

Plutonium *Investigation*

SWEDEN

ON THE WEB!
<http://www.pu-investigation.org>

WISE-Paris

31-33, rue de la Colonie

F-75013 Paris

Telephone +33 1 45 65 47 93

Fax +33 1 45 80 48 58

e-mail: WISE-Paris@globenet.org

<http://www.pu-investigation.org>

EDITORIAL

Open Letter (excerpt) to Brigitta Dahl, Speaker of the Swedish Parliament

Paris, 7 July 1999

Honorable Madame Speaker, Dear Brigitta Dahl,

On 8 December 1997, I told you, over lunch, that the Swedish utility OKG had gone ahead with the separation of several hundred kilograms of plutonium at the UK Sellafield site. You were stunned. (...)

In the 1980s you were instrumental in putting together Sweden's spent fuel management policy based on direct storage rather than the development of a plutonium economy. When I expressed my concern to you over the OKG plan to return the plutonium in the form of MOX fuel and to use it in Swedish reactors, you told me that while the plutonium separation had happened outside the country - in a way beyond Swedish direct control - this would be quite different if OKG intended to bring the fuel back to the country. You made it very clear that you intended to make your voice being heard on the issue.

Now OKG has made a formal application into MOX fuel use at its reactor site. (...) In parallel, SVAFO AB submitted an application for the reprocessing, also at Sellafield, of 5 tons of spent fuel from the R1 reactor.

(...) A few days ago SKI made a positive recommendation to the government concerning both of the projects. (...)

The Swedish government's decision to direct the Swedish plutonium to the nuclear waste stream would be a strong signal to abandon further plutonium separation and use - where ever. (...)

Thank you for your attention to this worthy problem. I'm looking forward to your reply.

With my very best regards,

Mycale Schneider

Note to readers of *Plutonium Investigation*: You can find the full text of the letter in the Our News section of www.pu-investigation.org

SWEDEN Secret Plutonium Past, Controversial Disposal Future

Sweden is the only country where not one, but two, governments have lost elections because of unpopular policies put to the voters on nuclear power. Although these elections were some twenty years ago, the political fallout from them still haunts nuclear policy in the country as it attempts to combine a political culture based on open decision-making with complex technological problems. And the question of what to do with the plutonium created in Sweden's reactors - store it, sell it, swap it, loan it, burn or bury it - has been at the center of

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the long-running debate over the implications of operating a nuclear program in the country.

The other key characteristic about Sweden's nuclear program is that the policy and lawmakers only embarked on the significant expansion of reactor construction after seeking social consensus over the strategy to deal with the radioactive waste arisings, including the destiny of the plutonium created in the spent fuel. In virtually all other countries the waste management strategies have been developed well *after* the nuclear programs were commissioned. However despite the forward planning Sweden has found it necessary to change the priorities initially presented to the public concerning waste - and plutonium - as political interests backing the continuation of nuclear power have made a comeback. The debate continues, but following Chernobyl and the emergence of climate change induced by global warming, it has changed its character from the early confrontations of the 1970s and early 1980s.

Nuclear Capacities

Today Sweden has 12 nuclear reactor units based at four sites in the southern part of the country. There is also a research/plutonium production reactor built underground at Ägesta, a Stockholm suburb, initially constructed to support Sweden's early nuclear weapons program. A further nuclear plant was built at Marviken on the east coast, but after a change of policy in 1970 it was converted to burn oil instead of uranium. The current capacity of the 12 reactors - 2 units at Barsebäck, 4 at Ringhals all on the west coast, and 3 each at Forsmark and Oskarshamn on the Baltic coast - is about 10,440 MW. In 1998 the nuclear program generated a record 70.47 TWh, up 5.3 % over the previous year, providing 45.75 % of the country's power output. Sweden exports electricity via the Nordic Nord Pool to Finland and Norway, and also to Denmark and Germany.

Sweden originally had plans to reprocess the spent fuel from its reactors, but has generally favored alternative storage and direct

disposal since the middle of the 1980s. The first commercial scale reactor at Oskarshamn-1 was ordered in 1965, and commissioned in 1972. Five further reactors were ordered in the 1960s: Ringhals-1 & 2 in 1968, and Forsmark-2, Oskarshamn-2 and Barsebäck-1 in 1969. The last reactors, Oskarshamn-3 and Forsmark-3, came on line in 1985. The reactors are operated by a mixture of one public utility, Vattenfall AB, and private companies Sydkraft AB (Sydsvenska värmekraft AB), FKA (Forsmarks Kraftgrupp AB) and OKG (Oskarshamns Kraftgrupp AB) (see box for details of ownership).

Nuclear regulation in Sweden is both multi-layered and relatively open. The lead agency is SKI, with around 110 employees, which is an authority within the Ministry of Environment. SKI's board is appointed by the government and consists of politicians and experts, and is chaired by its Director General, currently Lars Högberg. Fees from the nuclear power industry finance SKI's operations. As with other Swedish nuclear authorities, SKI may also request funds from the government and parliament. SKI has three advisory committees, comprising: the Reactor Safety Committee, the Safeguards Committee and the Research Committee. The other important nuclear regulator is SSI – the State Radiation Protection Institute (Statens Strålskyddsinstitut).

