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ENOUGH REASONS TO CLOSE KASHIWAZAKI-KARIWA PERMANENTLY

Short after the July 17, 2007 Chuetsu-oki earthquake [1] that shut down 4 units and damaged one at the *Kashiwazaki-Kariwa Nuclear Power Plant* a Group of Concerned Scientists and Engineers was formed. Started by four people it is now being endorsed by over 200 scientists and engineers. They demand that objective scientific and technical investigations be carried out "keeping in mind the possibility of permanent closure of the plant".

(671.5863) CNIC - The Ministry of Economy, Trade and Industry (METI) has established the "Subcommittee for Investigation and Response to the Nuclear Facilities affected by Chuetsu-oki earthquake", and ordered Tokyo Electric Power Company (TEPCO) to check equipment and carry out seismic response analysis at the Kashiwazaki-Kariwa nuclear plant. However, these investigations are clearly being carried out based on the premise that the plant will be restarted in the near future. It would therefore be difficult to call them objective scientific and technical investigations.

The scientists and engineers believe that it is necessary to condemn and highlight the problems of this type of biased investigation, which is being carried out by the regulatory authorities and TEPCO without the participation of residents. There are many reasons to be very critical towards the governmental committee: already 30 years ago it was proven that Kashiwazaki-Kariwa was not a god place to build a nuclear power plant.

The area in Niigata Prefecture is located in the middle of an earthquake belt that stretches from the Japan Sea coast in the Tohoku district to the north in the Chubu district to the southwest. It was known Niigata Prefecture had undergone many destructive (Class 7 on the Richter scale) earthquakes. Major quakes since the 16th century occurred in 1502, 1666, 1670, 1751, 1762, 1802, 1828, 1847 and 1964. Furthermore, this area is right in an active fold [2] region known as the U-etsu Fold Zone, and has many active faults each of which is evidence of repeated large earthquakes in the last several hundreds of thousand years. So there were many reasons to assume a risk of a major earthquake in the Kashiwazaki area.

It was known that the ground condition of the Kashiwazaki-Kariwa site was the worst among all of Japan's nuclear power plants. It was necessary to dig down about 40 meters to get the supporting stratum for a nuclear reactor. However, the stratum is geologically too young and could never be called hard bedrock. But in 1977, ignoring a warning from a specialist in active faults, a member of the examination committee, [3] the government approved the installation of the first unit of the Kashiwazaki-Kariwa power plant. Subsequently, choosing to overlook the presence of huge submarine active faults nearby, approval was given for six more units.

In the safety examination of reactors No. 6 and 7, licensed in 1991, both the government and TEPCO claimed that there was no submarine active fault in the area, potentially threatening the

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plant's safety. They acknowledged the presence of the 7-8 km long so-called F-B fault but stated that it was not an active fault. However, when a group of scientists [4] examined the records of seismic profiling included in TEPCO's application for reactor establishment after the 2007 Chuetsu-oki earthquake, it was easy to identify many such large-scale submarine active faults. There are four main ones, three of which run along either edge of the Sado Basin, a depression between Sado Island and mainland Kashiwazaki. In June 2003 TEPCO made a report to the Nuclear and Industrial Safety Agency revising their estimate of the F-B fault as a 20 km-long active fault. However, neither side made this new estimate public. Only finally in December 2007, after the Chuetsu-oki earthquake, was it publicly announced to be an active fault 23 km in length.

TEPCO stressed that this was "recent information" and wasn't known at the time of the license application. This is utterly incorrect.[5] TEPCO's evaluation of active faults is wrong as to both position and length. In fact, the most important submarine active fault is not the F-B fault, but the Eastern-boundary fault of Sado Basin [6]. It is over 40 km long, and capable of generating a major earthquake of magnitude 7.3~7.7. [7] TEPCO's study and the government's review of active faults in the offshore area of Kashiwazaki-Kariwa power plant is obviously peculiar, to put it mildly.

A major earthquake of magnitude 7 or greater could and should have been anticipated at the application and examination stage, and it must be a matter of grave concern that both TEPCO and the government "didn't realize" this. They are refusing to admit their responsibility, and are bent on starting up production at the plant again as soon as possible, though they say they are carrying out a new investigation. The Japanese nuclear industry, strongly interconnected with the government and its bodies, is famous for this attitude (see NM #654, april20, 2007)

A miraculously lucky escape

The recent Chuetsu-oki earthquake is thought to have resulted from underground rupture on the fault plane southeasterly-dipping from the Eastern-boundary fault of Sado Basin in which the land-side block thrust up northwestward over the sea-side block. It is possible that the slight displacements on the Madogasaka fault adjacent to the power plant and the southern extension of the Jorakuji fault to the east caused the uplift of the Nishiyama Hills and the Chuo Hills. There was, in short, a sudden outbreak of crustal movement centered around the nuclear reactor area.

Repeated major earthquakes of this type appear to have formed the general topographic features in this area both on the sea bottom and on land. The 2007 Chuetsu-oki earthquake, however, was of smaller scale than is anticipated from the Eastern-boundary fault of Sado Basin, and there was not a great deal of alteration in growth of relief on this occasion; that is, it was an aborted quake for this area. A quake of around magnitude 7.5 could easily have occurred, but thanks to the whims of nature the quake only reached 6.8. [8]

The Chuetsu-oki earthquake struck the Kashiwazaki-Kariwa Nuclear Power Plant with violent ground motion far beyond that of the basis of seismic design. The plant suffered considerable damage, and there was radiation leakage. However, the three reactors that were in active operation and the one reactor that was being started up at the time scrammed and a major disaster was avoided. Some take this to be proof that nuclear reactors are safe and earthquake-proof. But this is surely a case of culpable optimism.

Thanks to a happy combination of chance and circumstance, this recent case miraculously let us off the hook, but it could well have been a very different story. If the earthquake had been of magnitude larger than 7 (instead of 6.8), or had there been a large aftershock immediately following, or had all seven of the reactors been in operation at the time, we might instead have been faced with a fatal accident in which massive amounts of radioactive material were released, making uninhabitable not only the Kashiwazaki and Kariwa environs but a wide area of Niigata Prefecture.

Problems and possible delays restart Monju.

There is little hope the Monju prototype fast-breeder nuclear reactor will resume operations in October as scheduled after sensors used to detect sodium leaks were found to be defective. Since late March, there have been a string of reports of defective sodium sensors. In response, the Economy, Trade and Industry Ministry's Nuclear and Industrial Safety Agency (NISA) issued a stern warning to the operator, the Japan Atomic Energy Agency (JAEA) on April 7. After at least five sodium leak detectors at the reactor were found to be defective on and after March 26 because of shoddy installation work, NISA instructed the JAEA to confirm the safety of all sodium leakage-sensing devices. Monju has 403 detectors of this type. Examinations of the detectors carried out following incident showed that as many as half might have been improperly installed, they added. One official said the way the detectors were installed "can't help but be considered inexcusably lax." The Fukui prefectural government, the Tsuruga municipal government, which governs the area where Monju is located, and the government of the neighboring area of Mihamacho were not informed of the incident until three hours after it occurred. Given that the local governments and residents fear a sodium leakage accident similar to one that occurred in 1995, some authorities reportedly viewed the delay as a betrayal of trust.

