUQWZDGBU>

⁸ <http://www.greenpeace.org/international/en/news/Blogs/makingwaves/four-things-you-should-know-about-the-fukushi/blog/44098/>

⁹ <http://www.sourcewatch.org/index.php/SUEZ>

¹⁰ <http://amazonwatch.org/news/2014/0428-brazilian-indigenous-movement-denounces-gdf-suez-over-amazon-dams>

We Need Nuclear – Really?

In terms of climate solutions nuclear is at best a bit player and a dangerous distraction rather than a crucial key technology. This August a report was produced by the giant multinational investment bank, UBS which states that large centralized power stations like Moorside could be obsolete within 10 to 20 years¹¹.

Large nuclear power stations will soon become extinct because they are too big and inflexible, and are “not relevant” for future electricity generation, according to the bank. Instead UBS says solar energy costs have fallen rapidly and the technology is now on the verge of being competitive without subsidies. As a solution to climate change, nuclear power is currently a 'bit player' producing just 2.6% of global energy: 2,600 TWh/y out of a global final energy demand around 100,000 TWh/y¹².



Fellside Gas Plant at Sellafield uses over £30M of gas yearly¹³.

The UBS report follows similar analysis by other large financial institutions and energy experts who expect new solar and renewable technologies to drive rapid change in large scale utility companies. **Add to that the fact that in the real world, Sellafield in particular and nuclear in general absolutely relies on fossil fuel, before, during and decades after electricity production**

Nuclear is a future energy nightmare¹⁴ rather than an achievable energy dream¹⁵

¹¹ <http://www.no2nuclearpower.org.uk/news/campaign-update/large-power-stations-will-be-obsolete/>

¹²

http://www.theecologist.org/blogs_and_comments/commentators/2557652/the_bbc_friends_of_the_earth_and_nuclear_power.html

¹³ <https://mariannewildart.wordpress.com/2013/05/22/what-sellafield-doesnt-want-you-to-know-while-gas-prices-rise/>

Freshwater Pearls and Other Wildlife in Peril

The River Ehen flows from Ennerdale Water to run alongside and into the fertile area proposed for Moorside, discharging into the Irish Sea at Sellafield. The River Ehen is designated as a European Special Area of Conservation (SAC), designated for **Freshwater Pearl Mussels** and Atlantic salmon and also as a Site of Special Scientific Interest (SSSI)¹⁶. The River Ehen supports the largest viable population of Fresh Water Pearl Mussels left in England. Urgent action is required to prevent extinction of this critically endangered population. The health of the river and the health of salmon and other fish both upstream and downstream is crucial to the extraordinary life cycle of the Fresh Water Pearl Mussel¹⁷.

The Habitats Regulations¹⁸ make it clear that no damage to internationally protected sites should take place unless there are Imperative Reasons of Overriding Public Importance (IROPI) as described in Article 6(4) of the Habitats Directive 92/43/EEC. In EN-6¹⁹ the Department of Energy and Climate Change make it clear that they consider the case for nuclear power stations comes under IROPI. However, even in the case of IROPI, the Habitats Regulations state that any damage or loss of part of an internationally protected site **must** be compensated for by creation of new habitat of the same type, quality and extent as that destroyed. In the case of the River Ehen and the Fresh Water Pearl it is also clear that loss of or damage to this unique SAC cannot be mitigated for by creation of new habitat elsewhere.

Other wildlife dependent on the proposed 199 hectare Moorside site includes increasingly threatened species such as **Lapwing**, **Dunlin**, Sedgewarbler, **Northern Pintail**, **Sandwich Tern**, **Knot** and **Curlew**. There is a thriving population of roe deer, which often share pasture with the herd of beef cattle. The shoreline and marine environment is already stressed with pressure from Sellafield reprocessing. This would be exacerbated many times over should Moorside go ahead.

