NUCLEAR MONITOR

A PUBLICATION OF WORLD INFORMATION SERVICE ON ENERGY (WISE)
AND THE NUCLEAR INFORMATION & RESOURCE SERVICE (NIRS)

wise
World Information Service on Energy
founded in 1978

NUCLEAR INFORMATION & RESOURCE SERVICE
www.nirs.org

OCTOBER 8, 2010 | No. 717

MONITORED THIS ISSUE:

SPANISH PROTEST AGAINST PROPOSED NUCLEAR WASTE STORAGE

TheSpanish Ministry of Industry has started a process for the construction of a Centralized Temporary Storage of radioactive waste (Almacén Temporal Centralizado –ATC) to house waste from all nuclear power plants in Spain. Some municipalities in the country have submitted their applications to host the facility. Several sites have been proposed in the past, but at the moment it seems to be Zarra, in the province of Valencia, near Albacete.

(717.6089) WISE Amsterdam - When Zarra, a village with a population of 551 on Valencia's provincial boundary with Albacete, emerged as a likely candidate from a Cabinet meeting in Madrid as the site for nuclear waste storage, the anti-ATC protest group called for immediate action: "people are very angry".

Siting the nuclear cemetery in Zarra would compromise the safety of the Valencians, said Juan Cotino, third vice-president of Valencia's regional government earlier, in a reversal of the initially mild opposition to the ATC. Zarra could not satisfy the safety requirements for such a sensitive installation, he says. Most of the subsoil in the area ia a combination of clay and loam and could be geologically erratic in steep areas prone to landslides. But a delegate to the Madrid government claims that none of Cotino's present objections were put forward by the Valencian government when it originally opposed the ATC.

Antinuclear activists, however, were always clear in their rejection. In March already 4,000 people protested against the nomination of Zarra. And also in Madrid the opposition to the waste storage mounts; on September 22, some 1500 people demonstrated at the Ministry of Industry, Commerce and Tourism.

During the last two weeks of September quite a few things happened in the proposed region.

On September 19, a caravan of more than 200 slow-moving vehicles protested against the possible siting, causing 12-kilometer tailbacks on the A31 Alicante-Madrid road. It was the first of a series of demonstrations staged that week against the nuclear power plant at Cofrentes and the proposed waste storage center at Zarra

A few days later the police arrested 16 activists at the village of Ayora, close to Zarra. Among those arrested was the mayor, Manuel López Gaviria. He was arrested by four uniformed Guardia Civil officers at the school while teaching his students. Apparently, officials have identified the detainees through photos of the protests, as most of those arrested are "neighbors of the town of Ayora, where everyone knows everyone." The Guardia Civil said they could arrest as much as 'over a hundred people'. The arrest were made in connection with alleged crimes such as disobedience, public disorder and breaching traffic safety regulations. The charges include roadblocks on access roads to the Cofrentes nuclear power station.

A townmeeting was held immediately

after the arrests. These arrests and trials are "attempts to criminalize and silence an entirely peaceful protests" in order to "scare and frighten" the activists, and "the purpose of detention is to scare the demonstrators to stop the protests". According to one activist the people at the meeting were committed: "rather than to discourage, the effect of the arrest is quite the opposite. The people are one". A "cyberaction" has been started demanding "the immediate withdrawal of charges against all".

On 28 September about 300 people demonstrated in Valencia in solidarity with those accused.

Contact: http://www.facebook.com/noalcementerionucleardezarra
Sources: https://www.ecologistasenaccion.org/spip.php?article18596 / http://www.levante-emv.com/comunitat-valenciana/2010/09/28/detenidos-vecinos-ayora-protestas-atc/742890.html / http://www.abc.es/agencias/noticia.asp?noticia=533504 / http://www.que.es/valencia/201009281743-unas-personas-concentran-ayora-solidaridad-epi.html

EUROPEAN COMMISSION MISLED OVER SAFETY GEOLOGICAL DISPOSAL

A new study released today shows European leaders are being misled over the safety of underground nuclear waste disposal which could poison ground waters for centuries. The European Commission is due to publish a draft nuclear waste directive this autumn. The new report, 'Rock Solid? A scientific review of geological disposal of high-level radioactive waste' by Helen Wallace for Greenpeace International examines the current state of scientific evidence regarding the geological disposal of spent nuclear fuel and other high-level and long-lived radioactive wastes.

(717.6090) Greenpeace EU Unit - Deep disposal has dominated the research into the management of highly radioactive nuclear waste for over 30 years and is expected to be central to the directive. However, the European Commission has been misinformed of the dangers of deep disposal by its most critical advisors, the Joint Research Centre (JRC) and European Implementing Geological Disposal Technology Platform (IGD-TP). Both claim that a scientific consensus has been reached and construction should proceed. However, there is evidence to suggest that this is biased and deep geological storage projects could have serious problems that have not been identified because of lack of resources and funding for independent scrutiny.

The European Atomic Energy Community (Euratom), which was founded in 1957 to promote the use of nuclear power in Europe, has been financing research in the area of geological disposal of high level radioactive waste for more than three decades and has provided considerable support to national research and development programs.

Worldwide, thirteen countries are actively pursuing long-term waste management programs for high-level radioactive wastes resulting from nuclear electricity generation, but no country has yet completed an operational geological disposal facility for such wastes.

The 2009 Euratom-funded Vision Document of the European Implementing Geological Disposal of Radioactive Waste Technology Platform (IGD-TP) states that *“a growing consensus exists”* that deep disposal is the most appropriate solution to disposing of spent nuclear fuel, high-level waste and other long-lived radioactive wastes, and that it is time to proceed to licensing the construction and operation of deep geological repositories for radioactive waste disposal. This conclusion is supported by the 2009 report of the European Commission’s (EC’s) Joint Research Centre (JRC), which states that *“our scientific understanding of the processes relevant for geological disposal has developed well enough to proceed with step-wise implementation”.*

The IGD-TP Vision Document has been prepared by an Interim Executive Group with members from the nuclear waste management organizations SKB (Sweden), Posiva (Finland) and Andra (France) and the German Federal Ministry of Economics and Technology (BMWi). It adopts the vision that by 2025 the first geological disposal facilities for spent nuclear fuel, high-level waste and other long-lived radioactive waste will be operating safely in Europe. The Director of Energy (Euratom) for the European Commission’s Directorate-General for Research states in the Foreword:
These will not only be the first such facilities in Europe but also the first in the world. I am convinced that through this initiative, safe and responsible practices for the long-term management of hazardous radioactive waste can be disseminated to other Member States and even 3rd countries, thereby ensuring the greatest possible protection of all citizens and the environment both now and in the future.