The Monju reactor is still out of operation since the December, 1995 accident. The leak of about 640 kilograms of sodium, used as a coolant, from a duct in the reactor, caused a fire. Sodium can burn and explode if it comes into contact with air or water. Donen, which was operating Monju at that time, was fiercely criticized by the public for covering up the incident, as it was found to have edited video footage of the sodium leak in a bid to play down the accident. The JAEA aims to restart operations at Monju in October, 13 years after the shutdown, and has been checking the safety of the plant as well as monitoring its refurbishment. The sodium leakage detector problem, however, has cast dark clouds over the resumption plan.

Daily Yomiuri, 11 April 2008

Danger of another large earthquake remains

The 2007 earthquake was preceded by one in the same region in 2004, possibly pointing to a build-up of seismic energy in the area. Both were relatively small, magnitude 6.8, and there are many active faults both in the seabed and on land, so it is impossible to dismiss the likelihood of further major earthquakes. The next severe quake may be caused by major slip on the Madogasaka fault, for example, which may have perhaps undergone slight movement in the recent quake. It is also impossible to rule out a late aftershock of magnitude 6.5 or so occurring some years down the track directly under or in the immediate vicinity of the nuclear power plant. The possibility that this plant will be restarted is of grave concern indeed, given the extreme seismic hazard of the site, and the high possibility that it still carries considerable undetected damage from the recent quake.

In the 2006 revised version of the government's 'Regulatory Guide for Reviewing Seismic Design of Nuclear Power Reactor Facilities' the fundamental guideline states that "(all) buildings and structures shall be settled on the grounds which have sufficient supporting capacity". The ground of the Kashiwazaki-Kariwa plant was deformed remarkably by the Chuetsu-oki earthquake, affecting and in many cases causing considerable damage to structures right across the plant site. It has already given ample proof that it does not have sufficient supporting capacity. Therefore, the plant is in clear violation of the fundamental guideline stated above. Even by the standards of the nuclear power industry itself, the Kashiwazaki-Kariwa nuclear power plant must not be allowed to continue to operate.

Contact: Citizens' Nuclear Information Center, Tokyo, Japan.
Tel: +81 3 3357 3800
Email: cnic@nifty.com
Web: http://cnic.jp/english/
CNIC has published a special issue of *Nuke Info Tokyo* about the debate on the risks of earthquakes.

Sources:

[1] The Chuetsu-oki earthquake (magnitude 6.8) occurred at 10:13 am on July 16, 2007, just off the coast of Niigata Prefecture on the Japan Sea side of Honshu, Japan's largest island. As a result of the quake, four reactors (units 2, 3, 4 & 7) at Tokyo Electric Power Company's (TEPCO) Kashiwazaki-Kariwa Nuclear Power Plant shut down automatically. At the time, unit 2 was being started up after a periodic inspection, while the other three units (1, 5 & 6) were still shut down for periodic inspection.

[2] A very slow wave-shaped distortion of strata during geological time span, mainly under lateral compression, where buried faults, which could potentially be the origin of earthquakes, often exist.

[3] See Niigata Nippo: Tsunen Kikaku ("Kashiwazaki-Kariwa Genpatsu - the Shaky Safety Myth", 4.1, http://www.niigata-nippo.co.jp/rensai/n78/n78h5klml.html.

[4] Watanabe Mitsuhisa, Suzuki Yasuhiro, Nakata Takashi: Programme and Abstracts, Japan Association for Quaternary Research, No. 37, Suppl., 4(2007).

[5] Watanabe et al. (see 4) checked the data that TEPCO obtained and interpreted in its original application and, on the basis of criteria which were already authorized back in 1980, they were easily able to establish the existence of active faults at that location. Suzuki Yasuhiro, Nakata Takashi, Watanabe Mitsuhisa: Kagaku, 78, No.1, 97 (2008).

[6] This fault has been named by Watanabe Mitsuhisa, Nakata Takashi, Suzuki Yasuhiro: J. Geol. Soc. Japan, 114, 2008 (forthcoming).

[7] Suzuki Yasuhiro, Nakata Takashi, Watanabe Mitsuhisa: Kagaku, 78, No.1, 97 (2008)

[8] The seismic wave energy of a magnitude 6.8 earthquake is a little under 10% (i.e. less than one tenth) of that of a magnitude 7.5 quake.

U.K. GOES MAD FOR NUKES

There is an episode of "Spooks" - a BBC Spy Drama - in which "green terrorists" threaten to blow up the Thames Barrier and flood London unless the Government releases a report proving it is secretly trying to appear serious about climate change whilst actually continuing with business as usual. Few commentators would be surprised today if they were to learn such a report actually exists.

(671.5864) Pete Roche - Friends of the Earth (FoE) and the charity Help the Aged lodged papers at the High Court in London on April 9, seeking a Judicial Review of UK energy efficiency policy because of the Government's failure to meet its legal obligation to eradicate fuel poverty. People suffereing from fuel poverty are defined as those spending more than 10% of their income on heating and lighting. According to the Government's Fuel Poverty Advisory Group (FPAG), more than 2.3 million of the most vulnerable households in England suffer from fuel poverty, which means around eight old people are dying every hour due to cold related illnesses in the winter months.

Britain has plans for ten new "Eco-Towns" and all new houses will be zero-carbon after 2016. But 80% houses the UK population will inhabit in 2050 are already built, so, in order to cut carbon emissions by 60%, as will be a legal requirement when the Climate Change Bill currently going through parliament is passed, then emissions from these buildings will need to be cut by at least the same amount. Yet current plans expect an entirely inadequate contribution from the domestic sector.

Heat loss from the existing 25 million dwellings will need to be halved and around 600,000 microgeneration schemes, such as solar panels, need to be installed every year for the next 42 years, rather than the paltry 121,000 expected in the next three years.[1] 270 domestic solar PV systems were installed in 2007, compared with 130,000 in Germany. Environment groups have been focusing on persuading the UK Government to join the global renewable energy boom, and develop a renewable energy manufacturing base. Campaigners have persuaded a remarkable 270 MPs to sign a motion supporting German and Spanish style feed-in tariffs for small-scale renewable energy producers.[2] WWF-UK too has been campaigning for the introduction of financial incentives to motivate homeowners to improve the energy efficiency of their homes and rewards for homeowners who generate

their own electricity from micro-renewables.[3]

UK fuel poverty and climate campaigners are struggling to understand how exactly the Government thinks its new found enthusiasm for nuclear power will help. The big worry is that attention, finances and resources will get diverted from what really needs to be done now to tackle climate change, as seems to have happened in Finland. We can't afford to wait until 2025 to discover, as past experience tells us we will, the new reactor program was a £30 billion (USS 59bn or 37bn euro) mistake. Environment groups themselves are being careful not to switch too many resources from more immediate climate campaigning to fighting future plans for nuclear revival.

Jonathon Porritt, former FoE Director, and now Chairman of the Government's Sustainable Development Commission, says UK ministers are putting more effort into encouraging nuclear power than they have devoted to the entire field of renewables over the last 10 years. Ministers see nuclear power as the only manageable mega-fix available to them, the ultimate get-out-of-jail-free card - a sad and extraordinarily ill-judged illusion.

Walt Patterson, an FoE nuclear campaigner in the 1970s, says the pro-nuclear argument was comprehensively demolished two decades ago, so, like many people, he was astonished and bemused when nuclear power re-entered the policy agenda again in 2005. Given the nuclear industry's history of failure, why the Government thinks this industrial basket-case might be an appropriate place to look for a solution to the climate change problem is a bit mystifying.