Cumbria Wildlife Trust's Memo to the Select Committee on the Future of the Nuclear Industry relates to proposed build at Kirksanton, Cumbria but it also applies to Moorside (to the power of 3), the fresh water resource for Moorside may be Wastwater, the Ehen, Calder and boreholes:

Damage to the marine environment

1. The reports for Kirksanton give no indication of the amount of sea water that will be needed for cooling the reactor(s) at the site or how much would be discharged or at what temperature. However, the stated preferred option is for sea water cooling, and indeed, there is unlikely to be a source of fresh water which could be used for cooling the reactor. As there is no information available regarding abstraction/discharge at the Kirksanton site, information regarding sea water abstraction and discharge for the proposed reactor at Bradwell is used as a proxy. A report commissioned by British Energy (2008)²⁰ estimated that the new generation

¹⁴ <http://wildar4.wix.com/radiation-free-land>

¹⁵ <http://www.cumbrianenergyrevolution.org.uk/>

¹⁶ <http://westcumbriariverstrust.org/projects/pearls-in-peril/the-river-ehen>

¹⁷ <http://westcumbriariverstrust.org/projects/pearls-in-peril/freshwater-pearl-mussels>

¹⁸ <http://jncc.defra.gov.uk/page-1379>

¹⁹ <http://data.energy.npsconsultation.decc.gov.uk/documents/nps/EN-6.pdf>

²⁰ British Energy (2008), Proposed Nuclear Development at Bradwell: Environmental Scoping Report, Royal Haskoning UK, November

reactor would need 72000 litres per second of cooling water. By way of comparison this is slightly more than the average flow of the River Thames at Teddington Lock²¹.

2. Cooling water intake and outflow at such large volume and the raised temperatures near the site of release will affect the behaviour and distribution of marine species including Key UK Priority Habitats such as blue mussel beds, *Sabellaria* reefs, tideswept channels and mud and sand flats. It is also likely that chlorine would be used as a "biocide" to prevent marine life sticking to inlet and outflow pipes. The bleaching effects on marine life of chlorination will depend on volumes, rate of decay and complex chemical reactions. The chlorination process would cause harm to the ecosystem of the Duddon Estuary SPA/Ramsar and Morecambe Bay SAC. This is an area where information is lacking in the Habitats Regulations Assessment document for Kirksanton²² and research is required into possible impacts from an operating power station in future. It is likely however, that if the chlorinated water discharged into the marine environment has a detrimental effect on the organisms at the bottom of the food chain, species higher up the food chain which depend on these marine species would suffer.
3. A second issue is the impact of water abstraction on marine species which will result in larvae and eggs being removed from the marine environment into the cooling system. Thirdly, the discharge of large volumes of warm water in to the Duddon Estuary would inevitably have ecological effects, possibly including the creation of conditions favourable to invasive species not native to the Cumbrian coast.
4. Many of the species dependant on marine sources of food are designated as interest features of the Natura 2000 sites, for example birds such as Sandwich Tern, Northern Pintail, Red Knot and Common Redshank and these species come under the same European legislation protection as the habitats themselves.



Sucking the Life from the Irish Sea ²³

Sucking the Life from Wastwater*

*4 million gallons a day of fresh water is abstracted from Wastwater to cool existing wastes, new wastes would be hotter and require cooling for decades longer²⁴

²¹ This is the point at which the Thames becomes tidal

²² <http://data.energynpsconsultation.decc.gov.uk/documents/hra/kirksanton/report.pdf>

²³ <http://101-uses-for-a-nuclear-power-station.blogspot.co.uk/2011/03/heating-oceans.html>

²⁴ <http://101-uses-for-a-nuclear-power-station.blogspot.co.uk/2011/03/use-1-how-to-use-freshwater-resources.html>

Just How BIG is the Moorside Footprint ?

According to Westinghouse, the US based company owned by Toshiba, the AP1000, (a scaled up version of the commercially rejected AP600) sets a “new industry standard.” Neither has been built.

The plant site for each reactor (there are 3 planned) is estimated to require 9.6 acres, with huge cooling towers requiring additional 15 acres (Dominion and Bechtel 2002, Part 1, Section 2). Radioactively contaminated seawater would be drawn from the Irish Sea. Deposition from vapours and particulate matter emissions from cooling Towers would fall on Lakeland. The visible vapor plumes associated with cooling towers can rise more than 5,000 feet above the towers (ie above the Lakeland fells) and extend as far as 9 miles downwind.²⁵

Construction material: The reactor is housed in a freestanding steel containment structure, which is further contained in a reinforced concrete shield building (Westinghouse 2007)²⁶.