In an inter-political party agreement concluded in December 1997 it was decided that the final date 2010 for closure of all reactors - a deadline which was defined after a national referendum in 1980 - would no longer be applied, in exchange for government starting the phase-out immediately. This was then adopted in the form of the Law on Nuclear Phase-Out (*lafgen om kärnkraftsavveckling*) by the Parliament in 1998. Essentially, the government now considers that technical life of a power reactor is 40 years, as opposed to the 25 years assumed at the time of the original phase-out legislation. The Law also gives the government the right to order an "early" shut-down of reactors if that is necessary for energy restructuring

(energiomställningen), and allows the government to take into consideration the geographic location of the reactors in question.

The Law on Nuclear Phase-Out, agreed in Parliament on 10 June 1997, prepared the ground for the government order of 5 February 1998 to shut down Barsebäck-1, a decision which has not yet been fulfilled, since the owners tied up the government in a complicated court case. Sydkraft, owner of Barsebäck via BKG, filed a complaint against the government decision and did win in the first instance. On 16 June 1999, the Supreme Administrative Court pronounced its judgement concerning the nuclear power station at Barsebäck. The Court ruling means, in the words of the Ministry of Industry, that the government's shut-down decision "stands firm". However, the reactor needs not to be closed before the end of November 1999. Björn Rosengren, Minister for Industry, declared in a press release: "It's gratifying that judicial clarity has now been created concerning the correctness of the Government's decision to close the first reactor at Barsebäck. This means that the conversion of the energy system can now be further pursued in accordance with the ambition of a majority of the Riksdag".

The Social Democrat Party, currently in government in alliance with the Greens in Parliament following the election on 20 September 1998 - in which the party won its smallest ever percentage of the popular vote (38 %) - has stuck with its pre-electoral promise to move towards an early shut-down of the nuclear plant program.

Plutonium Proliferation and Non-Proliferation

Contrary to popular perception, the Swedish nuclear program started - as in the nuclear weapons powers - with a military nuclear weapons program, just after the second world war. Although an apparently civil Swedish atomic energy company (AB Atomenergi) was created in 1947, it was the creation of the weapons research and development effort in 1949 that drove the program

Who Owns Whom ?

Vattenfall and Sydkraft are utilities, who own a number of different electricity producing stations, of which four are nuclear: Oskarshamn, Ringhals, Barsebäck and Forsmark. Sydkraft is a privately owned company, the largest shareholders are: PreussenElektra (Germany) 27.7 %, Statkraft (Norway) 21 %, Malmo City (Sweden) 18.9 %. The rest is made up of a number of Swedish municipalities and funds.

Vattenfall owns 100% of Ringhals. Forsmark is owned by Forsmark Kraft Group (FKG). FKG is in turn owned to 74.5 % by Vattenfall. Barsebäck is owned by Barsebäck Kraft Grupp (BKG), BKG is owned 100 % by Sydkraft. Oskarshamn is owned by OKG, which is owned 54.5 % by Sydkraft.

One interesting point about the Norwegian part ownership of Sydkraft is that the plutonium in the Barsebäck spent fuel is part owned by entities within the European Union -and covered fully by Euratom- and part owned by a commercial entity outside Euratom.

forward. Because of the national security implications of the military program, Sweden decided to make its nuclear materials supplies independent of foreign suppliers, and so a uranium mine was opened at Ranstad, near the town of Skövde in central southern Sweden.

The military origins are now publicly known in Sweden; indeed SKI provides details on its web site. But it was a shock to many when a technical paper was published in the journal "Ny Teknik" (New Technology) on 25 April 1985 setting out in complex detail the inside history of the military program. Its author, Christer Larsson, caused nearly as great an upset in the Swedish establishment as did the Chernobyl accident that happened exactly a year later. The then Swedish prime

minister, Olaf Palme, ordered a Government investigation into the revelations, which was a little curious as in 1958 he had been the young secretary of the secret committee that decided that the research into developing the Swedish atom bomb, started in earnest in 1953, should continue.

A research reactor, R1, was started on 13 July 1954 in Stockholm; this was followed by another reactor, R2 with a capacity of 50 MW being developed at the research center at Studsvik, south of Stockholm.

Research was continued by AB Atomenergi - later re-named Studsvik Energiteknik AB - between 1960 to 1972, even though the Swedish Parliament (Riksdag) took a definitive political decision in 1968 not to pursue the weapons work, once the international nuclear Non Proliferation Treaty (NPT) had been negotiated at the United Nations. Military experiments involving 10 underground 'implosion tests' using around 10 grams of plutonium were conducted up to 1972 in the Ursvik region on the Baltic coast.

The centerpiece of the program however was the 65 MW Ågesta heavy water reactor, built some 45 meters underground in a Stockholm suburb. Named R3, it was completed in 1958, and producing plutonium and generating district heat as a by product, but which also provided a public rationale for the plant. The R3 was designed to generate about 20-23 kg of plutonium a year. According to SKI it has generated only 24.4 kg plutonium of which 2.8 kg is stored in Studsvik and the rest is under Euratom safeguards in Mol in Belgium. In 1957 opinion polls demonstrate popular support for Swedish nuclear weapons, but this began to wane by 1959. Even so R3 was used for a decade to support the weapons program, even the United States privately made clear it was concerned about Sweden's attempts to do it alone in weapons development. There is approximately 49 kg of plutonium-contaminated waste from R3 in the CLAB store.