New reactors are not going to start springing up very quickly. A Strategic Siting Assessment to identify possible sites will begin soon with a consultation on draft criteria, but won't be completed until the end of 2009. The Nuclear Installations Inspectorate has been assessing four new designs, but, even though AECL has pulled its ACR1000 design out of the race, it won't be finished until 2012. Then there will a planning process which might finish in 2013, so construction might start in 2014.

In February 2003, the Blair Government published its first Energy White Paper. This concluded that the current economics of nuclear power made it an unattractive option, and there are important issues of nuclear waste to be resolved. The Department of Trade and Industry (DTI) Minister at the time, Patricia Hewitt, said "*It would have been foolish to announce …a new generation of nuclear power stations, because that would have guaranteed we would not make the necessary investments in energy efficiency and renewables.*"

But the anti-nuclear Ministers in Blair's Government at the time failed to kill it off altogether. Instead it was put on the back-burner, supposedly for five years. There were warnings even then that DTI officials would deliberately go slowly on renewables to keep nuclear alive - this is indeed what seems to have happened. Blair didn't like the results of the 2003 energy review and started talking about re-visiting it as early as 2005. Nearly all the Ministers who pushed renewables and energy efficiency in 2003 had been moved by then, so in July 2006 a new draft White Paper backed new reactors.

Greenpeace challenged the legality of the July 2006 White Paper process, and in February 2007 the high court ruled it to be unlawful, so the Government was forced to hold another consultation. The second consultation ended on October 10, 2007 - by coincidence the 50th anniversary of Britain's worst nuclear accident - the Windscale Fire. But this was no better than the first, and most environment groups had ended co-operation in September prior to a series of workshops held in 8 cities with 1,100 members of the public. They said the government had failed to fairly reflect the arguments, and distorted the evidence, dubbing it "*a public relations stitch-up", FoE said "it is clear that the Government has essentially made up its mind … we are not prepared to take part in this latest Government farce*".

Independently, 20 senior academics say the consultations were deliberately skewed by linking nuclear to fears about climate change - because the government knew this was the only way to get people to accept nuclear, albeit reluctantly. Participants were misled - an inconvenient truth about nuclear - that it can only make a small contribution to reducing the UK's overall CO_2 emissions - was buried.

Patricia Hewitt's replacement, John Hutton, now known as the Secretary of State for Business Enterprise and Regulatory Reform, insists there will no subsidies for new reactors but the small print of the January 2008 Energy White Paper suggests a ceiling on the price private firms will have to pay for waste management and decommissioning, reducing companies' risks and making it cheaper for them to borrow. Greenpeace accused the government of providing covert subsidies and fixing the market.

Despite over two years work by the Government's Committee on Radioactive Waste Management (CoRWM), there is still no clear solution to the problem of what to do with nuclear waste. CoRWM specifically said it did not want its recommendations seized upon to support new reactors, but that is exactly what the Government is doing. The Liberal Democrats spokesman, Vince Cable, complained that "*Gordon Brown is wedded to building a new generation of nuclear power stations without providing any new evidence on how it would deal with waste ….*"

The answer, according to the Government, is to bribe local communities to accept a nuclear waste dump. So, the next stage in the UK's sorry thirty year history of nuclear dumping proposals will be a White Paper in the spring accompanied by a letter inviting municipalities to volunteer to host a dump.

Meanwhile, the devolved Scottish Government has expressed total opposition to nuclear power and refused to endorse the nuclear waste consultation process. It does not accept it is right to seek to bury nuclear waste, which will remain active for thousands of years, in a deep geological facility, or to expect any community to host such a facility.

Viewed from Europe, anti-nuclear

activity in Britain may seem thin on the ground. Environment groups have prioritized work on climate, seeking to introduce policies on energy efficiency and renewables which NGOs in many other European countries can already take for granted. UK activists taking direct action against airport expansions and coal-fired power stations see themselves, quite rightly, as the last generation that can do anything about climate change. But, as last summer's Heathrow Climate Camp day of action at Sizewell showed, nuclear power is not seen as a solution. If the proposals for new UK reactors continue to move ahead, and sites become clearer, nuclear power will be seen, not only as increasingly irrelevant to the job in hand, but as a positive hindrance which needs to be defeated.

Sources:

[1] Home Truths: A Low Carbon Strategy to Reduce UK Housing Emissions by 80% by 2050, by Brenda Boardman, FoE (EWNI) and Co-operative Bank, November 2007. http://www.foe.co.uk/resource/reports/home_truths.pdf

[2] EDM 890. http://edmi.parliament.uk/EDMi/EDMDetails.aspx?EDMID=35066&SESSION=891

[3] How Low Report, WWF-UK, 31st March 2008 http://www.wwf.org.uk/filelibrary/pdf/how_low_report.pdf

[4] See http://www.nuclearconsult.co.uk/

Contact: Pete Roche at Rochepete8@aol.com Pete was co-founder of the Scottish Campaign to Resist the Atomic Menace (SCRAM) in 1976, which organized some of the largest anti-nuclear power demonstrations in the UK. Between 1991 and 2004 he was a campaigner for Greenpeace UK. He is now an independent consultant, based in Scotland, and editor of two websites: www.no2nuclearpower.org.uk and www.microgenscotland.org.uk

TOO HOT TO HANDLE

THE TRUTH OF HIGH BURNUP SPENT FUEL

To boost the efficiency of nuclear reactors, operators have progressively enriched the uranium they use as fuel to increase its "burn-up" rate. This is a measure of the amount of electricity extracted from a given amount of fuel, and is expressed in gigawatt-days per ton of uranium (GWd/tU). The higher the burn-up, the longer the fuel rods can remain in the reactor. Since 1970, the average burn-up of these reactors worldwide has almost doubled, to more than 40 GWd/tU . The next generation of nuclear plants will bring a further step-change. Plans for the two designs most likely to be built in the U.S. and U.K. - Westinghouse's AP1000 and Areva's European Pressurised Reactor - envisage burn-up rates of 60 GWd/tU or more. At these rates, uranium fuel rods should burn for around a year longer than today's best burn-up fuel.

(671.5865) Nuclear Consultation Working Group - The problem with deciding 'in principle' to support new nuclear power stations is that once the actual details emerge, however troublesome, the Government will remain committed, and will be inclined to ignore them. In advance of detailed examination of the proposals of the nuclear industry the Government has reasserted its belief that new nuclear power stations would pose very small risks to safety. In fact the entire public consultation exercise seems to have been designed to protect the nuclear industry from proper scrutiny, and this 'keep it vague' method is continuing.