The IGD-TP states that inherent in *“all the successful outcomes to date in European nuclear waste management programs”* are judgments that safe geological disposal of spent nuclear fuel, high level waste, and other long-lived radioactive waste is achievable: *“In this context, the future RD&D [Research, Development and Demonstration] issues to be pursued, including their associated uncertainties, are not judged to bring the feasibility of disposal into question.”* This statement reflects the view expressed by the Radioactive Waste Management Committee (RWMC) of the OECD’s Nuclear Energy Agency (NEA) that *“geological disposal is technically* *feasible" and that a "geological disposal system provides a unique level and duration of protection for high activity, long-lived radioactive waste".*

However, the OECD/NEA position is merely a collective statement, based on the views of the RWMC, not an analysis of the existing scientific evidence. Similarly, the IGD-TP report relies on a road map towards radioactive waste management developed by the European Nuclear Energy Forum, and includes no references to papers in scientific journals. The EC's JRC report is largely a description of ongoing research projects; it cites only three papers published in academic journals (one of which dates from 1999) plus lists of background reports, largely published by the NEA and International Atomic Energy Agency (IAEA), and a few conference papers. The report makes no obvious links between these summaries of research activity and its conclusion that Europe is ready to proceed to implementation of deep geological disposal. In a rare example of a referenced claim, the JRC's statement that corrosion of steel (and the generation of hydrogen gas by this process) will not compromise the safety of a repository is based solely on an unpublished note of a panel discussion held in Brussels in 2007. Further, the report falsely claims that repository programs in Germany and the UK have *"(temporarily) foundered mainly for reasons of public acceptance"*, rather than because of safety issues.

In contrast, the present report is based on a literature review of research on deep disposal published in peer-reviewed scientific journals. It provides an overview of the status of research and scientific evidence regarding the long-term underground storage of highly radioactive wastes, and asks whether this evidence supports the view that such wastes can be disposed of safely underground. It finds that significant scientific uncertainties remain and it accordingly questions whether strong conclusions in favor of deep disposal can be drawn until all the relevant issues have been addressed.

This review identifies a number of phenomena that could compromise the containment barriers, potentially leading to significant releases of radioactivity:
* Copper or steel canisters and overpacks containing spent nuclear fuel or high-level radioactive wastes could corrode more quickly than expected.
* The effects of intense heat generated by radioactive decay, and of chemical and physical disturbance due to corrosion, gas generation and biomineralisation, could impair the ability of backfill material to trap some radionuclides.
* Build-up of gas pressure in the repository, as a result of the corrosion of metals and/or the degradation of organic material, could damage the barriers and force fast routes for radionuclide escape through crystalline rock fractures or clay rock pores.
* Poorly understood chemical effects, such as the formation of colloids, could speed up the transport of some of the more radiotoxic elements such as plutonium.
* Unidentified fractures and faults, or poor understanding of how water and gas will flow through fractures and faults, could lead to the release of radionuclides in groundwater much faster than expected.
* Excavation of the repository will damage adjacent zones of rock and could thereby create fast routes for radionuclide escape.
* Future generations, seeking underground resources or storage facilities, might accidentally dig a shaft into the rock around the repository or a well into contaminated groundwater above it.
* Future glaciations could cause faulting of the rock, rupture of containers and penetration of surface waters or permafrost to the repository depth, leading to failure of the barriers and faster dissolution of the waste.
* Earthquakes could damage containers, backfill and the rock.

Although computer models of such phenomena have undoubtedly become more sophisticated, fundamental difficulties remain in predicting the relevant complex, coupled processes (including the effects of heat, mechanical deformation, microbes and coupled gas and water flow through fractured crystalline rocks or clay) over the long timescales necessary. In particular, more advanced understanding and modelling of chemical reactions is essential in order to evaluate the geochemical suitability of repository designs and sites.

The suitability of copper, steel and bentonite as materials for canisters, overpacks and backfill also needs to be reassessed in the light of developing understanding of corrosion mechanisms and the effects of heat and radiation.

Unless and until such difficulties can be resolved, a number of scenarios exist in which a significant release of radioactivity from a deep repository could occur, with serious implications for the health and safety of future generations. In this light, the existence in a number of countries of 'road maps' for the implementation of deep disposal, and the rejection of other options, do not automatically mean that deep disposal of highly radioactive wastes is safe.

At present, the following issues remain unresolved and have implications for policy development:
* the high likelihood of interpretative bias in the safety assessment process because of the lack of validation of models, the role of commercial interests and the pressure to implement existing road maps despite important gaps in knowledge. Lack of (funding for) independent scrutiny of data and assumptions can strongly influence the safety case
* lack of a clearly defined inventory of radioactive wastes, as a result of uncertainty about the quantities of additional waste that will be produced in new reactors, increasing radioactivity of waste due to the use of higher burn-up fuels, and ambiguous definitions of what is considered as waste
* the question of whether site selection and characterization processes can actually identify a large enough volume of rock with sufficiently favorable characteristics to contain the expected volume of wastes likely to be generated in a given country
* tension between the economic benefits offered to host communities and long-term repository safety, leading to a danger that concerns about safety and impacts on future generations may be sidelined by the prospect of economic incentives, new infrastructure or jobs. There is additional tension between endorsement of deep disposal as a

potentially ‘least bad’ option for existing wastes, and nuclear industry claims that deep repositories provide a safe solution to waste disposal and so help to justify the construction of new reactors
* potential for significant radiological releases through a variety of mechanisms, involving the release of radioactive gas and/or water due to the failure of the near-field or far-field barriers, or both
* significant challenges in demonstrating the validity and predictive value of complex computer models over long timescales
* risk of significant escalation in repository costs.