Professor Hannés Alfén, the Nobel Prize-winning physicist who had helped design R3, was amongst its first and most prominent critics on safety grounds. He was influential in

pressing for its closure which came in 1974, although it was not decommissioned, but de facto kept in mothballs.

It is thought probable that radioactive wastes from the military research reactors, including R1 -called Baptise- was dumped in the Baltic from 1959, although this was halted when international agreements prohibiting the sea disposal of solid radioactive wastes were completed in 1983.

Today the Swedish military nuclear program is moribund, as Sweden has taken a global lead in opposing nuclear weapons. Thus amongst SKI's primary tasks listed in its mission statement are: "Ensuring that the Swedish government, in co-operation with the competent international safeguards agencies, is provided with adequate information on and control over nuclear substances and nuclear technology which are held, used and traded and which come under Swedish jurisdiction. This must be done to ensure that such substances or technology will not be used in any way contrary to Swedish legislation and Sweden's international obligations in the area of non-proliferation."

The History of Sweden's Waste Management Strategy

The current complex but coherent nuclear waste management strategy in Sweden has taken a tortuous road to reach what it is today. Some critics of the nuclear program, such as the national people's movement against nuclear power and weapons, Folkkampajen mot kärnkraft och kärnvapen (FMKK), have even argued that military motives delayed the serious recognition of the waste problem for two decades. The key matter today is whether Sweden will define its spent fuel and already reprocessed plutonium as part of its waste management responsibility, or whether it will pursue a strategy that defines plutonium separated out from spent fuel as an energy stock to be used in MOX fuel.

In the late 1960s, Sweden was planning to build its own reprocessing plant as part of its initial strategy of an indigenous nuclear fuel cycle. The favored location was near Samås, but this was abandoned in 1970 when the

municipality used its right of veto to develop the plant, in the first Swedish public protest against nuclear energy.

Sweden thereafter turned to using foreign reprocessing plants in France and the UK to take the spent fuel discharged from the six reactors which were under construction by the early 1970s.

Two events in the early 1970s had a significant impact on the course of the nuclear debate that led to Sweden's waste management strategy: in 1972 Stockholm hosted the first United Nations Environment Conference; and in 1973 the first global oil crisis. In the midst of the oil crisis in 1973, the Swedish parliament passed a resolution that called for a moratorium on further nuclear construction until the full waste management implications had been thoroughly examined. This set off a political controversy that was the most extreme crisis of governance in Sweden's history, and led to the fall of the Social Democratic government, which had been in power since 1932, the longest continued period of any democratically elected party in Europe.

Part of the process set off by the 1973 Riksdag moratorium was to create a review committee, AKA-Utredningen, which was charged with evaluating strategies for the handling of high level nuclear waste, including spent fuel. Whilst the review committee was still deliberating, the Social Democrats pushed through legislation in 1975 the Energy Act that gave the go ahead for an expanded reactor program aiming for 13 reactors to be operating by 1985. A year later the Social democrats lost power to the anti-nuclear Center Party, which established the so-called "Stipulation Act" (Villkorslagen) in 1977. This Act embodied a compromise, that stipulated the restricted conditions under which power companies would be permitted to operate reactors. It put the long term fate of spent fuel arisings at the center of the bargain. The Act stated that power utilities would only be granted an operating license if they had established a contract for the reprocessing of spent fuel, and could demonstrate how and where the final disposal of high acti-

vity waste would be handled; and could further demonstrate how unprocessed spent fuel would be stored safely.

To put these stipulations into effect the nuclear industry created a nuclear fuel safety project, KBS (Kärnbränslesäkerhet), which was built on the earlier AKA review committee. The Project produced its five volume report, KBS-1, at the end of 1977, dealing with the handling of spent fuel and the vitrified high activity reprocessing waste.

Uniquely KBS-1 which had taken some 400 scientists to prepare, was then further evaluated by 24 foreign organisations and 25 national organisations, as Sweden established an open decision-making culture matched nowhere else except in the United States. Only three endorsed it: the International Atomic Energy Agency, plus German and Finnish geologists.

Amongst the recommendations in KBS-1 were that plutonium separated from spent fuel in reprocessing should be deemed to be a valuable fuel resource and should be returned as MOX or sold to the reprocessing country, and recycled in breeder reactor fuel. (Small quantities of plutonium had already been recycled in experimental MOX fuel and burned in Swedish reactors by this point). A contract had already been signed with the French reprocessing company, COGEMA, to handle Swedish spent fuel, which was controversial as France had refused at this time to sign up to the NPT. Another contract with BNFL at Sellafield in the UK had been signed by OKG as early as 1969 for the reprocessing of about 140 tonnes of spent fuel.