A good example of this is the way in which we as taxpayers are being 'locked in' to taking responsibility for the long-term management of highly radioactive waste from new nuclear power stations without any clear idea of the implications. The high burn up fuel proposed for new reactors uses more enriched uranium, and leaves it in the reactor for longer. This gets more output from the fuel, but increases the dangers of radioactive releases as the fuel cladding gets thinner. This increased danger persists throughout its storage and disposal. The Government says that before it grants consent for new nuclear reactors it

> "will need to be satisfied that effective arrangements exist or will exist to manage and dispose of the waste they will produce".[1]

This approach has been denounced by the International Atomic Energy Agency as 'too vague to provide the required certainty'. In March 2007 the IAEA warned that Britain must not go ahead with a new generation of nuclear power stations until it has a "clear and robust" plan in place for dealing with the twin problems of decommissioning and waste treatment. The agency's executive director said:

> "The spent-fuel issue is the most critical one for nuclear. It will not develop if there is not a credible and satisfactory answer to the management of spent fuel and one which is convincing for the public." [2]

The Government is currently consulting on their guidance notes for funded decommissioning. (consultation ends May 12th 2008) Operators of new nuclear power stations are to have secure financing arrangements in place to meet the full costs of decommissioning and their 'full share' of waste management costs. This should not be mistaken as a plan, let alone one which is clear and robust. In particular it avoids examining the worrying implications of on-site storage and subsequent direct disposal of high burnup spent fuel to underground repositories. A fixed unit price payable to the Government for taking ownership of and responsibility for an operator's spent fuel is to be based on "a conservative estimate of the costs of disposal of the spent fuel in a geological disposal facility." It will cover the risk that the eventual costs of building a geological disposal facility to dispose of spent fuel are higher than estimated, and their non-availability at the time agreed.[3]

In order to encourage investment in new

nuclear power stations the Government will signal in advance what the fixed spent fuel disposal charge is likely to be. It is probable that the spent fuel issue will be brazened out with vague reassurances rather than examined openly and honestly. If for short term political expediency a long term burden is passed on to future generations, with no certainty that sufficient funds will be available, it will violate the principles of 'sustainable development'.

The Pressure for High Burnup

Behind the skilled public relations about new nuclear reactor designs being safer and more advanced than existing designs lays a harsh fact. The nuclear industry, starved of orders for the last twenty years, is frantically trying to compete in a liberalized electricity market by cutting costs, both in new designs and the operation of existing reactors. The high burnup use of fuel, known as 'optimization,' is reducing safety margins and splitting opinion within the industry. High burnup fuel means there is less fissile plutonium left, further reducing the viability of reprocessing.

For economic reasons new nuclear reactors will use uranium once, and spent fuel will be declared to be waste. This means abandoning the fantasy of a plutonium economy using fast breeder reactors in the numbers required to make a difference to climate change. But it also means that spent fuel from new reactors is going to be far more hazardous and problematic to manage than Britain's existing spent fuel. The Government's policy that it is "technically possible and desirable to dispose of both new and legacy waste in the same geological disposal facilities" is unsupported, plain wrong, and will not survive scrutiny.

The consequences of higher burnup spent fuel have been pointed out by the IAEA.[4]

> "The higher burnup of fuel has a significant impact on the choice of the storage option and on the design of storage systems, due to the increased decay heat, inter-alia, which is roughly proportional to burnup, imposing a higher cooling load to the storage system."

The 1999 liberalization of the energy market in Europe put further pressure on Electricité de France (EDF) to become more competitive and resulted in the testing of higher burn up fuel. The European Pressurized water Reactor (EPR) has been 're-engineered' as a result of the same demands. Originally designed as a 1495 MWe reactor based on the Framatome N4 and the Siemens KONVOI, analysis showed that to be competitive the cost per kilowatt hour would have to be reduced by an additional 10%.

An "optimization" study suggested that such a decrease in cost could be achieved if there was a 15% increase in the reactor's power, fuel was enriched to up to 4.9% uranium235, and spent fuel discharged at a burnup of 60,000 MegaWatt days per ton of Uranium. This compares with Sizewell B which has a fuel burnup of only 33,000 MWd/tU, and the Framatome N4 originally designed to use 39,000 MWd/tU burnup fuel (now raised in operation to 52,000 MWd/tU).

By 2004 it was claimed[5] : "The EPR….uses the best nuclear fuel in order to obtain the maximum energy. In doing so, it produces less waste." Its manufacturers currently claim that[6] "Its design is based on experience from several thousand reactor-years of light water reactor operation worldwide."

'Higher than expected rates of oxidation' of zircalloy fuel cladding at high burnups[7] have prompted the search for better alloys. It is, however, too soon to say how the addition of 1% niobium will affect the durability of high burnup fuel.[8] EDF is about to experiment using fuel to a burnup of 62,000 MWd/tU in 20 earlier reactors, so the truth is that the specific dangers associated with such fuel, in operation and storage, have not yet been experienced. Despite Westinghouse problems with high burnup the UK is asked to accept 60,000MWd/tU spent fuel from its AP1000 PWR design.

As for producing less waste, while it is true that as the enrichment and the burn-up rate of the fuel is higher the volume of spent fuel is lower; this comes at a very heavy price. High burnup spent fuel will be hotter and more radioactive and therefore take more space within a store. It is partly for this reason that the industry has lobbied for charges to be fixed in advance for taking away and disposing of their spent fuel.

As the temperature for dry storage must be maintained below design limits, the heat of the spent fuel needs to be decayed to a sufficiently low level by cooling in a storage pool for several years.

> "This cooling period is dependent upon the fuel's burnup (for a higher burnup, more than a decade of cooling in the pool may be required)".[9]

It is unclear whether the EPR with seven years storage capacity in the spent fuel pool within the reactor building has adequate provision for high burn up spent fuel. When it is removed from the cooling ponds certain problems of high burnup fuel actually intensify. The cladding of spent nuclear fuel above 45,000MWd/tU is vulnerable to the formation of radial hydrides after the spent fuel is removed from the spent fuel pool for dry storage or transportation.[10]

This matters because if these hydrides develop due to the rate of cooling, the duration of drying, and the hydrogen content, the cladding is prone to failure, especially during a handling accident in which it is dropped.[11]

In the USA the Yucca Mountain geological repository has been delayed and the management of spent fuel has become a nationwide preoccupation. Waste from over 100 nuclear reactors that the federal government was meant to start accepting for burial (at a low fixed charge) ten years ago, is still at the reactor sites at least 20 years behind schedule. It is forecast to cost the US government at least US$7 billion in settlements over the next few years.[12]As loaded dry casks increase fivefold in the decade to 2010, and reactor owners use higher burn up fuel, the Nuclear Regulatory Commission has expressed concern about high burnup spent fuel:[13]

> ".....there is limited data to show that the cladding of spent fuel with burnups greater than 45,000 MWd/MTU will remain undamaged during the licensing period. Limited information

suggests increased cladding oxidation, increased hoop stresses and changes to fuel pellet integrity with increasing burnup up to and beyond 60,000 MWd/MTU. These burnup dependent effects could potentially lead to failure of the cladding and dispersal of the fuel during transfer and handling operations.

Safety fears about the longer term integrity of such fuel is becoming an international matter leading the IAEA to demand more research on fuel behavior in dry storage as essential.[14]

"In particular...high burnup fuels and mixed oxide (MOX) fuels will need to be carefully assessed in the context of ensuring long term storage safety."

The high burnup of the EPR spent fuel leads to higher fissile contents. Higher heat loads require packaging with improved heat transfer capacity, and new materials that can withstand the effect of higher temperatures on components and materials. Coping with this is still at an experimental stage. The high initial enrichment results in spent fuels with higher gamma and neutron radiation levels than current fuels, so it will require greater shielding, as AREVA themselves acknowledge:[15]

"....to work towards achieving the 'low as readily achievable' criterion in relation to the control of radiation doses to workers and the public.....efforts are being focused on developing enhanced shielding designs.