Source: The report 'Rock Solid? A scientific review of geological disposal of high-level radioactive waste', written by Helen Wallace for Greenpeace International is available at: http://www.greenpeace.org/eu-unit/press-centre/reports/rock-solid-a-scientific-review

Contact: Greenpeace EU Unit, Jan Haverkamp
Email: jan.haverkamp@greenpeace.org

SMALL MODULAR REACTORS: NO SOLUTION FOR COSTS, SAFETY AND WASTE PROBLEMS

The same industry that promised that nuclear power would be "too cheap to meter" is now touting another supposed cure-all for America's power needs: the small modular reactor (SMR). The small modular reactor is being pitched by the nuclear power industry as a sort of production-line auto alternative to hand-crafted sports car, with supposed cost savings from the "mass manufacturing" of modestly sized reactors that could be scattered across the United States on a relatively quick basis. The facts about SMRs are far less rosy.

(717.6091) IEER & PSR - Proponents of nuclear power are advocating for the development of small modular reactors (SMRs) as the solution to the problems facing large reactors, particularly soaring costs, safety, and radioactive waste. “Small modular reactors” are defined by the US Department of Energy (DOE) as reactors that would produce 300MWe or less and are made in modules that can be transported. Unfortunately, small-scale reactors can’t solve these problems, and would likely exacerbate them.

There has been a proliferation of proposed Small Modular Reactor designs, but none have applied for certification by the Nuclear Regulatory Com¬mission (NRC) yet. The NRC says that it expects to receive its first SMR design certification application in 2012. The factsheet addresses SMR designs for which the NRC may receive design certification applications in FY2011. It does not include some designs that are being researched but that are not on the NRC list, notably the travelling wave reactor. IEER will produce a separate report later in 2010 on this reactor.

Inherently more expensive?
SMR proponents claim that small size will enable mass manufacture in a factory, enabling considerable savings relative to field construction and assembly that is typical of large reactors. In other words, modular reactors will be cheaper because they will be more like assembly line cars than hand-made Lamborghinis.
In the case of reactors, however, several offsetting factors will tend to neutralize this advantage and make the costs per kilowatt of small reactors higher than large reactors. First, in contrast to cars or smart phones or similar widgets, the materials cost per kilowatt of a reactor goes up as the size goes down. This is because the surface area per kilowatt of capacity, which dominates materials cost, goes up as reactor size is decreased. Similarly, the cost per kilowatt of secondary containment, as well as independent systems for control, instrumentation, and emergency management, increases as size decreases. Cost per kilowatt also increases if each reactor has dedicated and independent systems for control, instrumentation, and emergency management. For these reasons, the nuclear industry has been building larger and larger reactors in an effort to try to achieve economies of scale and make nuclear power economically competitive.

Proponents argue that because these nuclear projects would consist of several smaller reactor modules instead of one large reactor, the construction time will be shorter and therefore costs will be reduced. However, this argument fails to take into account the implications of installing many reactor modules in a phased manner at one site, which is the proposed approach at least for the United States. In this case, a large contain¬ment structure with a single control room would be built at the beginning of the project that could accommodate all the planned capacity at the site. The result would be that the first few units would be saddled with very high costs, while the later units would be less expensive.

The realization of economies of scale would depend on the construction period of the entire project, possibly over an even longer time span than present large-reactor projects. If the later-planned units are not built, for instance due to slower growth than anticipated, the earlier units would likely be more expensive than present reactors, just from the diseconomies of the containment, site preparation, instrumentation and control system expenditures. Alternatively, a containment structure and instrumentation and control could be built for each reactor. This would greatly increase unit costs and per kilowatt capital costs. Some designs (such as the PBMR) propose no secondary containment, but this would increase safety risks.

These cost increases are unlikely to be offset even if the entire reactor is manufactured at a central facility and some economies are achieved by mass manufacturing com¬pared to large reactors assembled on site.

Furthermore, estimates of low prices must be regarded with skepticism due to the history of past cost escalations for nuclear reactors and the potential for cost increases due to require¬ments arising in the process of NRC certification. Some SMR designers are proposing that no prototype be built and that the necessary licensing tests be simulated. Whatever the process, it will have to be rigorous to ensure safety, especially given the history of some of proposed designs.

The cost picture for sodium-cooled reactors is also rather grim. They have typically been much more expensive to build than light water reactors, which are currently estimated to cost between $6,000 and $10,000 per kilowatt in the US. The costs of the last three large breeder reactors have varied wild¬ly. In 2008 dollars, the cost of the Japanese Monju reactor (the most recent) was $27,600 per kilowatt (electrical); French Superphénix (start up in 1985) was $6,300; and the Fast Flux Test Facility (startup in 1980) at Hanford was $13,800. This gives an average cost per kilowatt in 2008 dollars of about $16,000, without taking into account the fact that cost escalation for nuclear reactors has been much faster than inflation. In other words, while there is no recent US experience with construction of sodium-cooled reactors, one can infer that (i) they are likely to be far more expensive than light water reactors, (ii) the financial risk of building them will be much greater than with light water reactors due to high variation in cost from one project to another and the high variation in capacity factors that might be expected.

Even at the lower end of the capital costs, for Superphénix, the cost of power generation was extremely high — well over a dollar per kWh since it operated so little. Monju, despite being the most expensive has generated essentially no electricity since it was commissioned in 1994. There is no comparable experience with potassium-cooled reactors, but the chemi¬cal and physical properties of potassium are similar to sodium.