The Prime Minister's acceptance of the KBS-1 provisions not only angered the now strong anti-nuclear factions, but also his own Center Party's members. The dispute led to his resignation, and the governmental coalition with the Liberal Party dissolving. A Liberal minority administration took over. For the second time in two years Sweden had lost a government over the increasingly controversial nuclear energy issue.

But the KBS process continued, with a second report, KBS-2, released in September

1978, setting out detailed plans for the direct disposal of spent fuel without reprocessing, with the innovative aspect being the proposed use of copper canisters to encapsulate irradiated fuel rods for around 40 years while the short-lived isotopes decayed. This proposal led to the decision to build the CLAB (Centralt mellanlager för använt bränsle) interim storage facility, opened in April 1986 at a site near the Oskarshamn reactors. All Swedish radioactive waste programs have been subject to review by IAEA expert panels since 1978.

The KBS proposals were endorsed by the government in June 1979. Then, following another election in September 1979, a second three-party government led by the Center Party again took power. It had already been agreed by all five main parties in Sweden that a national referendum would have to be held on the future of nuclear power in the country before the 1979 election. So the debate continued up to the vote on 23 March 1980, almost a year to the day after the serious nuclear accident at Three Mile Island in the United States. The first anniversary played a part in the people's perception of the importance of the decision to be taken.

The referendum was - as suited the Swedish decision-making approach - a complicated affair, offering nominally three choices to the people. In short, the two options advocating completion of the reactor construction program outweighed the single option to phase out the currently operating program within 10 years by 58 % to 38.6 %. Despite its apparently supportive result for nuclear power, in fact the referendum spelled the beginning of the end for the nuclear program in Sweden, as within a few months the Riksdag passed legislation to phase out the existing reactors by the end of their projected operational lives, calculated as by the year 2010 for the newest reactors. The referendum profoundly altered the nuclear industry's expansion plans. It also led to the acceleration of the development of alternatives to reprocessing. In 1981 another Act was passed in Parliament on the "Financing of the future costs for spent fuel", giving responsibility for the payment of the costs for managing radioactive wastes to the power companies.

Two years later the final report of the KBS process, KBS-3 on the Final Storage of Spent Fuel, was published in May 1983. Its 450 pages were supported by 140 background reports and references to a further 250 technical articles. It is regarded as the 'reference' plan for dealing with spent fuel in repository built in deep bedrock. The Äspö hard rock research laboratory developed in 1990 near CLAB at a projected cost of \$ 235 million - and since 1993 part of a collaborative arrangement with Canada, Finland, France, Japan UK and USA - as the main disposal option deriving from KBS-3, is expected to produce results by the end of 2000 to allow political decisions for the final steps on deep disposal to be taken.

In 1984 another Act on Nuclear Activities (see box) consolidated the strategy, which, because of the then determined length of reactor operation up to the final phase out in 2010, allowed an accurate calculation of the amount of spent fuel that will have to be dealt with by the plan. A quantity of 7,800 tonnes of spent fuel was estimated by SKB at the time. However as pointed out earlier this fixed close down date has been superceded. This change of policy no longer means that an accurate calculation can be made of the total final quantity of spent fuel arising from the operation of the commercial reactor program, which adds extra uncertainty about the size of final repository that will be required for emplacement of the fuel.

On 12 December 1985, the new Act led to the repealing of the 1977 Stipulation Act, and with its demise came the removal of the requirement on five reactors - Barsebäck-2, Ringhals-2 & 3 and Forsmark-1 & 2 - to reprocess their fuel. This led to new pressure to extend the storage capacity of the CLAB, which when designed in 1979 was originally planned to cope with 3,000 tonnes of spent fuel; the capacity has been extended to 8,000 tonnes. Despite nuclear opponents welcoming the withdrawal from reprocessing commitments, they have expressed safety concerns over CLAB, arguing that the interim store might be abandoned by future genera-

tions, with the concomitant consequences if essential maintenance is not kept up. Decay heat released would destabilise the atmosphere, critics fear, and the oxidation of the stricken fuel would lead to rapid degradation and to an environmental catastrophe. Another criticism of the CLAB has been the worry that over time the reactor grade plutonium would change to weapons useable Pu-239, because the Pu-240 decays faster than the Pu-239, described by critics as the 'ripening of plutonium'.

Criticisms of the site search for the final disposal repository for spent fuel, SFL, have emerged over the past few years from a number of communities which perceive themselves threatened by the prospects of such a disposal facility being constructed in their area. In 1995 small communities such as Storuman and closeby Malaa in Swedish Lapland opposed efforts by the Swedish nuclear fuel and waste management company, SKB, (Svensk Kärnbränslehantering AB) to investigate the geologic suitability of their locality for the SFL. Many other communities opposed earlier efforts by SKB to investigate their regions during an earlier site suitability search carried out from the very south to the extreme north over 1977-1983.