The construction of a new MOX reprocessing plant would inevitably follow to help “feed” the AP1000s.²⁷ Reprocessing of spent fuel was previously banned in America but preliminary numbers for construction of a 600,000 ft² MOX facility indicate the use of over 170,000 yd³ of concrete, 35,000 tons of reinforcing steel, 23,000 instruments, 1000 tons of Heating Vents and Air conditioning 500,000 linear feet of conduit, 47,000 linear feet of cable tray, 3,000,000 linear feet of power and control cable, and 80 miles of piping²⁸. This does not include new high-level liquid waste ponds required as a result of new reprocessing to make MOX.

Abandoned Lakeland cottage
opposite Sellafield on the
proposed Moorside site



²⁵ Pg 123 <http://www.epa.gov/compliance/resources/policies/nepa/309-reviewers-guidance-for-new-nuclear-power-plant-EISs-pg.pdf>

²⁶ Pg 209 <http://www.epa.gov/compliance/resources/policies/nepa/309-reviewers-guidance-for-new-nuclear-power-plant-EISs-pg.pdf>

²⁷ <http://www.sciencedirect.com/science/article/pii/S0306454908002983>

²⁸ <http://www.moxproject.com/about/>

How Safe is the AP1000?

The USA government's Nuclear Regulatory Commission has identified a daunting list of design problems involving the AP1000's major components and operating systems, resulting in countless revisions to the design. The design for the containment system of the AP1000 continues to be criticized with amendments by Westinghouse taking place on the hoof²⁹. The proposed AP1000 reactors propose a wholly *new hybrid containment* that has had no prior operational history³⁰.

Emissions would be cumulative to existing emissions from Sellafield and would include:

- Radiological air emissions from an AP1000 are estimated to consist of 1.3 x 10⁷ MBq/year (350 Ci/year) of tritium, 2.7 x 10⁵ MBq/year (7.3 Ci/year) of carbon-14, 1.3 x 10⁶ MBq/year (34 Ci/year) of argon-41, 4.1 x 10⁷ MBq/year (1,100 Ci/year) of krypton and xenon isotopes, 1.9 x 10⁴ MBq/year (0.52 Ci/year) of iodines, and approximately 1.7 x 10³ MBq/year (0.047 Ci/year) of other radionuclides (Westinghouse 2005). Non-radioactive air emissions could include heat and water vapor releases from cooling system; carbon monoxide, particulates, sulfur oxides, nitrogen oxides, and hydrocarbons from infrequent use of diesel generators and auxiliary power; and carbon dioxide emissions associated with that portion of the nuclear fuel cycle attributable to a given plant (NRC 2007).
- An AP1000 unit is estimated to discharge liquid radioactive waste totaling 9,490 MBq/year (0.25623 Ci/year), not including tritium. Tritium release is expected to total 3.74 x 10⁷ MBq/year (1,010 Ci/year) (Westinghouse 2005, Chapter 11).
- An AP1000 unit is expected to generate from 5,759 to 11,000 ft³/year of solid radioactive waste, which would be compacted to a volume of 1,964 to 5,717 ft³/year before being shipped for offsite disposal. The estimated activity shipped includes 6.52 x 10⁷ to 1.19 x 10⁹ MBq/year (1,760 to 32,010 Ci/year) of primary wastes and 1.62 x 10⁵ to 6.15 x 10⁷ MBq/year (4.38 to 1,660 Ci/year) of secondary wastes (Westinghouse 2005, Chapter 11)³¹.