Increased safety and proliferation problems

Mass manufacturing raises a host of new safety, quality, and licensing concerns that the NRC has yet to address. For instance, the NRC may have to devise and test new licensing and inspection procedures for the manufacturing facilities, including inspections of welds and the like. There may have to be a process for recalls in case of major defects in mass-manufactured reactors, as there is with other mass-manufactured products from cars to hamburger meat. It is unclear how recalls would work, especially if transportation offsite and prolonged work at a repair facility were required.

Some vendors, such as PBMR (Pty) Ltd. and Toshiba, are proposing to manufacture the reactors in foreign countries. In order to reduce costs, it is likely that manufacturing will move to countries with cheaper labor forces, such as China, where severe quality problems have arisen in many products from drywall to infant formula to rabies vaccine.

Other issues that will affect safety are NRC requirements for operating and security personnel, which have yet to be determined. To reduce operating costs, some SMR vendors are advocating lowering the number of staff in the control room so that one operator would be responsible for three modules. In addition, the SMR designers and potential operators are proposing to reduce the number of security staff, as well as the area that must be protected. NRC staff is looking to designers to incorporate security into the SMR designs, but this has yet to be done. Ultimately, reducing staff raises serious questions about whether there would be sufficient personnel to respond adequately to an accident.

Of the various types of proposed SMRs, liquid metal fast reactor designs pose particular safety concerns. Sodium leaks and fires have been a central problem — sodium explodes on contact with water and burns on contact with air. Sodium-potassium coolant, while it has the advantage of a lower melting point than sodium, presents even greater safety issues, because it is even more flammable than molten sodium alone. Sodium-cooled fast reactors have shown essentially no positive learning curve (i.e., experience has not made them more reliable, safer, or cheaper).

The world's first nuclear reactor to generate electricity, the EBR I in Idaho, was a sodium-potassium-cooled reactor that suffered a partial meltdown. EBR II, which was sodium-cooled reactor, operated reasonably well, but the first US commercial prototype, Fermi I in Michigan had a meltdown of two fuel assemblies and, after four years of repair, a sodium explosion. The most recent commercial prototype, Monju in Japan, had a sodium fire 18 months after its commissioning in 1994, which resulted in it being shut down for over 14 years. The French Superphénix, the largest sodium-cooled reactor ever built, was designed to demonstrate commercialization. Instead, it operated at an average of less than 7 percent capacity factor over 14 years before being permanently shut.

In addition, the use of plutonium fuel or uranium enriched to levels as high as 20 percent — four to five times the typical enrichment level for present commercial light water reactors — presents serious proliferation risks, especially as some SMRs are proposed to be exported to developing countries with small grids and/or installed in remote locations. Security and safety will be more difficult to maintain in coun¬tries with no or underdeveloped nuclear regulatory infrastructure and in isolated areas. Burying the reactor underground, as proposed for some designs, would not sufficiently address security because some access from above will still be needed and it could increase the environmental impact to groundwater, for example, in the event of an accident.

More complex waste problem

Proponents claim that with longer

PBMR

Despite 50 years of research by many countries, including the United States, the theoretical promise of the PBMR has not come to fruition. The technical problems encountered early on have yet to be resolved, or apparent¬ly, even fully understood. PMBR proponents in the US have long pointed to the South African program as a model for the US. Ironically, the US Department of Energy is once again pursuing this design at the very moment that the South African government has pulled the plug on the program due to escalating costs and problems

opera¬tion on a single fuel charge and with less production of spent fuel per reactor, waste management would be simpler. In fact, spent fuel management for SMRs would be more complex, and therefore more expensive, because the waste would be located in many more sites. The infrastructure that we have for spent fuel management is geared toward light-water reactors at a limited number of sites. In some proposals, the reactor would be buried underground, making waste retrieval even more complicated and complicating retrieval of radioactive materials in the event of an accident. For instance, it is highly unlikely that a reactor containing metallic sodium could be disposed of as a single entity, given the high reactivity of sodium with both air and water.
Decommissioning a sealed sodium- or potassium-cooled reactor could present far greater technical challenges and costs per kilowatt of capacity than faced by present-day above-ground reactors.

Not a climate solution
Efficiency and most renewable technologies are already cheaper than new large reactors. The long time — a decade or more — that it will take to certify SMRs will do little or nothing to help with the global warming problem and will actually complicate current efforts underway. For example, the current schedule for commercializing the above-ground sodium cooled reactor in Japan extends to 2050, making it irrelevant to addressing the climate problem. Relying on assurances that SMRs will be cheap is contrary to the experience about economies of scale and is likely to waste time and money, while creating new safety and proliferation risks, as well as new waste disposal problems.

(This is a shortened version of the factsheet on Small Modular Reactors produced by Arjun Makhijani and Michelle Boyd for the Institute for Energy and Environmental Research (IEER) and Physicians for Social Responsibility (PSR), September 2010. It is available at: /www.ieer.org/fctsheet/small-modular-reactors2010.pdf)
Contact: Leslie Anderson, +1 703 276-3256
Mail: landerson@hastingsgroup.com
Or: info@ieer.org

HINKLEY POINT BLOCKADED

On Monday 4 October 2010, activists from the Stop Nuclear Network in the UK blockaded the entrance to Hinkley Point Nuclear Station in Somerset. Hinkley Point is one of the sites where EDF wants to build new nuclear power stations in Britain, and very likely the first one. At present, there are two reactors: Hinkley Point A, which is being decommissioned, and Hinkley Point B, which is still producing electricity.

(717.6092) SNPN - An eyewitness report: To block traffic onto the site, four activists lay in the road locked-on together using metal and plastic tubes. The action started at 6.30am before the workers shift change could happen. It took a while for the Security and Nuclear Police to respond and when they did they just closed the gate. Not long after that we could hear the public address system going 'lock down lock down lock down', so we had succeeded in disrupting the running of the Station.
By 7am there was a long tail back of workers' cars and delivery trucks, as there is only one road into Hinkley, so they weren't going anywhere. When the local Avon and Somerset police liaison officer arrived he seemed sympathetic to why we were there and asked if we had any demands. Besides shutting down Hinkley B, we did ask to speak with the Manager of Hinkley B and the Manager for the proposed Hinkley C. They eventually arrived, and a slightly heated debate took place over the issues nuclear waste and the proposed building of Hinkley C, being the first EPR Reactors that EDF want to build here in the UK. At 10.30 we decided to end our Blockade which was the first time a action of this type had ever happened at Hinkley and it won't be the last especially if EDF are granted planning permission some time in 2011.