Nuclear Imports and Exports

Sweden has sought to use foreign reproprocessors to deal with its spent fuel burden having decided to abandon plans for an indigenous closed nuclear fuel management strategy. Contracts were placed in 1969 with BNFL in the UK and on 19 April 1977 and 16 March 1978 with COGEMA in France, for the reprocessing of 140 tonnes of spent fuel at the UK plant, and around 677 (57t + 620 t) tonnes at the French facility. The reprocessing of the Oskarshamn fuel was completed in autumn 1997, and has left 833 kg of plutonium in store at Sellafield, which the OKG company wants to convert to MOX fuel - to be loaded into its power plant after 2003. The fact that the reprocessing had been actually carried out and that Sweden - though having defined an outspoken anti-plutonium policy - was now owning a substantial quantity of separated plutonium abroad came as a total surprise

to Swedish parliamentarians and the public. *Plutonium Investigation's* chief editor Mycle Schneider disclosed the fact during his speech at the Swedish Parliament when he received the Right Livelihood Award (Alternative Nobel Prize) in December 1997. A formal license application to use MOX fuel filed by OKG is currently being studied by Government. According to an OKG spokesperson interviewed by *Plutonium Investigation* at the end of June 1999, no decision is expected before autumn 1999.

Extracts of *The Nuclear Activities Act (1984:3)*

Section 5 a

No license to build a nuclear power reactor may be issued.

Final disposal in [Sweden] of spent nuclear fuel or nuclear waste from a nuclear plant or other nuclear activities in another country is prohibited without a license. The same applies to storage which occurs pending final disposal (intermediate storage). A license may be granted only if particular reasons exist and the implementation of the programme referred to in Section 12 is not thereby impeded.

Section 12

The holder of a license to own or operate a nuclear power reactor shall, in consultation with other reactor owners, draw up or have drawn up a program for the all-round research and development work and the other measures specified in Section 10, paragraphs 2 and 3, and Section 11. The program shall contain both an overview of all measures that may be required and details of measures intended to be taken within a period of at least six years. Every three years, the program shall be sent to the Government or the authority appointed by the Government, in order to be examined and evaluated. In conjunction with this examination and evaluation, any requisite conditions may be imposed with respect to the continued research and development work.

After reprocessing was dropped as national policy, in the early 1980s the other power companies which contracted their fuel to La Hague have done deals to convert their reprocessing contracts to storage. They negotiated for Japanese companies to take over 25% of their contracted capacity, and have swapped some of the remaining resultant capacity freed up at the French reprocessor with eight German companies. On 26 June 1986, the Swedish Government gave a permit for the 57 tonnes of spent fuel already sent to La Hague to be traded for 23.6 tonnes of difficult-to-process German spent MOX fuel. On 7 July 1986 a contract was signed between the Swedish and German authorities resulting in the German MOX fuel being transported between autumn 1987 and the middle of 1988 to Sweden for emplacement in CLAB. SKI says that the plutonium content was in exact the same quantities as the Swedish origin fuel transferred to German ownership at La Hague. [In strict legal terms SKI insists that no Swedish-owned plutonium has been reprocessed at La Hague, although Swedish-origin fuel probably has under German title.] In October 1992 a new law was passed to prohibit any further final storage of foreign spent fuel in Sweden. The total current quantity of Swedish plutonium in all forms under safeguards is 38,266 kg according to information supplied by SKI to *Plutonium Investigation*.

The official policy on radioactive waste imports was stated by the then Energy minister, Birgitta Dahl, in December 1986. She said that the basic principle Sweden promoted was that every nation should take care of its own wastes. "This means amongst other things, that there will not be any storage of spent foreign fuel or nuclear waste in Sweden." But even before the minister made this policy statement, some foreign nuclear wastes had been imported for storage at the Ranstad uranium mine, even though it was not licensed to do so. In 1987-88, the Transnuklear/Nukem affair involving the circumvention of nuclear handling and transport regulations in Belgium, France and Germany, also revealed that some German origin nuclear waste had been sent to the Studsvik research plant contrary to official policy. Worse still, the allegations suggested that bribes had been offered to and accepted by

Studsvik officials to make the deal possible. Following an investigation in 1988, SKI reported that some minor infringements had been discovered, but otherwise gave a positive account of nuclear transfers. Studsvik AB chairman, Kjell Hakansson reportedly said that the revelations had come as "an unpleasant surprise to us."

New Proposals For Reprocessing

The operators of Sellafield, BNFL, have been criticized by both Nordic politicians and the international environmental movement for promoting plans for Sweden to send further spent fuel to the UK for treatment. In December 1998 the Swedish environment minister called for an end to releases of radioactive substances into the sea in support of the international agreement completed at Sintra in Portugal, in July 1998, as part of the OSPAR commission on discharges to the marine environment. Based on leaked official documents, Greenpeace Sweden revealed in March 1999 the extent of the negotiations between UK and Swedish authorities for new reprocessing contracts - to cover research reactor fuel from R1 - which if implemented would undermine the official policy of not separating out plutonium from Swedish spent fuel.

In December 1998 SKI received an application from SVAFO AB - a daughter company of all the Swedish nuclear power operators - for a license to export 4.8 tons of spent nuclear fuel from R1 to the UK. Wastes from the reprocessing of the fuel should be sent back to Sweden. BNFL has offered to exchange small amounts of additional high level waste for larger volumes of intermediate and low level wastes ("Curie-Swap"). The Riksdag has on a number of occasions confirmed that Swedish nuclear waste management must be directed toward storage, rather than reprocessing. It has also been clearly stated that management of Swedish nuclear waste must take place within the nation's boundaries. A decision by Government is expected to be taken by autumn 1999.