An Early Day Motion was presented to the House of Commons in 2010 by Paul Flynn MP stating: That this House notes with deep regret the recent death of Hugh Richards, the Welsh environmental architect and campaigner for safe sustainable energy systems and against nuclear power; believes that perhaps his greatest campaign victory was to persuade the Welsh Assembly Government environment minister in August 2009 to support the Welsh Anti-nuclear Alliance's call for a public inquiry into proposed nuclear new build in Wales, on the basis that the case for new plants had not been legally justified; recognises his very important contribution to public knowledge on the nuclear waste repository footprint, spent fuel management and so-called high burn-up nuclear fuel for new reactor designs, drawing attention to the fact that such irradiated nuclear fuel is typically hotter and longer-lived than existing used nuclear fuel, by which research he painstakingly demonstrated that the nuclear industry's plans for long-term management of new build wastes are quite literally unsustainable; further notes his chilling assessment that the use of such nuclear fuel would make the plants more vulnerable to terrorists' attacks, because of the need for extended storage at reactor sites for up to 160 years, and that 30 years after start-up of one of the reactor designs, **the AP-1000, currently being proposed, the radioactive inventory will be approximately 22 times that released by the Chernobyl accident in 1986**; and calls on the Government to heed carefully Hugh Richards' splendid and meticulous analytical legacy of the dangers of new nuclear energy development³².

²⁹ <http://www.cleanenergy.org/groups-urge-feds-to-suspend-nuclear-licensing/>

³⁰ http://fairewinds.org/sites/fairewinds.org/files/reports/AP1000_Containment_Leakage_Report_Gundersen_Hausler_4-7-2010.pdf.pdf

³¹ pg 219 <http://www.epa.gov/compliance/resources/policies/nepa/309-reviewers-guidance-for-new-nuclear-power-plant-EISs-pg.pdf>

³² <http://www.no2nuclearpower.org.uk/reports/TooHottoHandle.pdf>

How Safe Are We?

The nuclear industry tell us that we are very safe and that radiation is natural and necessary to life. Radiation is necessary to life, radioactive decay for example moves the tectonic plates beneath the earth's crust³³. But even the most natural radiation, such as radon can also be harmful and the longer we live, the cumulative effect naturally impacts on us, eventually causing damage to DNA and causing disease. An independent report for the UK Government, Radon and Public Health estimated that radon is a cause in over 1,100 lung cancer deaths each year in the UK³⁴. Man made radiation is a known cause of a host of diseases and the nuclear industry runs its own Compensation Scheme for Radiation Linked Diseases³⁵. The scheme's website states: The following cancers are included as specified eligible diseases because the parties accept, for the purposes of the Scheme, that they are capable of being caused by radiation:-

Bladder	Bone
Brain & Central Nervous System	Breast (female)
Colon	Leukaemia (excl chronic lymphatic leukaemia (CLL))
Liver	
Oesophagus	Respiratory / Lung
Prostate	Ovary
Skin (non-Melanoma)	
Uterus	Thyroid
Other Tissues	Cataract

Members of the public outside the nuclear industry's military fences and downwind of the emissions are not eligible for compensation. The nuclear industry and government collude to suggest that "population mixing" is a cause of increased childhood cancers. Rather ironically the Nuclear Regulatory Commission describing proposed AP1000 reactors in the USA states: Social and economic impacts will vary depending on how rural the surrounding area is and where the majority of the workforce chooses to live. For example **..if the area is mostly rural with very few towns nearby (and those are very small), and the majority of workers choose to live there, then the local impacts can be larger and adverse**³⁶ (NRC 2000)

Radiation Free Lakeland agree that a boom and bust type influx of workers is detrimental, however the "population mixing" myth that seeks to absolve man made radiation from blame for radiation linked diseases is not credible³⁷.

³³ <http://pubs.usgs.gov/gip/dynamic/unanswered.html>

³⁴ <http://www.ukradon.org/information/risks>

³⁵ <http://www.csrl.org.uk/html/qa.php>

³⁶ pg 124 <http://www.epa.gov/compliance/resources/policies/nepa/309-reviewers-guidance-for-new-nuclear-power-plant-EISs-pg.pdf>

³⁷

http://www.researchgate.net/publication/26832621_Commentary_childhood_cancer_near_nuclear_power_stations

Bombs Ahoy?

Ecologist editor, Oliver Tickell has echoed the feelings of many who struggle to understand the UK government's agenda to push new nuclear when the economics and risk are unjustifiable.

"On the face of it, the UK government's obsession with nuclear power defies reason. It's very expensive, inflexible, creates 'existential' threats and imposes enormous 'long tail' liabilities tens of thousands of years into the future. But there is a simple explanation: it's all to maintain the UK's status as a nuclear WMD state³⁸."