Boycott EDF
Even before EDF has secured planning permission for Hinkley Point C, the company wants to begin with 'enabling works', which has upset the local community. Nikki, a Bridgwater Mum said: "From this autumn on, EDF wants to dynamite and bulldoze 435 acre of green fields - habitats for badgers, bats, and other wildlife, and in close proximity to Bridgwater Bay, which is a sanctuary for thousands of waders, ducks, and other sea birds. It is a joke to think this land could be restored - as EDF claims - should Hinkley C not be built." "If EDF wants to nuke the climate and the planet, the nonviolent resistance is not just an option, but a duty - at Sizewell, and here at Hinkley Point", says Nicola Deane from Suffolk.

To resist EDF's plans for nuclear expansion, not only here at Hinkley Point, but also at Sizewell, Bradwell, Hartlepool, and Heysham, the Stop Nuclear power Network is calling for a boycott of EDF.

The Stop Nuclear Power Network is a UK-based non-hierarchical grassroots network of groups and individuals taking action against nuclear power and its expansion and supporting sustainable alternatives. We encourage and seek to facilitate nonviolent direct action, as well as more conventional forms of campaigning.

A national gathering of the Stop Nuclear Power Network will take place in Bristol on, Saturday 23 to Sunday 24 October. The weekend is to meet people from your region and from around the country who are taking action against nuclear power. Make plans together and build solidarity with people who live next door to Hinkley Point. Crash space available on a dry, warm and quiet floor space. If you need a bed, please get in contact ASAP and we'll try and help you out.
Email: nonewnuclear [at] aktivix.org

For more information on the campaign to boycott EDF, see http://boycottedf.org.uk

Source and contact: Stop Nuclear Power Network (SNPN), c/o 5 Caledonian Road, London N1 9DX United Kingdom
Web: http://stopnuclearpoweruk.net

PROLIFERATION & THE ‘NUCLEAR REVIVAL’: TAKING STOCK, MANAGING CONCERNS

The so-called ‘nuclear revival’ is considered by some observv¬ers to be the next major challenge for the nuclear non-proliferation regime. It is considered by some to set in motion the rapid diffusion of nuclear technology to states in volatile regions, namely North Africa, Southeast Asia and the Middle East. It is, some argue, likely to cause these states to engage in ‘nuclear hedging’, that is, the deliberate stock¬piling of nuclear capacity and expertise to keep open the option of quickly building a nuclear weapon if security conditions take a turn for the worse. Iran’s behavior, in particular, is seen as the potential catalyst for a nuclear ‘tipping point’, ‘cascade’ or ‘proliferation epidemic’ in the Middle East. The safeguards system of the International Atomic Energy Agency (IAEA) is already financially strained and is said to be incapable of handling the rapid influx of new nuclear facilities that comes with a nuclear revival. The non-proliferation outlook for this predicted revival has so far been, to say the least, rather pessimistic.

The pessimism of some in the non-proliferation commu¬nity is juxtaposed by the extreme optimism of nuclear en¬ergy advocates with regard to the extent of nuclear energy’s resurgence. The IAEA, for example, projects in its high-end scenario that nuclear energy generation will increase from its current 372 gigawatts electric (GWe) to 807 GWe by 2030. The World Nuclear Association’s (WNA) high-end scenario predicts 1203 GWe of nuclear generating capacity by the same year. The Massachusetts Institute of Technol¬ogy’s (MIT) 2003 study predicted 1,000 GWe of nuclear by 2050, but in 2009 said that this was ‘less likely’ than they initially anticipated.

Historical projections for nuclear power capacity have invariably been overly optimistic. For example, the IAEA projected that during the 1980s—when more reactors were connected to the grid than any other decade—there would be 14 new countries using nuclear power with a combined low-end predicted capacity of 52 GWe by 1989. As it turns out, the actual capacity of these countries by 1989 was just shy of 9 GWe, nearly 6 GWe of which belonged to South Korea alone, with reactors in only 4 of the 14 countries. However, the ability of the IAEA to make accurate projec¬tions is dependent on the predictions of its member states, which are often overly optimistic for political reasons. Past predictions, be they from the IAEA, governments or others have almost always been wrong.

The reality is that ten years into the forecasted ‘nuclear revival’ neither the optimistic projections for nuclear energy growth nor the pessimistic predictions for the non-prolif¬eration regime’s ability to cope appear to be accurate. Of course, the lack of any significant increase in nuclear energy production means that the predicted burden on the non-proliferation regime has not materialized, but the pes¬simism is unfounded regardless. Countries in which new nuclear build is taking place, or is expected to, are generally not considered proliferation threats because they are either existing nuclear weapon states, or already have well established nuclear industries and a demonstrated apathy towards possessing nuclear weapons of their own, like Canada or Japan.

The main proliferation concern -potential new entrants in volatile regions- have shown little rigour in pursuing their nuclear energy ambitions. The Survey of Emerging Nuclear Energy States (SENES) of the Nuclear Energy Futures (NEF) Project -a partnership between the Centre for International Governance Innovation (CIGI) and the Canadian Centre for Treaty Compliance (CCTC), Carleton University -currently lists 34 states pursuing nuclear energy. Of these, only Iran has actually made significant headway in the past decade to connect a nuclear power reactor to its electrical grid, but it began its ongoing quest to do so under the Shah in the 1970s. All states pursuing nuclear power will face some problems of cost, industrial bottlenecks, personnel constraints and nuclear waste, but aspiring states face unique challenges of their own. Since many of these states are poorer, less developed countries, they often lack the institutional capacity, physical infrastructure and finances to support a large-scale, multi-billion dollar nuclear power plant project.