Who's Who ? In Sweden

STATE and INDUSTRY

SKB

Swedish Nuclear Fuel and Waste Management Company (Svensk Kärnbränslehantering AB). According to the Swedish law, power companies which operate nuclear power plants are responsible for waste management. These companies jointly created SKB, which is in charge of the management and disposal of spent fuel and other radioactive waste coming from the nuclear power plants, as well as for the radioactive waste produced by hospitals and research institutes.

P.O. BOX 5864, S-10240 STOCKHOLM
TEL: +46 8 459 8400 - FAX: +46 8 661 5719
e-mail: info@skb.se
http://www.skb.se/eng/detta_ar/default.htm

SKI

The Swedish Nuclear Power Inspectorate (Statens Kärnkraftinspektion) depends on the Ministry for the Environment and Natural Resources and is in charge of the technical aspects concerning nuclear safety, as well as of financing and research in the nuclear field.

KLARABERGSVLADUKTEN 90, S-10658, STOCKHOLM
TEL: +46 8 698 8400 - FAX: +46 8 661 9086
e-mail: ski@ski.se
<http://www.ski.se/engelska/ski/index.htm>

SSI

The National Institute for Radiation Protection (Statens Strålskyddsinstitut) depends on the Ministry for the Environment and Natural Resources and is in charge of coordinating the policy regarding environmental and public radiation protection. SSI is also in charge of the specific regulations regarding radiological protection.

BOX 12180, S-11225 STOCKHOLM
TEL: +46 8 728 7100 - FAX: +46 8 729 7108
<http://www.ssi.se/english/index.html>

Studsvik AB-Reactor and Waste Research Center

S-611 82 studsvik, Nyköping
TEL: +46 15522 1000 - FAX: +46 155263000
e-mail: studsvik@studsvik.se
<http://www.studsvik.se/>

ABB ATOM AB-Nuclear fuel fabrication and research company

MIMER STORA GATAN 3, S-72163 VÄSTERÅS
TEL: +46 21347000 - FAX: +46 21189471
<http://www.abb.se/atom/home2.htm>

Sydskraft / Barsebäck Kraft AB

Barsebäck is the operator of the Barsebäck nuclear power station (Sydkraft is the owner of the power plant).
BOX 527, S-24625 LODDEKOPINGE
TEL: +46 4672 4000 - FAX: +46 4677 5793
<http://www.sydskraft.se/>

Forsmarks Kraftgrupp AB

Is the operator of the Forsmark nuclear power station.

JAMTLANDSGATAN 99, S-16287 STOCKHOLM
TEL: +46 8 739 5000 - FAX: +46 8 37 8804

OKG Aktiebolag

Is the operator of the Oskarshamn nuclear power station.
S-57283 OSKARSHAMN, OSKA SIMPEVARP
TEL: +46 49 778 6000 - FAX: +46 49 178 6090

Vattenfall AB

Is the operator of the Ringhals nuclear power plant.
JAMTLANDSGATAN 99, S-16287 STOCKHOLM
TEL: +46 8 739 5000 - FAX: +46 8 37 8804
<http://www.vattenfall.se/webb99/international/index.htm>

OPPOSITION ACTIVITIES and CONTACT ADDRESSES

FMKK

The Swedish Anti-Nuclear Movement (Folkkampanjen mot Kärnkraft-Kärnvapen) is an activist people's organisation created at the time where the referendum about the phase-out of nuclear power in Sweden took place. It has worked since then to make the government and the different authorities enforce the choice made by the Swedish citizens by edicting laws and programs in order to respect the phase-out. Whereas FMKK officially still has several thousand members, currently only a small core group is active.

PO BOX 9152, S-10272 STOCKHOLM
TEL: +46 8 841490 - FAX: +46 8 84 5181
e-mail: info@folkkampanjen.se
<http://www.folkkampanjen.se/engfront.html>

Greenpeace Nordic-Stockholm

DIMA LITVINOV
HÖKENS GATA 2, BOX 15164, S-10465 STOCKHOLM
TEL: +46 8 702 7070 - FAX: +46 8 694 9013
e-mail: dima@nordic.greenpeace.org
<http://www.greenpeace.se/>

Friends of the Earth Sweden

KLAUS PONTVIK
BOX 7048, S-40231 GÖTEBORG
TEL: +46 31 12 1808 - FAX: +46 31 12 1817
<http://www.mjv.se/>

Ingeborg Kleinhans

[activist working mainly on plutonium issues]
VÄSTERMALMSGATAN 10, S-724 61 VÄSTERÅS
TEL: + 46 2155 546
e-mail: i.kleinhans@swipnet.se

Dr Nils-Axel Möerner

[geologist-critic of CLAB]
Department of Paleogeophysics and Geodynamics,
University of Stockholm.
TEL: +46 8 164 725