United States official estimates for the heat output of 50,000 MWd/tU PWR spent fuel suggest that 50 yrs after withdrawal from the reactor each ton emits at least 800 W. The heat output from four 60,000 MWd/tU EPR or AP1000 fuel assemblies would at this stage exceed 2,000W. For deep underground disposal the temperature requirements of the Nirex PWR packaging concept limit the decay heat in one canister (each with four fuel assemblies) to 1,700 W.[16]

Three quarters of Swedish fuel has a burn up of below 40,000MWd/tU but as SKB acknowledged in 2007:[17]

"Now that the nuclear power companies have announced that they want to increase the average burnup for both PWR and BWR fuel to 60 MWd/kgU, additional calculations are also required of…..radionuclide inventory, decay heat and criticality. New leaching tests also have to be done."

This is important because the SKB repository concept has been adopted by the Nuclear Decommissioning Authority as the 'reference repository' for Britain in order to demonstrate the feasibility of deep geological disposal. Setting aside the great uncertainties in this approach, the Swedish concept could at least theoretically accommodate the cooler low burnup spent fuel comprising Britain's 'legacy'.

About 20% of the US spent fuel from PWRs to be accommodated in the Yucca Mountain geological repository has a burnup of over 45,000MWd/tU, requiring a more generous spacing of the deposition tunnels to allow a greater volume for heat dissipation. The French agency looking at the deep disposal concept[18] already foresees major difficulties with the long term storage of MOX fuel, tied to its heavy thermal load (average MOX fuel burnup is 'only' 47,000 MWd/t.)

What is apparent is that high burnup spent fuel from the EPR or AP1000 cannot be accommodated in the NDA 'reference repository' as presently designed. High burn-up spent fuel will either have to be stored for longer than 50 years (probably over 70 years) or emplaced with fewer fuel assemblies in each canister, requiring a larger repository, both involving greater public expense per ton of spent fuel.

There is no evidence that this has been taken into consideration by the government or its agencies. Indeed, in February 2007 NIREX acknowledged that 'no calculations had yet been performed for the heat output from EPR canisters', and consequently estimated the impact on a deep underground repository of the spent fuel from a program of 7 EPRs on the assumption that 4 fuel assemblies could be placed in each canister.[19]

The year 2075 is earliest time that it is envisaged the direct disposal of spent fuel deep underground could occur, should it prove feasible. At that time the radioactivity of the more demanding

More problems with high burn-up fuel.

Besides the problems handling high burnup spent fuel, there is more. In March, findings were presented on the behaviour of high burn-up fuel. A team led by Michael Billone at U.S. Argonne National Laboratory said that fuels with a burn-up above 45 GWd/tU cause previously unforeseen safety problems, and would break existing NRC safety rules unless changes are made to the way fuel elements are packaged.

The danger would come if there were a sudden loss of cooling water - as in the accident that led to the partial meltdown of the Three Mile Island reactor core in 1979. To contain the radioactivity in such an event, it is crucial that the fuel rods and their zirconium alloy cladding maintain their integrity as they are doused with cold water from the emergency cooling system. If the cladding has become brittle, the rods may split open and leak plutonium and other radioactive material into the reactor building. According to the Argonen-led team even during normal operation, cooling water corrodes the surface of the cladding by reacting with zirconium to form zirconium oxide. The NRC's rules require that the corroded layer must not amount to more than 17 per cent of the thickness of the cladding. But the research shows this rule is not stringent enough. When they put different types of cladding used for fuel with a burn-up above 45 GWd/tU through a series of tests designed to simulate a loss-of-coolant incident, they found they all became brittle before oxidation had reached the 17 % limit. They attribute this enhanced brittleness to the increased amounts of hydrogen released by high burn-up fuels during normal reactor operation. The gas is gradually absorbed into the cladding, where it increases the solubility of oxygen. Between 650 degreesC and 1200 degreesC, this can trigger "breakaway oxidation" of zirconium, making it rapidly more brittle in an emergency. Fuels operating at 60 GWd/tU would produce around 40 per cent more hydrogen than existing high burn-up fuels.

New Scientist, 11 April 2008

high burnup spent fuel from new build would be over six times the radioactivity from Britain's legacy spent fuel and HLW (High Level radioactive Waste). Radioactivity from new build remains at six times that from the legacy spent fuel over the following 100 years, directly influencing heat output and hence working conditions during the operational period of the repository.

The nuclear industry says new nuclear build in the UK should not be dependent on a solution to the waste issue being found. "If new build does occur, a repository dealing with legacy wastes could readily accommodate the smaller volumes of easier-to-handle wastes from that new generation of nuclear plants."[20]

Conclusions

Government tolerance of this wilful misinformation will forfeit public trust as the truth emerges. Official ignorance about such matters is inexcusable, particularly in the context of IAEA warnings. The Government has already acceded to nuclear industry demands for a 'fixed charge' to take ownership of its spent fuel and dispose of it. Uncertainties about the safety and feasibility of direct disposal of high burnup spent fuel will take decades to address. In this context **any** level of charge fixed now would expose future taxpayers to the risk of huge uncovered liabilities while representing a deliberate present day incentive to the nuclear sector.

- Direct disposal of spent fuel in deep underground repositories is an unproven concept.
- The Swedish repository adopted by Britain to establish the feasibility of the concept for British legacy waste was designed for 'normal' burnup spent fuel (99.8% os Swedish spent fuel is below 50,000MWd/tU).
- The vendors of new reactors, in particular the EPR and the AP1000, want our Government to agree to take very high burnup spent fuel (over 60,000MWd/tU) off their hands for a charge fixed in advance of technical and scientific confidence.
- Such fuel is more demanding at every stage of the nuclear cycle form the reactor itself, subsequent cooling in ponds, through drying and storage in dry casks to eventual burial. It will increase potential worker and public exposure to radiation.
- There is very little experience of spent fuel over 60,000MWd/tU, and materials for its safe containment after the cooling pond are still at an experimental stage.
- Such fuel will need several decades additional cooling time, or to be spaced out more widely in underground repositories, increasing their 'footprint'.
- Such are the uncertainties about high burnup spent fuel, **any** level of disposal charge fixed now would expose the future taxpayer to the risk of huge uncovered liabilities.

According to the Royal Society if a new nuclear power program is established the need for a separate disposal site for newer HLW would remain.[21]

There are compelling reasons to shield any program for managing Britain's legacy waste from the highly uncertain and risky consequences of disposing of high burn-up spent fuel from a new nuclear power program.

Contact: Hugh Richards, Transedw Lodge, Hundred House, Llandrindod Wells, Powys LD1 5RY, United Kingdom.

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NEW REPORT CRITICIZES GNEP; 13 FINDINGS DETAIL SERIOUS PROBLEMS

On March 31, a coalition of public interest, environmental and policy groups released a groundbreaking report detailing the severe shortcomings and false assertions posed in the Global Energy Nuclear Partnership (GNEP). The new report, *Risky Appropriations: Gambling US Energy Policy on the Global Nuclear Energy Partnership*, finds that GNEP is "an ill-conceived, poorly supported, rushed, and technically and economically risky program." The report was commissioned and sponsored by: Friends of the Earth USA, the Government Accountability Project, Institute for Policy Studies, and Southern Alliance for Clean Energy.