The Ecologist editor goes on to say:

But why is a civil nuclear programme so important to having a nuclear WMD programme? Here are some reasons:

- to maintain nuclear WMD we need a substantial pool of nuclear physicists, engineers, University departments, professors, graduates, technicians, etc;
- it would be very expensive to sustain this whole nuclear establishment purely for the sake of a WMD programme - far better to spread out the costs with a civil nuclear programme which ends up bearing most of the costs;
- nuclear science and engineering would offer unattractive and insecure career prospects if tied exclusively to employment on nuclear WMD;
- it's important to be able to spread out the costs of the entire nuclear fuel cycle from uranium sourcing and enrichment through to disposal of wastes so that a nuclear WMD programme can piggy-back at low cost on a much larger civil nuclear programme



Sellafield: a place where bombs are birthed

But now it's no longer plutonium we need - we have more than enough of that, with our 100 tonne plutonium stockpile. It is, rather, a supply of tritium that's needed. Produced as a by-product of operating nuclear power plants, it's essential to maintain supplies as it decays away at about 5% per year.

Tritium is used as a secondary source of neutrons to ignite nuclear fission devices, so boosting the power of a conventional fission bomb by magnifying the early neutron flux and achieving a greater burnup of the uranium or plutonium before the whole assembly is blasted to smithereens.

Additionally tritium is a key ingredient of H-bombs which release colossal volumes of energy by the nuclear fusion of this unstable isotope of hydrogen.

The UK's military also needs high-enriched uranium as fuel for both Trident and hunter-killer nuclear submarines. The former are the deployment platform for the UK's nuclear missiles.

38

http://www.theecologist.org/blogs_and_comments/commentators/2530828/bombs_ahoy_why_the_uk_is_desperate_for_nuclear_power.html

Conclusion and Recommendations

Despite the industry billing Moorside as “the biggest nuclear development in Europe³⁹” there has been, to date, little outcry, either from groups local or national. This lack of outcry may be due to Cumbria having, over decades of grooming, become nuclear compliant⁴⁰. The industry and government are presenting Moorside as a fait accompli with any public debate being limited to the route the proposed pylons would take⁴¹. While maps of the proposed pylon route are featured regularly in the local press and government fliers to households, the map of the proposed Moorside site has yet to appear in press. This piles on the pressure for Moorside while even people local to the area are unaware of the scale of the plan⁴².

There is little opportunity to object to the plan through the official channels with an outright ‘no.’ Any future Moorside consultations will be limited to, for example the reactor design. This means that groups and individuals will have to create their own platforms and take their own initiative in order to oppose new nuclear build next to the world’s most dangerous stockpile of nuclear waste.

Groups who have, to date, not yet directly and specifically objected to Moorside include:

Friends of the Lake District
The National Trust
The Ramblers Association
Greenpeace
Friends of the Earth
The National Farmers Union
Cumbria Wildlife Trust
WI
RSPB

Radiation Free Lakeland recommend that rather than new nuclear build, the area around the Sellafield site should be an untouchable buffer zone to:

- a) provide a measure of safety for surrounding towns and villages
- b) to accommodate the documented leakage of radiation from the Sellafield site into groundwater⁴³.
- c) to minimise the target area for terrorist attack (instead of doubling it)⁴⁴

³⁹ <http://www.businesswire.com/news/home/20140630005476/en/Toshiba-GDF-SUEZ-Complete-NuGen-Deal-Europes#.VBXdP2ZDgbU>

⁴⁰ http://powerbase.info/images/5/59/A_Nuclear_Slush_Fund.pdf

⁴¹ <http://www.nwemail.co.uk/home/business/map-showing-potential-route-of-cumbria-cables-and-pylons-released-1.1159251>

⁴² <https://mariannewildart.wordpress.com/2014/08/10/stop-moorcide/>

⁴³

<https://docs.google.com/viewer?url=http://www.geolsoc.org.uk/~media/shared/documents/specialist+and+regional+groups/EngineeringGroup/4-JMcCord+Sellafield+GW+Mgmt+14012009.ashx&chrome=true>

⁴⁴ <http://www.theguardian.com/uk/2001/dec/16/september11.terrorism>

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