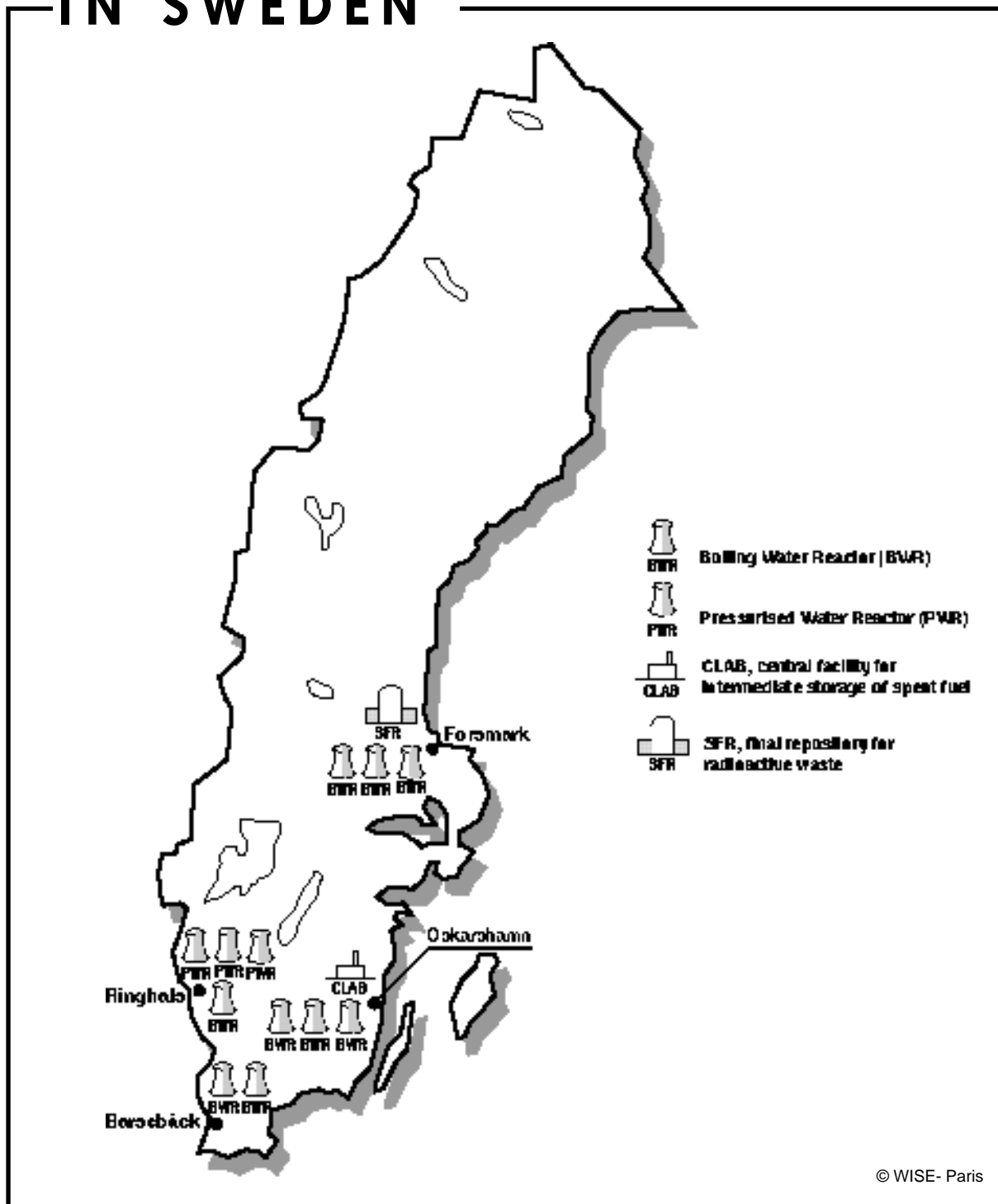
Professor Steffan Westerlund

[Critic of SFR]
UNIVERSITY OF UPPSALA
BOX 256, S-75105 UPPSALA
TEL: +46 18 471 0000

Barseback Offensive 99

MILJÖBIBLIOTHEKET, BOX 1092, S-22101 LUND
TEL & FAX: +46 46 122 2444
e-mail: barseback@hotmail.com

Plutonium IN SWEDEN



12 OPERATING NUCLEAR POWER PLANTS

- 9 Boiling Water Reactors
- 3 Pressurized Water Reactors

1 SITE FOR INTERMEDIATE STORAGE OF SPENT FUEL

- Oskarshamn

1 SITE FOR FINAL REPOSITORY FOR RADIOACTIVE WASTE

- Forsmark

FIGURES OF THE MONTH

WISE-Paris has researched the quantity of plutonium fabricated into MOX fuel and loaded into French light water reactors. In total 25.7 tons of plutonium were fabricated into 1,104 MOX assemblies and loaded into Electricité de France (EDF) reactors as of June 1999. Currently 17 reactors (only 900 MW units) are loaded with a maximum of 30 % of MOX in the core.

In parallel the stockpile of French plutonium continues to increase year after year and has reached 38.7 tons at the end of 1997. At the same time an additional 33.6 tons of foreign plutonium was stored in France. The total quantity of non irradiated plutonium on the shelves in France increased from 72.3 tons, as declared by the French government to the International Atomic Energy Agency (IAEA), to around 80 tons at the end of 1998. As of the end of June 1999, the official figure for 1998 had still not been published.