(671.5866) Government Accountability Project - GNEP is a key component of the Bush administration's plan to expand America's use of nuclear power. GNEP was launched in early 2006 with the aim of expanding the international nuclear industry and forging partnerships with other countries to address fuel supply, spent nuclear fuel and proliferation of nuclear weapons through the use of nuclear power. According to the administration, under GNEP, the U.S. and other leading nuclear countries would provide an assured supply of reactor fuel and take back spent fuel from other countries that were willing to forego development of their own uranium enrichment and reprocessing programs.

The crux of the plan involves the United States importing and reprocessing spent nuclear fuel from other countries to harness nuclear energy. The Bush administration and Department of Energy (DOE) claim that GNEP would reduce America's dependence on fossil fuels in a safe manner. Specifically, many pro-nuclear power proponents have been pushing the plan as adequately addressing the rising issue of global warming and rapid climate change.

However, this investigation by Synapse Energy Economics has found that, in general, GNEP is an ill-conceived, poorly supported, rushed, and technically and economically risky program that only will begin to produce benefits, if it ever does, four or more decades in the future. Even if its unproven technologies are shown to be viable, GNEP also has the potential to inhibit the adoption of more reasonable solutions to global climate change by diverting resources into an unproven and, most likely, a prohibitively expensive nuclear option. GNEP also would increase the danger of nuclear proliferation and the potential for weapons grade materials falling into the hands of hostile or unstable nations and terrorist groups. Finally, GNEP would make the United States the dumping ground for radioactive wastes from the other participating nations.

More particularly, the study made the following findings:

1. The Bush administration's announced plan for GNEP lacks important details about technical viability, proliferation risks, waste streams and ultimate life-cycle costs.
2. The administration has presented no economic analysis of the costs and benefits of the GNEP plan. Nor has it compared GNEP to other technically feasible and cost-effective alternatives. Such an economic justification should be provided before significant funds are appropriated for GNEP.
3. Full implementation of GNEP would represent a significant expansion and redirection of the nuclear industry.
4. The reference technologies and processes for GNEP already have been selected by the DOE. However, none of these technologies and processes currently exist in commercially viable applications. In fact, few of the technologies and processes that would be required for GNEP have even been shown to be viable in large engineering-scale demonstration projects.
5. The Bush administration's proposed schedule for deployment of GNEP is not feasible -the technologies that would be required to implement GNEP successfully would take decades to develop if, in fact, they can be made technically and commercially viable at all.
6. The administration's plan for GNEP would rashly lock the United States into decisions to deploy certain nuclear technologies and processes well before R&D is completed, demonstration projects are tested and operated and the chosen technologies and processes are shown to be feasible and cost-effective.
7. Developing and deploying the new facilities required for GNEP would likely be prohibitively expensive.
8. GNEP would be an unreasonably expensive and slow option for addressing global climate change.
9. GNEP could reverse the U.S. practice of not reprocessing reactor wastes.
10. It is unclear whether GNEP would eliminate the need for additional geologic waste repositories.
11. GNEP is unlikely to reduce the risk of the proliferation of nuclear materials.
12. Deployment of the facilities that would be required in GNEP could entail significant risks to the public health and safety.
13. Implementation of GNEP would require overcoming a number of significant political challenges.

A PDF copy of the report can be found at:
http://www.whistleblower.org/doc/2008/GNEPMarch.pdf

Contact: Government Accountability Project, Dylan Blaylock, GAP Communications Director
Tel: +1-202.408.0034 ext 137
Email: dylanb@whistleblower.org

IN BRIEF

France: Prison and fine threat for revealing nuclear danger. A French anti-nuclear activist has been threatened with years of imprisonment and an enormous fine for publishing a secret report that shows the European Pressurized Reactor (EPR) would not withstand an airliner crashing into it. Stephane Lhomme, the spokesperson of "Reseau Sortir du Nucleaire", an alliance of 815 anti-nuclear organizations, was held 10 hours in arrest by the DST secret service on March 25, before being released. "But it is probable that they will attack again with a trial with the possible result of a long time in jail and a heavy fine," his organization says. Five years and 75,000 euros are being mentioned. "For now, it seems they still actively search for the person in the state-owned electricity corporation Électricité de France who forwarded the secret defense document." Contradicting the statements of French authorities, the secret report about the EPR, says it wouldn't withstand a plane crash.
Press release BI Lüchow-Dannenberg, 1 April 2004

Spain: Serious leak Asco kept secret; new world record wind power
On April 5, a leak of radioactive material at the Asco nuclear power plant in Tarragona was made public by Greenpeace and confirmed shortly afterwards by the Spanish Nuclear Safety Council (CSN). The CSN was not advised by operators Endesa until April 4 of the leak, which occurred during refueling last November. In a statement CSN said it had raised its rating of the leak to 2 on the International Nuclear Event Scale (INES) for "inadequate control of nuclear material and for supplying incomplete and deficient information to the regulator". The CSN said it was considering sanctions against the plant's operators for not providing it with enough information about the leak. CSN added that the plant's management now estimated that a maximum of 84.95 million becquerels (Bq) of radioactivity had been leaked, which compares to a figure of 235,000 Bq published on April 8. The CSN said it had so far examined 579 out of between 700 and 800 people who had been through the Asco I nuclear plant since the leak and none had been found to have been contaminated.
Asco I is a 21000 MW pressurized water reactor (PWR), owned by Endesa, Spain's second largest utility. It came on stream in August 1983 and its operating permit is due to expire in 2011. Spain's recently re-elected Socialist government has pledged to phase out the country's eight nuclear plants and step up electricity generation from renewable energy sources.
Meanwhile, wind power is breaking new records, accounting for just over 40 percent of all electricity consumed during a brief period in late March. On March 22, as heavy winds lashed Spain wind parks generated 9,862 megawatts of power which translated to 40.8 percent of total consumption. In July the government approved legislation that will allow offshore wind parks to be set up along the nation's vast coastline in an effort to boost the use of renewable energy sources. Spain, which along with Germany and Denmark, is among the three biggest producers of wind power in the 27-nation European Union, is aiming to triple the amount of energy it derives from renewable sources by 2020
Reuters, 14 April 2008 / ENN, 26 March 2008

Canada: Nova Scotia politicians back uranium mining ban. The all-party standing committee of resources of the Nova Scotia legislature has reaffirmed its support for the province's moratorium on uranium mining. "We are not interested in having the moratorium stand in the way of legitimate mining," said Graham Steele, the New Democrat MLA who proposed the motion. "We understand the uranium moratorium as it's currently worded can, in some circumstances, stand in the way of the development of a healthy mining sector. So we're all for the removal of those kinds of impediments, while leaving the uranium in the ground where it belongs."
The motion also calls on the province to consider allowing exploration for other minerals even if uranium turns up during the search. Steele said it's now up the provincial government to appoint a committee to review whether it's possible to mine other minerals without disturbing uranium deposits. Gordon Dickie, president of the Mining Association of Nova Scotia, told the committee that Nova Scotia is sacrificing tens of millions of dollars in possible exploration because of the moratorium.
Nova Scotia banned uranium exploration in 1982 after rural residents protested the environmental impact. Canada produces about one-third of the world's uranium.
CBC News, 15 April 2008

Will fear of foreign ownership of BE derail UK nuclear program? Speculation that French state-controlled power giant Electricite de France can end up owing British Energy has not gone down well in the British press. According to Managing Editor of Platts EU Energy, Paul Whitehead, especially the euroskeptic right-wing titles, which had until now been broadly supportive of a UK nuclear revival, cites energy security and consumer protection as reasons why BE should stay British, plus the fact that the new jobs that would be created by a nuclear revival could end up abroad under a foreign ownership scenario.
British Energy (BE) is the privatized UK generator that owns the country's newest nuclear power plants. BE said in mid-March that it was in talks with "interested parties" about its future and plans to play a "pivotal role" in any new nuclear program. The talks, it said, could lead to a merger or takeover. EdF is by no means the only company interested in British Energy or the UK nuclear sector more generally, with Germany's E.ON and RWE and Centrica, the British company that owns British Gas, also tipped as possible partners for BE.
The French nuclear program is often cited by proponents of nuclear as a success story, with nuclear accounting for around 80% of French power generation and leaving a large surplus for export to neighboring countries (15% of UK power demand is imported from France!). And the 'success' of the program is seen also in the low cost of French generation.