The risk, or concern, is that these new states will obtain the expertise in nuclear engineering and related disciplines that would allow them to go on to eventually develop nuclear weapons, most notably in the form of highly-trained scientists. Though the relationship between nuclear energy and weapons is complex, a nuclear power programme is nonetheless a potential stepping stone toward weapons development, and also a potentially highly effective cover for mask¬ing nefarious intent. Many fear that Iran is using its nuclear power programme for exactly that reason.

Despite these fears, if most aspiring nuclear energy states are not making any real progress towards acquiring nuclear energy then it goes almost without saying that the associated proliferation challenges of a nuclear revival are much less likely to materialize. This means that the burden on the IAEA and its safeguards system may not be as profound as many might expect.

IAEA safeguards

That the predicted revival in nuclear energy has not fully materialized, however, should not be taken as an indication that the IAEA, or its safeguards, are any less important. The humbler scale and pace of nuclear energy expansion still means an increase in the number of nuclear power reactors, increased trade and transport and perhaps more states with sensitive nuclear fuel cycle technologies. As new facilities are built, the IAEA will need to expand on its existing safeguards capacity.

The post-Gulf War emergence of the Additional Protocol as the highest standard of verification for the 1968 Nuclear Non-Proliferation Treaty (NPT) has gone a long way to improving the effectiveness of the safeguards system. It is a step closer to the ‘anytime, anywhere’ verification that was envisaged -but not enshrined- in the IAEA Statute. It is only sensible, then, that the first step in improving the current state of safeguards is to try to increase the number of states implementing Additional Protocols, which as of September 2010 stood at 102. Regrettably, those states that do not have an Additional Protocol in force include 18 of the states in the SENES project.

Interest by these states in technical cooperation from the IAEA and from nuclear suppliers may be just the opportunity needed to convince them that an Additional Protocol is both worthwhile and important. The United Arab Emirates (UAE) seems to be setting an example, agreeing to have an Additional Protocol in place as a condition of supply in its nuclear cooperation agreement with the US. However, the Additional Protocol is not likely to become an absolute requirement for nuclear cooperation in the near future. *Developing countries and particularly prominent non-aligned countries already feel overburdened by safeguards, and many consider this as an imposition beyond what is already expected of them by the NPT, seeing it as a form of inequality or even as a way of depriving them of technology.* (italic added, WISE)

As important as the Additional Protocol is, attempting to make it mandatory may be unproductive. Nuclear suppliers may, however, be able to incentivize the adoption of Additional Protocols through measures such as increased cooperation, assistance programmes and training, rather than through the imposition of punitive steps such as technology denial.

IAEA safeguards and nuclear export controls are an important part of the non-proliferation regime, and are effective in ensuring that states are responsible with their nuclear technology and material. They have proven invaluable in helping deter states that might otherwise consider the pursuit of nuclear weapons. These supply-side measures, though effective non-proliferation measures, are not as important as the reality that most states today simply do not want nuclear weapons. The demand, except in increasingly rare instances, is just not there, and the IAEA's relatively recent changes to its safeguards philosophy is perhaps in part a reflection of that.

For states in which the Agency has sufficient confidence that all nuclear activities taking place are intended for purely peaceful purposes, the IAEA's 'integrated safeguards' system streamlines monitoring activities, thereby allowing it to allocate resources more effectively to states with problem¬atic nuclear programmes like Iran. It is also shifting towards what it calls information-driven safeguards, a more holistic approach to verification that involves analyzing information beyond traditional accounting methods, including unde¬clared activities and intelligence information provided by states. These two initiatives are exactly the right kind of efforts that the IAEA needs to make in order to cope with potential increases in the number of nuclear facilities it is responsible for safeguarding.

The IAEA itself is a veritable bargain for developed states, which primarily view it as a verification body. The Agency's 2010 budget was US$444m, with an additional target of US$158m in extra-budgetary contributions. To give an example of the return on investment that states receive for their money, in 2008 the IAEA had 237 safeguards agreements in place with 163 states covering 1,131 facilities, and conducted 2,036 on-site inspections.
The problems currently faced by the IAEA, revival or not, revolve primarily around resources, with the IAEA hampered by budgetary constraints imposed on it by many member states. If the number of new nuclear facilities is to increase even at a gradual pace, the IAEA will struggle to cope financially.

As former IAEA Director-General Mohammed ElBaradei cogently put it to the Board of Governors in 2009: 'I will be cheating world public opinion to be creating the impres¬sion that we are doing what we're supposed to do, when we know we don't have the money to do it.' Dr ElBaradei and a 2008 Commission of Eminent Persons both recom¬mended a doubling of the budget by 2020 to account for the increasing safeguards burden placed on the Agency as new facilities are built. Such a doubling would probably be wise, and will certainly go a long way to assuage any enduring concerns about a possible nuclear revival, if member states can be convinced of its necessity.

Even when the IAEA's increasingly effective verification system successfully detects cases of non-compliance, international responses to them are not always effective. So far, determining the form that these responses take has been done on a somewhat ad hoc basis and with mixed results ranging from economic sanctions, military strikes and Security Council-mandated decommissioning programmes. Nuclear hedging presents an additional challenge: even if countries are pursuing nuclear power to hedge against regional rivals it is difficult to divine true intent because the technologies involved are inherently dual-use. Iran has done well so far to keep much of the world in doubt about its ultimate aim, despite being recently caught hiding a secret enrichment facility near Qom. Thankfully, Iran's behavior appears to be the exception rather than the norm.