QUANTITIES OF PLUTONIUM FABRICATED INTO FRENCH MOX FUEL

(in numbers of fuel assemblies and in metric tons)

Year	Number of assemblies		Plutonium content (metric tons)	
	Per year	Cumulated	Per year	Cumulated
1982*	36	36	0.7	0.7
1987	16	52	0.3	1.1
1988	32	84	0.7	1.7
1989	48	132	1.0	2.7
1990	56	188	1.2	4.0
1991	64	252	1.4	5.4
1992	64	316	1.4	6.8
1993	56	372	1.3	8.1
1994	88	460	2.0	10.1
1995**	72	532	1.7	11.8
1996	72	604	1.8	13.5
1997	176	780	4.3	17.8
1998	228	1008	5.6	23.4
1999 (June)	96	1104	2.3	25.7

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Sources: COGEMA, EDF, WISE-Paris

*fabricated in Germany

**including 16 assemblies fabricated in Belgium

WORDS OF THE MONTH

"A sound energy policy and a sound environmental policy calls for utilisation of plutonium in nuclear power reactors."

Opening line of the paper by H.S. Kamath and colleagues at the Bhabha Atomic Research Center in India to the International Symposium on MOX Fuel Cycle Technologies, held at IAEA in Vienna, 17-21 May 1999

"There are some organisations for which killing nuclear power is one of their 'raison d'être'. Being the most nuclear company (...), COGEMA is their first target".

Jean Syrota, CEO of COGEMA in an interview with La Tribune (25 June 1999).

After more than ten years at the head of "the target", Jean Syrota, god-father of the powerful elitist Corps des Mines, has been dropped by the politicians. He has been replaced by Anne Lauvergeon, nominated by Prime Minister Lionel Jospin on June 23, 1999. Being replaced by a 39 year old woman at the key position of the nuclear industry is interpreted as a slap in the face of Syrota. (Note for insiders: even if she acceded to the Corps des Mines, she has graduated of the Ecole Normale Supérieure rather than the top graded Ecole Polytechnique as most of the "mineurs"). COGEMA officials have been under increasing fire since January 1999 when the La Hague managers tolerated a violent demonstration against the leading Green Party candidate at the European elections Dany Cohn-Bendit.

Greenpeace Activist Victim of Police Violence

Greenpeace activist Laurent Bonnemains from Cherbourg, the city close to the La Hague reprocessing plant in French Normandy, was certified unfit for work by his medical doctor for at least 60 days after he was violently attacked by national police following a peaceful action by the environmental group. In May 1999, Greenpeace divers managed to install pumping equipment into the discharge pipe of Europe's largest source of radioactive pollution. Several thousand liters of contaminated water were pumped into special containers on board of a purpose equipped ship. When Greenpeace had unloaded one of the containers onto a truck, the police intervened and prevented

the truck from moving. A group of gendarmes seized Mr. Bonnemains after he had climbed down a crane and held him down while one of them brutally and clearly on purpose twisted his thumb. As a consequence Mr. Bonnemains had the ligaments ruptured, had to undergo surgery and stayed for one week in hospital. He filed a complaint with the public prosecutor. Greenpeace France's nuclear campaigner Jean-Luc Thierry declared: "Once again it is those who try to attract attention to pollution who are criminalised and become victims of violence." He also assures that Greenpeace will support any medical and legal costs involved to shed the light on this "intolerable police misconduct".

WORTH READING



Mike Sadnicki, Fred Barker, Gordon MacKeron, "THORP: The Case for Contract Renegotiation" commissioned by Friends of the Earth, June 1999, 145 p., £ 10

This will be a tough nut to crack for the plutonium industry. The report the three well known authors examines the case by for renegotiating the contracts

between the British reprocessing company BNFL for its THORP plant, and German and Japanese utilities and adopting an alternative approach to spent fuel management based on interim storage and direct disposal. As Patrick Green, Friends of the Earth's Senior Energy, Nuclear and Climate Campaigner, pointed out: "FOE's purpose in commissioning the report was not to simply repeat the environmental case against reprocessing. Instead, it was to critically assess whether these contractual commitments are, on economic or environmental grounds, still worth fulfilling."

The results show considerable future costs savings arising from the ending of reprocessing by the end of 1999: ranging from

- £440 million to £526 million for German contracts and
- £209 million to £571 million for Japanese contracts.

Fresh fuel for the debate over the phase-out of spent fuel reprocessing.

FOE, 26-28 Underwood Street - London N1 7JQ
Tel: + 44-171 490 1555 - Fax: + 44-171 490 0881
E-mail: info@foe.co.uk

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- "La France Nucléaire 1997", Mary Byrd Davis, WISE-Paris, 256 pages; 120 FRF + 25 FRF for postage
- "Comprehensive Impact Assessment of the Use of MOX Fuel in Light Water Reactors", Jinzaburo Takagi, et al., CNIC, Tokyo, 335 pages; 400 FRF (NGOs 160 FRF) + 60 FRF postage + VAT for Europe (contact CNIC for US and Asia, fax: 81-3-53 30 95 30).

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