But that low cost power is only possible because EdF's power stations have been largely amortized, with most of their debt written off. And that was possible because EdF's ownership status gave it access to state-guaranteed finance at very favorable rates when it built most of its reactors in the 1970s and 1980s.
Platts, 8 April 2008

Taiwan: election saves nuclear power program. Political sources think the effect of the election defeat of the antinuclear Democratic Progressive Party will not be as dramatic as was the DPP's election victory eight years ago. After taking over power in the 2000 presidential election it then took the DPP eight months of internal politicking before it canceled construction of two ABWRs at Lungmen. The cancellation order was lifted by court judges in early 2001, but it was the first of a flurry of DPP measures aimed at crippling Taipower's nuclear development program. The construction of the Lungmen reactors is still not completed.
The impact of the March 22 election victory by the pronuclear Kuomintang (KMT), may be seen quickly, sources in Taiwan said. Because certain issues are pressing, the incoming KMT-led government may not wait very long before making key decisions affecting the future of Taiwan Power Co. The KMT victory is anticipated to unlock government approval of a spent fuel storage project and thereby prevent the closure of Taipower's two oldest power reactors at Chinshan. For several years Taipower has been waiting for the government to license setting up spent fuel dry storage infrastructure at Chinshan-1 and -2. Chinshan-1 must shut in 2010 because the spent fuel pool is full, unless the dry storage project is licensed and completed. According to Taipower officials, it will take 18 months following award of the licenses to complete the construction and remove the fuel from the spent fuel pool. So time was running out.
Nucleonics Week, 27 March 2008

Wishful thinking? Stabilizing carbon dioxide concentrations at 550 parts per million (ppm) by 2100 could lead to a nuclear power industry boasting 6000 reactors, according to Sonny Kim of the Joint Global Change Research Institute. Kim is a laboratory fellow at the Joint Global Change Research Institute, set up by the Pacific Northwest National Laboratory and the University of Maryland. The body has been studying the interlinked mechanisms of climate change with the help of the Kansai Electric Power Company, Rio Tinto, the Electric Power Research Institute and the US Department of Energy, among others. Kim explained the research to delegates at the World Nuclear Fuel Cycle 2008 meeting in Miami, USA.
JGCRI research indicates that with no global carbon control policy, emissions would triple by 2100. This would be driven in part by a five-fold increase in electricity generation over the same period. Under this reference scenario nuclear power would grow from 439 reactors and 16% of global electricity now, to about 2400 reactors and 20% of electricity. Should the world act as one to impose a tax on carbon dioxide emissions with the aim of stabilizing concentrations of CO_2 at 450 ppm, that tax might have to increase as high as US$800 per ton of carbon (about US$220 per ton of CO_2). Stabilizing at 550 ppm could cost US$110 per ton of CO_2 by comparison, and that choice would affect the scale of the future nuclear power industry. The other main factor, still according to JGCRI, would be the availability or not of carbon capture and storage to enable the continued use of fossil fuels.
I really don't see how they think this is an argument for nuclear power! And this is a report by the nuclear industry, so low estimates of CO_2-emissions by nuclear, nothing about availability of uranium, industry cpacity, etc. However, a more convincing argument to exclude nuclear power from ways to combat CO_2 emissions is hard to find: 2.400 reactors and still a three-fold increase of carbon-emission in 2100!
World Nuclear News, 9 April 2008

Two dead after gas leakage nuclear complex Pakistan. An unsigned statement apparently issued by or on behalf of the Pakistan Atomic Energy Commission (PAEC) said that at 2.30pm on April 8, an incident of hydrogen sulphide gas leakage occurred when the Khushab heavy water plant was under annual maintenance and was in a shutdown status. The gas leakage left two workers dead before the situation was brought under control.
According to the Carnegie Endowment non-proliferation website
<http://www.carnegieendowment.org/static/npp/deadlymaps.cfm> the Khushab nuclear complex, 250km south of Islamabad, is the location for heavy water production; a 50MWt plutonium production reactor, not subjected to safeguards; tritium production facility, also not subject to safeguards. The incident occurred at the heavy water plant. Panic gripped the area and an emergency was declared in the local hospital. The adjoining area in a radius of 16km was sealed and hundreds of employees living in a colony near the plant were evacuated as a precautionary measure. It said that an inquiry had been ordered to ascertain the cause of the incident.
According to a news agency, a similar leak took place in the Khushab facility a couple of years ago killing five people. This incident was never made public. One is compelled to ask whether our nuclear facilities are properly secured against such mishaps. It is not just gas leak but also radiation that poses a risk. The government has drawn up the Nuclear Safety and Radiation Protection Regulations which also provide for a Nuclear Safety Regulatory Authority for the implementation of the rules. But it has yet to establish a credible track record. Two years ago, the dumping of nuclear waste in the abandoned uranium mines in Baghalchur had led to a hue and cry and a court case. But not much has been heard about it ever since
Dawn (Pakistan), 9 & 11 April 2008

Siemens loses half a billion Euro in Olkiluoto-3 EPR

The extra costs of problems and delays in Olkiluoto nuclear project to Siemens can top 500 million Euro, the brokerage company CAI Cheuvreux has estimated (1). Siemens, who recently issued a profit warning, have themselves said that the losses are "not insignificant". Siemens share price has fallen by 25 % in two weeks, and its participation at the Finnish EPR project is quoted as one of the key factors behind company's poor economic performance.
The Olkiluoto EPR (European Pressurized Reactor) project is estimated to be 1.5 billion over budget at the moment. Half a billion Euro recently attributed to Siemens may reflect its 34 % share it has in the project, with French Aréva having the remaining 66 %. Aréva made provision of 700 million Euro already in 2006 in order to cover the costs resulting delays of Olkiluoto-3 project.
Greenpeace energy campaigner Lauri Myllyvirta warned: "The Olkiluoto 3 project was based on an unrealistic cost and construction time estimates, that made the alternatives look too expensive. New nuclear project proposed in Finland are building on equally inflated assumptions and in the future any extra expenses would certainly be charged on Finns."

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French Flamanville-3 project may repeat the fiasco of EPR project

Serious economic and technical difficulties that are hitting the first EPR construction in Finland turn this exemplary project into a fiasco that instead of mature nuclear technology displays its numerous dark and problematic sides.
The need to improve the reputation for EPR project contributed to the decision of French industry to build a second EPR reactor - this time under its full control and on its own ground, (the third reactor) at Flamanville in Normandy. The construction of this nuclear power plant started in December 2007, after site preparation and ground works have been performed before.
It took less than three months before the inspectors of ASN, the French nuclear safety authority, have observed several significant problems. Since end of March, ASN has published a dozen letters summarizing the outcomes of its inspections at Flamanville 3. The problems include the use of concrete of inadequate quality, badly arranged steel enforcement in the concrete base slab, numerous bad welds performed by the unqualified supplier of the containment steel liner, ineffective or nonexistent quality control, unauthorised variations from the approved project or an inability to satisfactorily repair mistakes.
Greenpeace translated several of the most important ASN letters into English and published them. Bellow is a summary of three of them.