Implications for non-proliferation
It is probably inevitable that at least a few new states will succeed in their ambitions to acquire nuclear power. The report of the CIGI-CCTC NEF Project, The Future of Nuclear Energy to 2030 and Its Implications for Safety, Security and Nonproliferation details the numerous constraints standing in the way of a substantive nuclear revival.
In doing so, it identifies those aspiring states that are most likely to overcome those constraints and succeed in their nuclear ambitions, as Iran is poised to do. Though most aspiring states have so far only taken the easy steps towards acquiring nuclear power, the report identifies several that have the potential to make significant headway by 2030, namely: Algeria, Egypt, Indonesia, Jordan, Kazakhstan, Turkey, the UAE and Vietnam.
The problem with many of the commonly used terms such as 'tipping point' or 'proliferation cascade' is that they inevitably falter at the level of the individual state. It is simple enough to imagine strategic scenarios in which a domino effect leads to many new nuclear-armed states, but it is difficult to identify individual states that would actually follow such a course in a world increasingly characterized by economic and social integration.

Egypt is a prime example. Not only is it one of the aspiring nuclear energy states that has the potential to succeed in its plans, but it is frequently referred to as a 'usual suspect' in the proliferation context because of its long and complicated nuclear history, including a minor reporting failure in 2004 that was eventually put down to a lack of clarity over what was required of it under its IAEA safeguards agreement. Egypt has a poor relationship with the undeclared nuclear-armed state of Israel, including violent clashes in the 1948 Arab-Israeli War, the 1967 Six-Day War and the 1973 Yom Kippur War. Despite this violence, though, Egypt never devoted resources to the serious pursuit of nuclear weapons to counter the Israeli arsenal, nor did Israel threaten to use its own against Egypt. It would be ahistorical to assume that Egypt, or indeed other Middle Eastern states, would automatically follow suit were Iran to acquire nuclear weapons. If this logic applies to Egypt it also applies to the less conflict-prone states in the Middle East and elsewhere as well.

The proliferation problem that the expansion of nuclear energy to new states poses to the non-proliferation regime is essentially unchanged from what it has always been: detecting and dealing with rare cases of NPT non-compliance as they arise. It is not about managing the rapid influx of new nuclear-capable states eager for a nuclear weapons capability. Between the unlikelihood of a significant nuclear revival, increasing recognition of the IAEA's worth and need for resources, and the genuine apathy that most states feel toward nuclear weapons, in terms of non-proliferation, nuclear energy's resurgence may not be as alarming as might initially have appeared to be the case.

Justin Alger is a researcher at the Canadian Centre for Treaty Compliance (CCTC) at Carleton University, Ottawa, Canada. He has worked on nuclear energy research for the past four years as a primary researcher on the Nuclear Energy Futures Project and as a part of his graduate studies. He holds a Master's in International Affairs from Carleton University, and an Honours Bachelor's in History from McMaster University.
First published in: Trust & Verify, July-September 2010. VERTIC, Development House, 56–64 Leonard Street, London EC2A 4LT, United Kingdom

About this article

Although this is an interesting article -the reason why we publish it in the first place- we have some remarks with the overall message. The reason that proliferation problems are not as problematic as foreseen ten years ago, is only because of the failure of the nuclear revival, and is no proof for the argument that nuclear power has less proliferation problems than expected.

This article considers problems that come with nuclear power have to be solved without looking at the cause (nuclear power): it is focused at solving the symptoms, not the cause; it sees nuclear power as something inevitable. That is maybe understandable from his point of view (it is 'simply something that exists' and has to be dealt with), but not something the antinuclear power movement will accept.

The last remark we want to make is about the "reality that most states today simply do not want nuclear weapons". Latent proliferation (having the technical know how, the technology and materials) has always been seen as equally problematic as horizontal (more countries) or vertical (more installations, material & technology in same number of countries) proliferation. Horizontal proliferation is only one political decision away from latent proliferation. And the fact that such decisions haven't been made until now, does not mean much for the future. "No demand for nuclear weapons" can change rapidly and an almost autonomous development can reverse that.

To end; it is clear, and it follows also from this article, that nuclear power and the dangers concerned with it, increases global inequality: some countries are allowed to do things others aren't. And IAEA making use of "intelligence information provided by states" will rather increase that problem.
(WISE Amsterdam)

RADWASTE ACTION DAY & VIRTUAL MARCH ON WASHINGTON

Reflecting the global extent of the impact of radioactive waste from industrial scale nuclear energy and weapons production, grassroots activists have joined together in coordinated action to send this message: Stop Making More Radioactive Waste; there are better options for electric power production and conflict resolution. September 29 was chosen because on that day in 1957, a liquid radwaste tank in Russia exploded causing widespread contamination

(717.6093) NIRS - This September 29, day of coordinated action was the first in a string planned for the coming years. The next day of coordinated action is scheduled for April 26, 2011 -25 years since one of the reactors at Chernobyl exploded and burned for 14 days, spreading plumes of radioactivity around the globe.

Radioactive Waste Day Events took place across the US, Canada, in Sweden, Russia, Finland, England, Australia and South Africa.

Virtual March on Washington
Inspired by the actions of September 29, for the April Action Day NIRS is sponsoring an International Virtual March on Washington! No matter where you live in the world, you can take part, and it's easy and fun! Here's how:
1. Download and print one of the signs shown on the website (see below), or make one of your own;
2. Hold your sign in front of you and have your partner or a friend take your photo.
3. Then give the sign to your friend and take a photo of her.
4. Then e-mail both photos (or as many photos of as many friends as you have!) to nirsnet@nirs.org.

NIRS will add every photo they receive into the slideshow (watch it, it's fun) and put together a photo petition to present to the Department of Energy's Blue Ribbon Commission on America's Nuclear

Future in April! Think of it as a virtual march on Washington -a way you can have your say to this Commission that seems far more interested in finding ways to make more lethal radioactive waste than in finding solutions to the waste problem we already have.