ASN letter dated March 12, 2008:
Inspectors detected non-conformities in the pinning of the steel framework of the concrete base slab. Several pinned overlaps between U-shaped bars were incorrectly positioned (pins missing from the lower part, distance and length of overlap outside tolerances). Concrete was already being poured over the deficient steel framework.
This observation also reveals the inadequacy of the technical inspection carried out by the construction companies and of EDF's supervision of the construction activities. ASN requests the companies to assess whether the steel frameworks of concrete plots that have been poured earlier are likely to have similar defects. In addition, inspectors discovered inconsistency between reinforcement blueprint and a work plan for its practical implementation.
When the inspectors visited concrete plot no.1, the monitoring values known as slump results showed two consecutive values of 200, for a permitted margin of 170 ±30. The observed results were thus at the upper limit of the authorised range. Nonetheless, there seem to have been no corrective steps undertaken to re-centre the observed value. The ASN inspector also mentions the lack of care in treating concrete samples.

ASN letter dated Febraury 19, 2008:
The supplier of the containment steel liner does not have required qualifications. Ceidre, the department of EdF in charge of overseeing the welding, was aware of the problem since November 2007 but failed to report it. The fabrication of the liner was going on despite the fact that identified failures of quality further exposed the lack of competence of the supplier. In addition, the welding book lacks many information that are of key importance to the tightness of the liner. Still, Ceidre had already accepted the book.
One quarter of the welds of the steel liner of the reactor containment building were deficient, and there is a more detailed report related to this issue that has not been published.
ASN demands that EdF improves the situation without further delays and evaluates the implications for the work already performed. The safety authority calls for a clarification on why a clear violation of requirements was not reported.

ASN letter dated January 25, 2008:
Concrete ratio between water and cement were observed between 0.47 and 0.49, but 0.45 is the highest permissible value for exposure class XS3 required for the reactor base slab. These values are not sufficient to limit fractions in the concrete and to ensure its durability when exposed to coastal atmosphere. ASN requests the operators to adhere to required ratio between 0.40 and 0.45 and not to tolerance its deviations.
The samples of concrete were piled up without any order or systematic classification. It was not possible for the inspectors to verify that the samples from the base slab were actually stored.
Concrete was not tested after abnormal events during pouring, which is a violation of the quality requirements. The concreting station operators lacked precise knowledge on the requirements placed on their work and relied on their personal ad-hoc judgments, which shows a lack of safety culture.

Source: ASN website
http://www.asn.fr/sections/acces-lettre-suite/?Installation=107&libel=R%E9acteur%20EPR%20de%20Flamanville

WISE/NIRS NUCLEAR MONITOR

The Nuclear Information & Resource Service was founded in 1978 and is based in Washington, US. The World Information Service on Energy was set up in the same year and houses in Amsterdam, Netherlands. NIRS and WISE Amsterdam joined forces in 2000, creating a worldwide network of information and resource centers for citizens and environmental organizations concerned about nuclear power, radioactive waste, radiation, and sustainable energy issues.

The WISE/NIRS Nuclear Monitor publishes international information in English 20 times a year. A Spanish translation of this newsletter is available on the WISE Amsterdam website (www.antenna.nl/wise/esp). A Russian version is published by WISE Russia and a Ukrainian version is published by WISE Ukraine. The WISE/NIRS Nuclear Monitor can be obtained both on paper and in an email version (pdf format). Old issues are (after two months) available through the WISE Amsterdam homepage: www.antenna.nl/wise.

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Greenpeace EPR-campaign
As they have chosen the (development of the) EPR as their campaign focus for this year, WISE has decided to facilitate Greenpeace International with at least one page per issue of the Nuclear Monitor. We think this work is crucial and we think the provided material and news is useful for all of us, everywhere.

WISE/NIRS offices and relays

WISE Amsterdam
P.O. Box 59636
1040 LC Amsterdam
The Netherlands
Tel: +31 20 612 6368
Fax: +31 20 689 2179
Email: wiseamster@antenna.nl
Web: www.antenna.nl/wise

NIRS
6930 Carroll Avenue, Suite 340
Takoma Park, MD 20912
Tel: +1 301-270-NIRS
(+1 301-270-6477)
Fax: +1 301-270-4291
Email: nirsnet@nirs.org
Web: www.nirs.org

NIRS Southeast
P.O. Box 7586
Asheville, NC 28802
USA
Tel: +1 828 675 1792
Email: nirs@main.nc.us

WISE Argentina
c/o Taller Ecologista
CC 441
2000 Rosario
Argentina
Email: wiseros@ciudad.com.ar
Web: www.taller.org.ar

WISE Austria
c/o Plattform gegen Atomgefahr
Roland Egger
Landstrasse 31
4020 Linz

Austria
Tel: +43 732 774275; +43 664 2416806
Fax: +43 732 785602
Email: post@atomstopp.at
Web: www.atomstopp.com

WISE Czech Republic
c/o Jan Beranek
Chytalky 24
594 55 Dolni Loucky
Czech Republic
Tel: +420 604 207305
Email: wisebrno@ecn.cz
Web: www.wisebrno.cz

WISE India
42/27 Esankai Mani Veethy
Prakkai Road Jn.
Nagercoil 629 002, Tamil Nadu
India
Email: drspudayakumar@yahoo.com;

WISE Japan
P.O. Box 1, Konan Post Office
Hiroshima City 739-1491
Japan

WISE Russia
P.O. Box 1477
236000 Kaliningrad
Russia
Tel/fax: +7 95 2784642
Email: ecodefense@online.ru
Web: www.antiatom.ru

WISE Slovakia
c/o SZOPK Sirius
Katarina Bartovicova
Godrova 3/b
811 06 Bratislava
Slovak Republic
Tel: +421 905 935353
Email: wise@wise.sk
Web: www.wise.sk

WISE South Africa
c/o Earthlife Africa Cape Town
Maya Aberman
po Box 176
Observatory 7935
Cape Town
South Africa
Tel: + 27 21 447 4912
Fax: + 27 21 447 4912
Email: coordinator@earthlife-ct.org.za
Web: www.earthlife-ct.org.za

WISE Sweden
c/o FMKK
Barnängsgatan 23
116 41 Stockholm
Sweden
Tel: +46 8 84 1490
Fax: +46 8 84 5181
Email: info@folkkampanjen.se
Web: www.folkkampanjen.se
c/o FMKK

WISE Ukraine
P.O. Box 73
Rivne-33023
Ukraine
Tel/fax: +380 362 237024
Email: ecoclub@ukrwest.net
Web: www.atominfo.org.ua

WISE Uranium
Peter Diehl
Am Schwedenteich 4
01477 Arnsdorf
Germany
Tel: +49 35200 20737
Email: uranium@t-online.de
Web: www.wise-uranium.org

WISE/NIRS NUCLEAR MONITOR

c/o WISE Amsterdam
PO Box 59636
1040 LC Amsterdam
Netherlands

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