Source and contact: NIRS, Mary Olson, PO Box 7586 Suite 300 North, Asheville, NC 28802, United States
Tel: +1 828-242-5621
Mail: maryo@nirs.org,
Web: www.nirs.org/radwaste/actionday/dayhome.html

IN BRIEF

EU: ITER budget 2011 cut. Members of the European Parliament's budget committee on October 4, voted to cut planned funding for the ITER experimental nuclear fusion project in 2011. The budget committee adopted an amendment to cut the ITER budget by 57 million euro to Euro 304.76 million (US$419.77 million) in 2011 in a revision to the EU's research budget. The week before, the parliament's rapporteur on the budget, Polish center-right MEP, Sidonia Jedrzejewska, said it was difficult to find cuts in the research budget because of very tight limits in the long-term budget and the need for proposed increases in areas like entrepreneurship and innovation and other energy-related projects. MEPs agreed to compensate for increases in expenditure in these areas by making equivalent cuts in the ITER budget, based on the assumption that the fusion project, which is running behind schedule, would not need all the funds allocated to it in 2011. This did not go far enough for the Green group, which wants the ITER program scrapped. "The least costly option would be to abandon the project now before the main construction has started at all. All the more so, given the massive doubts as to the commercial viability of nuclear fusion, which even optimistic analysts agree will not be commercially functional before 2050... We are deeply concerned that the Council is planning to throw an additional Eur1.4 billion into the black hole that is the ITER budget in 2012 and 2013," German Green MEP Helga Trupel said.
Platts, 5 October 2010

Canada: 60 million for electricity not produced. The people of Ontario paid Bruce Power nearly Can$60 million in 2009 to not generate electricity for the province. According to the Toronto based CTV news station, a deal between the nuclear generator, a private company, and the Ontario Power Authority (OPA) sets out a guarantee for a certain amount of power to be purchased -- even if it's not needed; the socalled ‘surplus baseload generation’. The OPA agreed to pay Bruce Can$ 48.33 (US$ 47.67 or 34.48 euro) for each megawatt hour of electricity that was not needed. In 2009, demand for electricity was down in Ontario, largely as a result of the recession. This meant Bruce's nuclear reactors weren't operating at full capacity. As a result, the OPA paid Bruce power Can$ 57.5 million for about 1.2 terawatt hours of electricity that was not produced. A terawatt is a million megawatts. An OPA spokesperson said the arrangement is like having a fire station: “they aren't needed all the time, but one must still pay to keep it open”. A Bruce Power spokesperson said the company is simply fulfilling its side of the deal.
CTV Toronto, 21 September 2010

Australia: no NT Government support for Angela Pamela mines. Australia’s Northern Territory Government would not support the establishment of a uranium mine at Angela Pamela, 20km south of Alice Springs, it said 27 September. Paladin Energy Ltd, which holds an exploration licence for the Angela and Pamela uranium deposits with joint-venture partner Cameco Australia, says it is “surprised” by the announcement. Although the project is still at the exploration phase, Paladin says it has already spent “many millions of dollars,” relying on encouragement and positive support from the government. Chief minister Paul Henderson said that the close proximity of the mine to tourist centre Alice Springs “has the very real potential to adversely affect the tourism market and the Alice Springs economy.” According to Nuclear Engineering International, the decision does not mean that the government is against development of uranium mines elsewhere. Ultimately approval for the establishment of a uranium mine will be the responsibility of the Commonwealth Government.
Nuclear Engineering International, 29 September 2010

Kuwait: opposition to nuclear fantasies. A Kuwaiti lawmaker questioned plans by the oil-rich Gulf emirate to build a number of nuclear reactors for power generation and demanded information about the expected costs. In a series of questions to Prime Minister Sheikh Nasser Mohammad al-Ahmad al-Sabah on September 22, the head of parliament's financial and economic affairs panel, Yussef al-Zalzalah, asked if sufficient studies have been made on the issue. He also demanded to know the size of the budget allocated for the project and what has been spent so far. In its drive to develop nuclear energy for peaceful use, particularly to generate electricity, the Gulf state set up Kuwait National Nuclear Energy Committee (KNENEC) in 2009 headed by the prime minister. The emirate has signed memoranda of cooperation with France, the United States, Japan and Russia and, in April, upgraded its deal with France to the level of a full agreement.
KNNEC secretary general Ahmad Bishara said earlier in September that Kuwait will sign a fifth memorandum of cooperation with South Korea, which last year clinched a multi-billion-dollar deal with the neighboring United Arab Emirates. Zalzalah also inquired about press statements that Kuwait planned to build four 1,000 MW reactors by 2022, and if sufficient studies were made, and demanded documents related to the issue. Bishara has said Kuwait expects electricity demand to double in 10 to 15 years from the current 11,000 MW, which would make the country face a serious power shortage. KNNEC is conducting a series of studies on the cost of power generation by nuclear energy, setting up legal frameworks, reviews on potential sites for nuclear reactors and human resources, Bishara said. These studies are expected to be completed before the end of the year, and then the KNNEC will make the decision if Kuwait is to go nuclear, he said.
It sounds that even in a country where absolutely no civil society exits, there is still opposition to nuclear power.
AFP, 23 September 2010

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.

Receiving the WISE/NIRS Nuclear Monitor

US and Canada based readers should contact NIRS for details of how to receive the Nuclear Monitor (address see page 11). Others receive the Nuclear Monitor through WISE Amsterdam.
For individuals and NGOs we ask a minimum annual donation of 100 Euros (50 Euros for the email version). Institutions and industry should contact us for details of subscription prices.

WISE AMSTERDAM/NIRS

ISSN: 1570-4629

Editorial team: Dirk Bannink and Peer de Rijk

With contributions from: WISE Amsterdam, Greenpeace EU Unit, VERTIC, NIRS, IEER, PSR, SNPN and Laka Foundation.

Next issue of the Nuclear Monitor (#718) will be mailed out on October 29, 2010

The “Elfi Gmachl Foundation for a Nuclear-free Future” / PLAGE-Salzburg supports the Nuclear Monitor financially.
See: http://www.plage.cc (not available in English (yet))

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
Tegelviksgatan 40
116 41 Stockholm
Sweden
Tel: +46 8 84 1490
Fax: +46 8 84 5181
Email: info@folkkampanjen.se
Web: www.folkkampanjen.se

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

The NUCLEAR MONITOR
Nuclear Information and Resource Serive/World Information Service on Energy
6930 Carroll Avenue, #340
Takoma Park, MD 20912